

EDUCATOR GUIDE

Grades 3-5

SEA LIONS

LIFE BY A WHISKER

K2 STUDIOS

The Marine Mammal Center

DEFINITION FILMS



CONTENTS

Included in this guide



pg **1**
GLOSSARY
Glossary of terms



pg **2**
LESSON ONE
Sea Lions Around the World



pg **5**
LESSON TWO
Rough Waters



pg **8**
LESSON THREE
Diving Deeper



pg **11**
LESSON FOUR
Turning the Tide



pg **14**
LESSON FIVE
Lend a Flipper



pg **16**
RESOURCES
All resources for lessons



pg **46**
INDEX
Credit of involvement



**LESSON RUN TIME IS APPROX 45 MINUTES OR
CAN BE EXTENDED OVER A LONGER PERIOD.**



GLOSSARY

Terms used in this guide



Community based science: Also known as citizen science, this is science carried out by community members who do not necessarily have formal degrees or training in scientific research projects

Diagnose: Looking at symptoms and using tools to figure out what is making a patient sick or injured

Haul out: When sea lions come on land to rest, sometimes in large numbers

Mammal: Animals that are: 1) warm blooded, 2) have hair, 3) breathe air, 4) have live births, and 5) drink milk when young

Marine mammal: Mammals adapted to live all or part of their lives in the ocean and that depend on the ocean for food

Marine Protected Area: Marine areas with special rules that often limit or prohibit removing marine resources and species from these areas

Pinniped: Flipper-footed marine mammals (seals and sea lions)

Symptom: A behavior or condition that usually signals the occurrence of a particular illness or injury



LESSON ONE

Sea Lions Around the World



PATIENT STORY

NAME: Smores

AGE: Female Stellar Pup

DIAGNOSIS: Malnutrition and maternal separation

TREATMENT: Feed

RESOURCE 1.1

Introduction

Life by a Whisker introduces students to the lives and behaviors of sea lions. In studying these animals, students will become familiar with broader biological and environmental concepts as well as human efforts to rehabilitate sick and injured sea lions.

Lesson Overview and Enduring Understanding

Students will learn to define **mammals**, **marine mammals**, and **pinnipeds**. Students will also become familiar with the 7 sea lion species and the ways these species interact with and are interconnected to humans.

Next Generation Science Standard Alignment

Science and Engineering Practices:

Asking Questions and Defining Problems

Engaging in Argument from Evidence

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas:

LS1B: Growth and Development of Organisms

LS3A: Inheritance of Traits

LS3B: Variation of Traits

LS1A: Structure and Function

ESS3C: Human Impacts on Earth Systems

Crosscutting Concepts:

Patterns

Cause and Effect

Systems and System Models

Materials

1.1	Smores' Portrait	Page 16
1.2	WHALE Acronym	Page 17
1.3	Seals vs Sea Lions	Page 18
1.4	Sea Lion Puzzle	Page 19-32
1.5	Sea Lion Fact Sheet	Page 19-32
1.6	Sea Lion Ranges	Page 33

Preparation

- Smores' Portrait (Resource 1.1), WHALE acronym (Resource 1.2), Seals vs Sea Lions (Resource 1.3), and Sea Lion Ranges (Resource 1.6) may be projected or printed to display for the class.
- Print 1 copy of each Sea Lion Picture Puzzle (Resource 1.4) and Sea Lion Fact Sheet (Resource 1.5). They can be printed double sided as a single sheet. If not, make sure corresponding puzzles and fact sheets are handed out together. If using as a



LESSON ONE Continued...

puzzle, cut Sea Lion Picture Puzzle (Resource 1.4) into pieces. If printed double sided with the fact sheet, puzzles can be assembled sea lion up (less challenging) or fact sheet up (more challenging). Or, don't cut the resource into pieces and use it as a worksheet.

Anticipatory Set

Begin the lesson by showing the portrait of Smores, a past patient at The Marine Mammal Center. Don't share Smores' name or story just yet. Instead, ask students the following questions, adding questions as needed to gauge students' background knowledge.

- Do you know what kind of animal this is?
- Have you seen one of these animals before? If yes, where?
- What do you know about this animal?

As students discuss the photo and share their background knowledge, guide them to grasp that this is a sea lion and this sea lion will lead them through the remainder of the lesson.

