HAWAIIAN MONK SEALS: LEARNING GUIDE

Lesson plans and activities created for your classroom

Best suited for: Grades 6-8

RELATED NGSS/OCEAN LITERACY BENCHMARKS

- 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- OL5: The ocean supports a great diversity of life and organisms.
- OL6: The oceans and humans are inextricably connected.

BACKGROUND & OVERVIEW

The endangered Hawaiian monk seal is the rarest seal in the United States and face a number of challenges to their survival. Their population hovers around 1,400 individuals. This learning guide will reinforce concepts related to species introduction, diet, reproduction, habitat, threats, and solutions. It is designed for grades 4-7 but can be adapted across the elementary and middle school level by the instructor.

As an instructor, this guide can be used to supplement the lesson plan found on our YouTube channel (15 minute interactive video) or your own. You can choose which activities to use. All activities can be modified to support lesson delivery on topics such as: ocean conservation, climate change, marine debris pollution, marine mammals as a whole, and ecosystem health.

OBJECTIVES

1. Familiarize students with Hawaiian monk seal strandings, HMARs work, and how to determine cause of death
2. Introduce threats to Hawaiian monk seals and brainstorm solutions
3. Discover how humans of all ages can support a threatened species

STUDENT UNDERSTANDING

1. I have a basic understanding of the endangered Hawaiian monk seal, including their population status, the tools used by professionals to identify them, and natural processes they experience.
2. I understand how Hawaiian monk seals contribute to a healthy ocean.
3. I understand the challenges facing Hawaiian monk seals, and how I can help be part of the solution.

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Vocabulary

Archipelago (n): A term used to describe an island chain

Hawaiian Monk Seal (n): An endangered marine mammal only found in the Hawaiian Islands

Endemic (adj): Native to an area, only found in one geographic location

Pupping (v): Giving birth to a baby seal

Weaning (v): When a mother is stopping nursing with its pup, and the pup is learning to survive alone

Forage (v): To search for food

Molt (v): To shed the top layer of skin and fur, happens once a year

Haul Out (v): To exit the water and rest on coastal land

Toxoplasmosis (n): A parasitic disease that is spread by feral cats and infects monk seals, one of their main threats to survival

Fishery Interactions (n): When a marine animal suffers from hooking, entanglement, ingestion, or other interaction with fishing gear

Entanglement Hazard (n): Debris in the ocean in which can cause injury and death to marine animals by wrapping around them (ex: net)

Boat Strike (n): When a boat hits a marine animal, potentially injuring and killing it

Endangered (adj): When a species is at risk of no longer existing, low population

Invasive (adj): A plant or animal that is introduced to an area where it doesn't belong. Spreading quickly and harmfully into a new environment, example: feral cats

Marine Mammal Stranding (n): when a marine mammal is found outside it's habitat, likely because something is wrong.

Critical Habitat (n): A term used to describe the habitat needed by a species for successful conservation.

LESSON 1: HAWAIIAN MONK SEAL STRANDING DETECTIVES

Stranding (n): when a marine mammal is out of its natural habitat, likely because something is wrong. Dolphins, whales, seals, and sea lions strand regularly on coastlines throughout the world, and response organizations handle the situation. HMAR is part of the stranding response network in Hawaii, and supports marine mammal strandings on Oahu. When we appear on scene, we need to make sure the animal is given enough space, control any public crowds, and gather as much information as we can about the animal, and assist in transport if needed.

Some of the reasons that Hawaiian monk seals strand are listed below:

- Disease / Malnourishment
- Entanglement in marine debris, such as netting
- Predation from sharks
- Human-caused trauma
- Boat Propeller Strike

When we respond to a stranded marine mammal, we have to use clues about the external appearance to gather information on possible causes of death. HMAR will transport the animal to a lab, where researchers will necropsy, or dissect, the body to gather internal information on the animal. For example: Are there parasites in the body? Are there any internally broken bones? Is there plastic in the stomach? All of this information helps to determine cause of death and enhance conservation management of the species as a whole.