Procedure

1. While Smores' portrait (Resource 1.1) is displayed, tell the class this animal is interesting because it's a **mammal** just like us. Ask them to define a **mammal** and gauge their level of background knowledge. Share the WHALE acronym (Resource 1.2) and review the characteristics of **mammals**.
2. Share that whales are also an example of marine **mammals**, a special kind of **mammal**. Ask the class if they know any **marine mammals**. Guide them through prompting questions to recognize that **marine mammals** are **mammals** adapted to live all or part of their lives in the ocean and depend on the ocean for food. Tell them there are 5 types of **marine mammals**. Direct their attention to the bottom of the WHALE handout, where there are pictures representing each group of **marine mammal**.
3. Tell the class you are focusing on the group of **marine mammals** called **pinnipeds**. Display Seals vs Sea Lions (Resource 1.3) and ask them if there are any differences they notice between the two types of animals. Guide them to note that seals have ear holes, short front flippers, and a gray to tan coat. Sea lions, meanwhile, have ear flaps, long front flippers, and a darker brown coat. Tell the class they are now going to dive deeper into learning about the 7 kinds of sea lions around the world.
4. Break students into 7 groups and pass out one Sea Lion Puzzle (Resource 1.4) and the corresponding Sea Lion Fact Sheet (Resource 1.5) per group. If using these resources as a puzzle, ask groups to put the pieces together. Puzzle pieces may be taped together, but for multiple uses it is recommended students instead lay pieces next to each other.
5. Once the puzzles are complete, ask the groups to discuss the most interesting thing they learned about their sea lion. Have them work together to answer the prompt on the fact sheet and brainstorm one wonder, or question, they have about the sea lion on their puzzle.
6. Display Sea Lion Ranges (Resource 1.6) and ask groups to share the information on the fact sheet, as well as their wonder, with the class. As each group shares the range of their sea lion, label the Sea Lion Ranges (Resource 1.6). Once every group has shared, the map should show the ranges of all 7 sea lion species.
7. Looking at the map, ask the class if any of their sea lions are threatened. If groups answer yes, ask them to explain why. Put up Smores' Portrait



LESSON ONE Continued...

(Resources 1.1) again and explain that Smores was a Steller sea lion admitted to The Marine Mammal Center in Sausalito, California. Share that some Steller sea lion populations are “endangered,” and work from organizations like The Marine Mammal Center is important to protect these species.

8. Ask students what they think The Marine Mammal Center does for these animals. After students have shared, briefly share The Marine Mammal Center is a hospital that increases ocean conservation through **marine mammal** rescue and rehabilitation, scientific research, and education. Ask students to define rehabilitation, scientific research, and education. If needed, guide them towards understanding the following definitions: rehabilitation (restoring to good health), scientific research (answering questions by testing hypotheses using data), and education (teaching people about the ocean and marine conservation issues).
9. Ask students why Smores, a sea lion pup, would need to be rescued and what information they are using to come to that conclusion. Share that Smores was rescued because she was separated from her mother before she could feed herself. Veterinarians and volunteers taught Smores how to hunt fish on her own and she was released near the Farallon Islands in California.

Assessment

Prompt students to review the WHALE acronym and check for understanding of key **mammal** characteristics. Ask students to share the most interesting sea lion facts they learned. Finish by asking them to write down and share one question they have about sea lions that they hope to learn in future lessons.

Ocean Conservation Activity

Tell your family about
your sea lion



LESSON TWO Rough Waters



PATIENT STORY

NAME: Snouty

AGE: Juvenile Californian Male

DIAGNOSIS: Trash caught around
nose and mouth

TREATMENT: Disentanglement & feed

RESOURCE 2.1

Introduction

Life by a Whisker introduces students to several human-induced threats faced by sea lions around the world. This lesson will focus on the effects of ocean plastic pollution, using this as a lens through which to examine how humans affect sea lions and their marine ecosystems.

Lesson Overview and Enduring Understanding

Students will identify several sources of ocean trash and how they affect marine organisms, including sea lions. Students will consider the ways they potentially contribute to ocean trash and actions that can reduce their pollution impact on the ocean.

Next Generation Science Standard Alignment

Science and Engineering Practices:

Asking Questions and Defining Problems

Constructing Explanations and Designing Solutions

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas:

LS4C: Adaptation

LS2C: Ecosystem Dynamics, Functioning, and Resilience

ESS3C: Human Impacts on Earth Systems

Crosscutting Concepts:

Cause and Effect

Systems and System Models

Influence of Engineering, Technology, and Science on Society and the Natural World

Materials

2.1	Snouty's Portrait	Page 34
2.2	Plastic Pollution Video	Video
	1-3 clean plastic items	Prop

Preparation

- Snouty's Portrait (Resource 2.1) may be projected or printed to display for the class.
- Pull up the Plastic Pollution Video <https://vimeo.com/113359330> (Resource 2.2) on a projector or other display.
- Collect and clean 1-3 plastic items to use as examples of plastic ocean pollution. Alternatively, you may print and display photos of plastic items. (Skip printing if displaying on a projector.)



LESSON TWO Continued...

Anticipatory Set

Display Snouty's Portrait (Resource 2.1) without sharing the name or background of this animal. Briefly review the previous lesson by asking students what kind of animal is on the board. Listen for terms like **"mammal,"** **"marine mammal,"** and/or "sea lion" to gauge what students absorbed from the last lesson. If they are able to provide any of these terms, ask them to describe the traits associated with that type of animal. After, ask the class if they think the animal on the board is healthy and why. Guide them to the realization that this animal was harmed by trash in the ocean.

Procedure

1. Ask students to share different types of trash they might find in the ocean. Write their ideas on the board, listing items under several headings such as "Plastic," "Metal," "Paper," and/or "Organic Materials." You may change the number or headings and heading titles, although it is recommended you include "Plastic" as it is the focus of this lesson.
2. After students are done sharing, add to their list with other trash commonly found in the ocean and along the coast. You may add any relevant items you wish, including: cigarette butts (which contain plastic filters), bottle caps, shopping bags, fishing line, disposable water bottles and cutlery, and styrofoam. After adding to the list, there should be many more items under "Plastic" than any other heading.
3. Explain that plastics are one of the most common types of trash found in the ocean. Synthetic plastics

were invented in 1907, but grew popular when demand for building and other materials boomed in WWII. They continued to grow in popularity and are now used in most commercial and household products. Plastics come in all sizes; from tiny particles you can only see under a microscope to enormous items like fishing nets. Play the Plastic Pollution Video (Resource 2.2) and ask students to write down all the different kinds of plastic they see in the water.

4. After students have watched the video, ask the class what questions they have about the plastic they saw. Write their questions on the board. If the following questions were not suggested by the class, you may add them to the board when students are done sharing. You may change, remove, or add questions as you like.
 - What was this plastic originally used for?
 - How did this plastic get into the ocean?
 - How might it harm ocean animals?
 - How can we make sure less of this plastic gets into the ocean?
 - Why is it hard to keep this kind of plastic out of the ocean?
5. When students are done sharing their questions, break them into small groups. Assign each group a piece of plastic from the video and ask them to answer 3 of the questions on the board. Alternatively, you may ask them to answer particular questions. Have each group share their answers with the class.
6. While they're still in groups, tell students about single versus multiple use plastics. Single use plastic is made to be used only once before it is thrown away, which creates huge amounts of waste. Multiple use plastic can be used many times, producing less waste. Not all plastics are equal! Ask students to work together in their groups to identify different single and multiple use plastics they and their families use. Also ask them to come up with things they can use instead of the single use plastics items they talked about. Afterwards, have groups share with the class.
7. While they are still in their groups, display Snouty's Portrait (Resource 2.1) again, this time explaining



LESSON TWO Continued...

this animal was a patient at The Marine Mammal Center. Ask groups to list what items are in the ocean that can hurt this animal. Once the item is identified, ask students to answer the questions they answered in Step 4. Have each group share their answers with the class.

8. Share that Snouty was admitted to The Marine Mammal Center due to a crab pot entanglement. Emphasize that while a crab pot is not plastic which makes up the majority of ocean trash, this equipment still came from humans. Veterinarians removed the entanglement and performed cosmetic surgery on Snouty's mouth before volunteers helped rehabilitate Snouty by feeding him and giving him antibiotics. Snouty was released at Rodeo Beach in the Golden Gate Park National Recreation Area, California.

Assessment


Show the class one of the plastic items you brought to class. Ask them to trace this piece of trash from its source to the ocean, explaining what it was originally used for, how it got into the water, and how it could harm ocean animals, including sea lions. When they are done sharing, ask them to write down and share one wonder, or question, they have about sea lions that they hope to learn in the next lesson.