Directions: Look at the two individuals below and read the "notes," on the external appearance. In pairs, decide what you think caused the death of these two individuals.

RKC1: "Sole"

Juvenile male

Found already deceased in shallow water along rocky coastline

No marine debris found on or inside body

Ribs visible externally

Shoulder bones visible externally

Using this information, what do you think the cause of death is?

Cause of Death: _____

RI37: "Ipo"

Adult female

Found onshore

Appeared at a healthy weight

Blood found coming from mouth

Jaw / head appears injured

No marine debris found on or inside the body

Using this information, what do you think the cause of death is?

Cause of Death: _____

LESSON 2: CAN YOU ID A MONK SEAL PART 1

Part of HMAR's work is responding to Hawaiian monk seal sightings in coastal areas. Since we know there are 35-40 seals on Oahu, we try to identify them as best we can. We use clues to tell the difference between a male and female monk seal. Males have two dots on their bellies while females have five. This looks like a number "2" or "5" on dice. Females have 4 for nursing their pups and a belly button, whereas males have 1 for reproduction and 1 for a belly button. Mothers typically spend 5-7 weeks with their pup as they grow, without feeding or leaving their side.

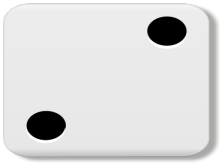


Photo 1

Photo 2

Photo 3

Imagine you are a responder for HMAR who appears on site to these animals. Luckily, the seals are laying on their back. Looking at the photos, determine if the seal is male or female to the best of your ability. Sometimes it's very challenging!

Photo 1: _____

Photo 2: _____

Photo 3: _____

LESSON 2: CAN YOU ID A MONK SEAL? PART 2

In order to support this population, we identify seals that are hauled out in coastal areas. We use clues to tell the difference between a male and female monk seal and other markings on their body. Each seal has different scars, marking, and spots. Some seals will have natural bleach marks, like birthmarks, or markings put on by government partners. As a marine conservationist, we need to use information we know about each individual monk seal to help save them.

Below are pictures of three different seals. Use the information about each individual to identify what seal is in each photo. This can be done in partners or individually.

- **Wawamalu** (RK24) is a male with the tags "K24" and "K25." He is very young, so he doesn't have any distinct scars quite yet.
- **Kaimana** (RJ58) is a juvenile female with a small scar on the middle of her neck. She also has tags "J58" and "J59."
- **RG28** doesn't have a nickname, so we call him by his ID tags. The two on his hind flippers are "G28" and "G29." He is the oldest and has a crescent scar on the right side of his belly. His left fore-flipper also has a bleach mark.

1. _____ 2. _____ 3. _____

4. _____ 5. _____

6. _____ 7. _____ 8. _____

LESSON 3: WHERE MONK SEALS GET THEIR FOOD

Read the excerpt below and answer the questions.

Hawaiian monk seals can eat up to 20 pounds of prey per day. They forage on the benthic ecosystem (bottom of the seafloor) and can dive up to 1,800 feet deep and hold their breath over 20 minutes. However, normally their dives are shorter and shallower on average. Learn about the ocean zones using the diagram and information on this page.

Ocean Zones

The intertidal zone

is closest to shore. At high tide it is covered with water. At low tide, it is exposed to air. Living things must adapt to changing conditions and moving water in this zone.

The neritic zone

lies over the continental shelf. The water is not very deep. There are plenty of nutrients and sunlight. Many organisms live in this zone.

The oceanic zone

is the open ocean out past the continental shelf. The water may be very deep. Nutrients may be scarce. Fewer organisms live in this zone.

The photic zone

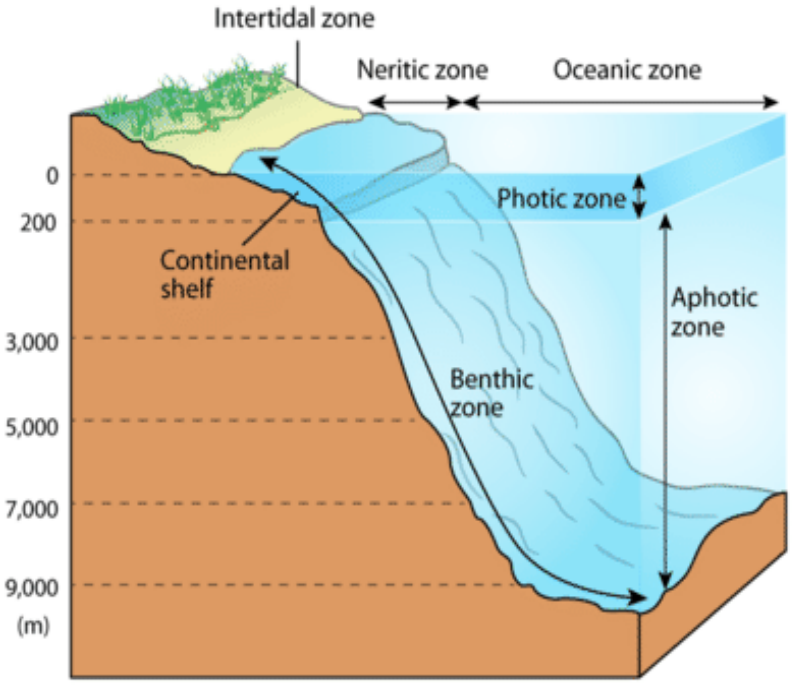
is the top 200 meters of water. This zone has enough sunlight for photosynthesis. That's why there are more living things here than in the aphotic zone.

The aphotic zone

is water below 200 meters. There isn't enough sunlight here for photosynthesis. Living things must eat whatever drifts down from above or each other. That's why there are fewer living things here than near the surface.

The bentic zone

is on the ocean floor. The ocean floor drops as you move away from the continents. There are fewer living things on the ocean floor where the water is very deep.



1. *What ocean depth (in meters) would a Hawaiian monk seal never be spotted at?*

_____

2. *What zone is a Hawaiian monk likely to be found resting or hauled-out?*

_____

3. *What is an area that HMAR would most likely respond to a Hawaiian monk seal human disturbance at?* _____

4. *What zone(s) is a Hawaiian monk seal likely to predate an octopus at?*

_____

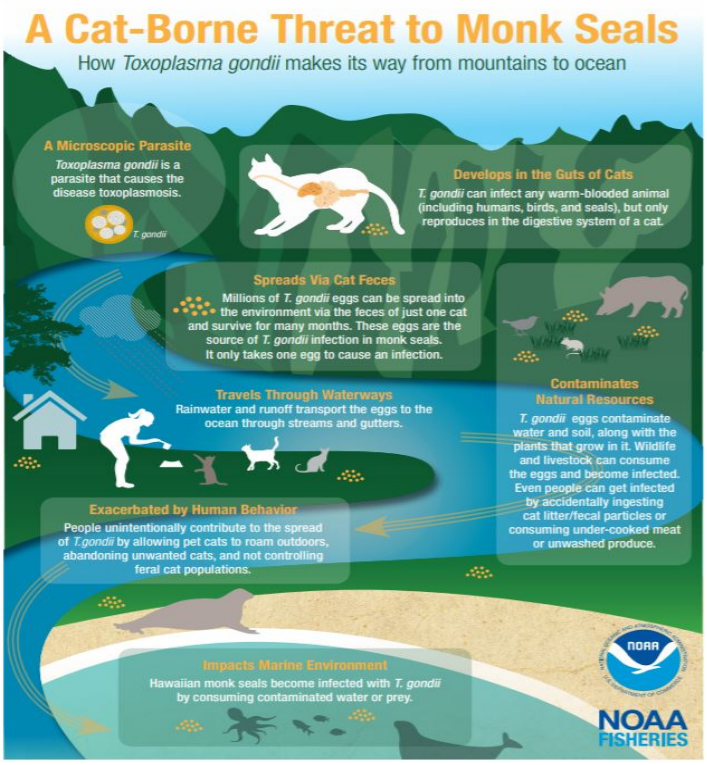
5. *What zone(s) is a Hawaiian monk seal likely to predate a large fish at?*

_____

LESSON 4: THREATS TO HAWAIIAN MONK SEALS: READING

Read the excerpt below about top threats to Hawaiian monk seals. After, discuss in groups practical solutions you can take in your everyday life to support this species, and the ocean ecosystem. No matter where you live, we can all be part of the solutions to these environmental challenges. Challenge yourself to think of 10 solutions in your group!

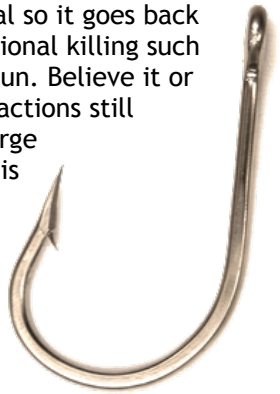
Toxoplasmosis is a disease that can stop a monk seal's organs from working properly and impair their brain function. It comes from a parasite that is spread by feral cats. We have hundreds of thousands of feral cats on Oahu! Review the diagram on the right to learn how toxoplasmosis travels to the marine environment, where it hurts marine mammals like the Hawaiian monk seal.



Another threat to Hawaiian monk seals is **entanglement**. When fishing gear is left behind, like nets, marine life can interact with it and get stuck. For marine mammals that breathe air, like us, they can drown when they are caught in netting. This is why it's so important to make sure your fish is caught in a way that doesn't hurt the ocean.

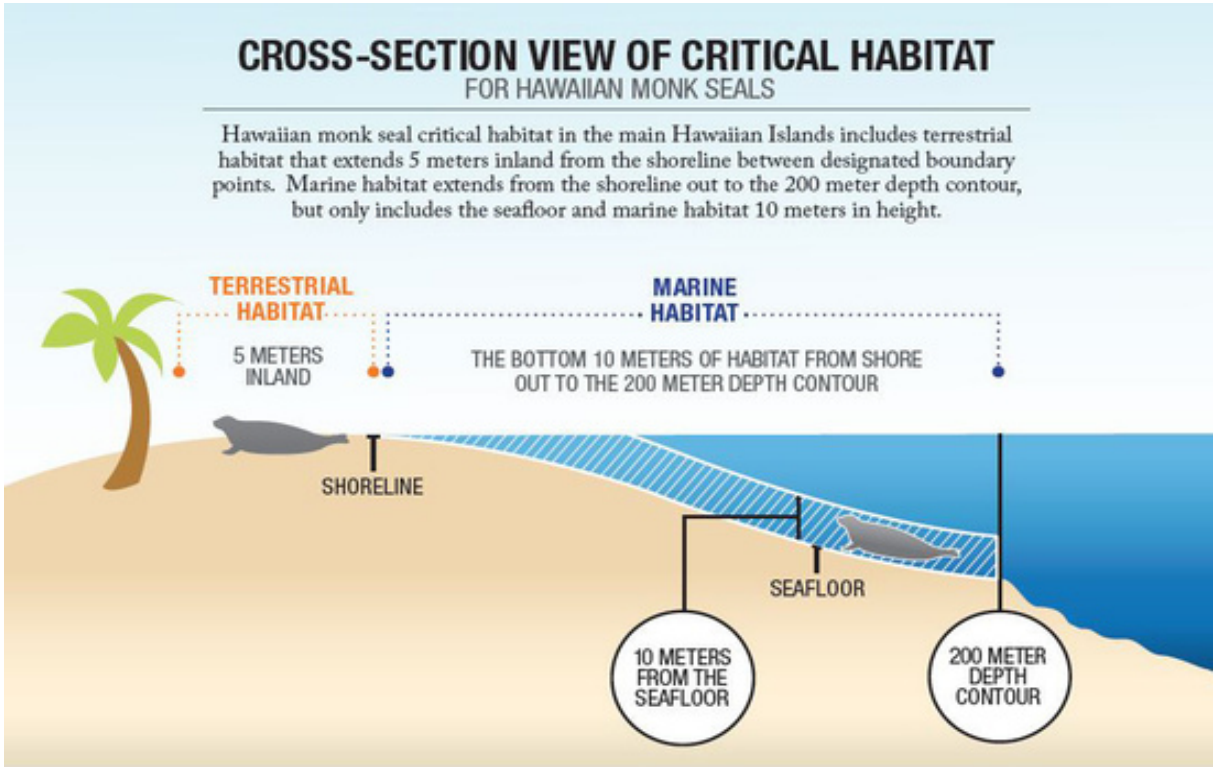
The third threat to Hawaiian monk seals is **hookings**, which occur during fishing activity or when hook and line is left behind afterward. Hawaiian monk seals can be injured by the hook, and it can be sensitive to eat. However, as long as the hook is not swallowed, it will likely rust and fall out. If the seal ingests the hook, the individual will need to be captured to have it removed by a marine mammal veterinarian.

Human interactions are a top threat to the species and includes: disturbance, harassment, intentional harm, feeding, and killing. Altering the natural behavior of a monk seal can prevent it from learning survival skills and keeping its natural behavior. Some examples include: humans feeding a juvenile seal so it doesn't learn to hunt on its own, touching and harassing a resting seal so it goes back into the water, and intentional killing such as shooting a seal with a gun. Believe it or not, these human-caused actions still happen today and are a large challenge to recovering this endangered population.



LESSON 4: THREATS TO HAWAIIAN MONK SEALS: ACTIVITY

Below is a diagram that shows Hawaiian monk seal critical habitat, which is a term used by scientists and conservationists to describe the habitat that essential for the conservation of the species. All of the top threats to monk seals occur in this critical habitat. After reading the except above, break into groups. Decide as a group where in the critical habitat you think each threat is most likely to affect a Hawaiian monk seal.



How can you help?

Some of these threats are local (toxo) but some affect marine life globally. As a group, discuss in small groups some actions humans can take to address some of these threats. Consider actions that can be taken on an individual, local, government, and global level using tools such as social media, movies, field work, science, and politics.

Toxoplasmosis

1.
2.
3.
4.
5.

Entanglements/Hookings

1.
2.
3.
4.
5.

Human Interactions

1.
2.
3.
4.
5.

Intentional Killings

1.
2.
3.
4.
5.

LESSON RUBIC FOR EDUCATORS:

Lesson 1:

- Sole's cause of death was disease / malnourishment
- Ipo's cause of death was intentional trauma

Lesson 2 (part 1): Option: Watch HMAR's Health Check & ID video on our Youtube channel as a class (5 minutes)

- Photo 1: Male
- Photo 2: Female (the pup is also a clue)
- Photo 3: Male

Lesson 2 (part 2): Allow students time to work on this individually. Depending on the grade level, allow them anywhere from 15-30 minutes. As an option, allow them to work in partners or groups after attempting on their own. HMAR personnel attempt to ID seals alone at first. If we can't figure it out, we ask others. Working in teams helps get the job done, no matter how old you are. Students are learning how to use their observation skills during this exercise.

- Photo 1: Kaimana
- Photo 2: RG28
- Photo 3: Kaimana
- Photo 4: Wawamalu
- Photo 5: RG28
- Photo 6: Kaimana
- Photo 7: RG28
- Photo 8: Wawamalu

Lesson 3:

- What ocean depth (in meters) would a Hawaiian monk seal never be spotted at?
  A: Anything deeper than 2,000 feet
- What zone is a Hawaiian monk likely to be found resting or hauled-out?
  A: Intertidal zone
- What is an area that HMAR would most likely respond to a Hawaiian monk seal human disturbance at?
  A: Intertidal zone
- What zone is a Hawaiian monk seal likely to predate an octopus at?
  A: Neritic Zone / Photic Zone / Continental shelf
- What zone is a Hawaiian monk seal likely to predate a large fish at?
  A: Photic Zone / Oceanic Zone

Lesson 4:

Toxoplasmosis

1. Don't feed feral cats
2. Feral cat management laws
3. More funds for trap, neuter, release .
4. Make it illegal to feed feral cats
5. Require cat owners to keep cats inside

Human Interactions

1. Community education workshops
2. Permanent signage in the area
3. Media awareness initiatives
4. More funding for enforcement
5. Tourist educational video requirement

Entanglements/Hookings

1. Barbless hooks requirement
2. Fishing bins at high fishing areas
3. Make it illegal to leave hooks/line behind
4. Funding for fisher education
5. Recycling efforts for marine debris

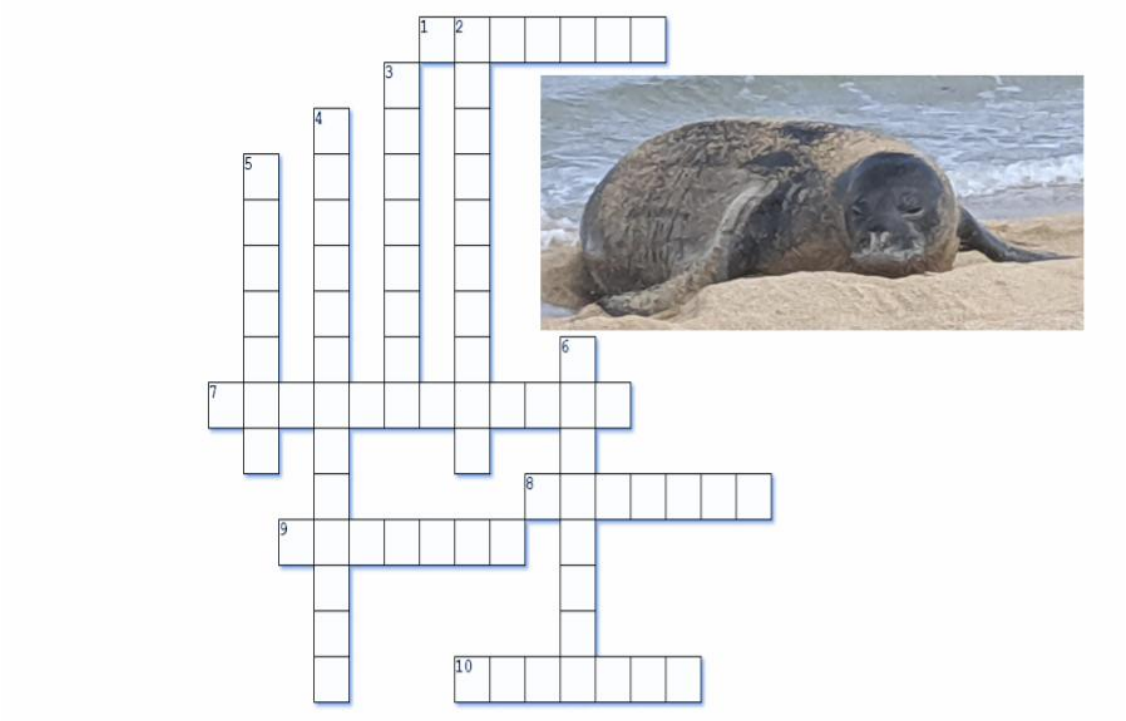
Intentional Killings

1. Community education workshops
2. Jail time for offenders (enforcement)
3. Social media campaigns
4. Transparency about the problem
5. Understanding why offenders do it

Let's See What You've Learned!

Vocabulary

1. Endemic
2. Endangered
3. Invasive
4. Toxoplasmosis
5. Entanglement Hazard
6. Molting
7. Foraging
8. Haul Out
9. Pupping
10. Weaning



Across:

1. Just a young seal figuring out the world on her own!
7. Help! I'm stuck in all this plastic!
8. Sometimes swimming can get exhausting
9. I need to get rid of my old skin and fur!
10. You'll only ever find me where I'm from

Down:

2. At risk of no longer existing
3. A monk seal needs to eat
4. How can cats affect monk seals?
5. Sounds like mama seal is having a baby dog, but she's really having a baby seal!
6. When a species lives somewhere new and harms native life