Ocean
Conservation
Activity
Throw trash in the
garbage



LESSON THREE

Diving Deeper



PATIENT STORY

NAME: Gumdrop
AGE: Female Californian Adult
DIAGNOSIS: Domoic acid toxicosis
TREATMENT: Rest and fluids

RESOURCE 3.1

Introduction

Life by a Whisker illustrates how marine species can be negatively affected by both human and environmental factors. It is important to understand the diverse threats sea lions and other ocean animals face so we can better protect and rehabilitate them.

Lesson Overview and Enduring Understanding

Students will learn to ask questions about and draw conclusions from scientific figures. They will come away with the knowledge of how human and environmental factors harm sea lions, as well as how veterinarians and volunteers rehabilitate sick or injured sea lions.

Next Generation Science Standard Alignment

Science and Engineering Practices:

- Asking Questions and Defining Problems
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas:

- LS4C: Adaptation
- LS2C: Ecosystem Dynamics, Functioning, and Resilience
- ESS3C: Human Impacts on Earth Systems

Crosscutting Concepts:

- Cause and Effect
- Systems and System Models
- Influence of Engineering, Technology, and Science on Society and the Natural World

Materials

- | | | |
|-----|-------------------------|------------------|
| 3.1 | Gumdrop's Portrait | Page 35 |
| 3.2 | Domoic Acid Attack | Video Link below |
| 3.3 | Patient Diagnosis Graph | Page 36-37 |

Preparation

- Gumdrop's Portrait (Resource 3.1) may be projected or printed to display for the class.
- Pull up Domoic Acid Attack (Resource 3.2): <https://youtu.be/123k3Ao53T0>
- Print Patient Diagnosis Graph (Resource 3.3). You may print one for each student, or enough for students to complete the activity in pairs or small groups.

Anticipatory Set

Display Gumdrop's Portrait (Resource 3.1) in front of the class. To review previous lessons, ask students what they can tell you about this patient. For example:



LESSON THREE

Continued...

- What kind of animal is this?
- How old might it be?
- Does it look sick or injured?

Prompt the class by telling them this animal was sick, but with something that was hard to tell from looking at it. Explain that animals are not always injured externally but have an internal sickness. If needed, the comparison to a human with a broken arm versus a human with the flu can be made. Have them hypothesize what sort of sicknesses a sea lion might have, without letting on that it was a patient at The Marine Mammal Center.

Procedure

1. Play Domoic Acid Attack (Resource 3.2) and ask students to take notes about the sickness affecting the California sea lion in the video.
2. After watching the video, ask students what they think “**diagnose**” means. Provide hints until **diagnose** is defined as figuring out what’s making a person or animal sick by looking at **symptoms**, or signs in their behavior or body. Share that diagnosing a patient is the first step to create a game plan to rehabilitate sick or injured animals. Ask students to share **symptoms** they think would be important to **diagnose** an animal. You may prompt them to think of **symptoms** related to behavior, appearance, or test results.
3. Break the class into 7 groups. You may break them into the same groups from Lesson 1 so they are working with a sea lion species they are familiar with. If your class did not partake in Lesson 1, divide the class into 7 groups and assign each group a different sea lion species. Ask groups to brainstorm **diagnoses** that might be common for their sea lion, as well as **symptoms** they would see in a sea lion with these health problems. Ask groups to share with the class and take notes on new ideas they learn from other groups.
4. Pass out the Patient Diagnosis Graph (Resource 3.3). You may pass out one graph per group or break students into larger or smaller groups. Ask students if they’re familiar with any of these diagnoses. Provide clarity where needed. Give enough information that students know what the diagnoses are, but do not share information about **symptoms** or causes because they will try to figure these things out later in the lesson.
5. After discussing the different diagnoses on the graph, ask students to answer the following questions:
 - What information do you see on the graph?
 - What did you learn from the graph?
 - What questions do you have after looking at this graph?
6. Assign each group one of the diagnoses included in the graph. Ask the group to brainstorm answers to the following questions before sharing with the class:
 - How do you think an animal would get this injury or illness?
 - How did humans contribute to this injury or illness?
 - How would you help this animal get better from this illness or injury?
7. Share that sea lions get sick and injured for many reasons. Some reasons are because of changes in the environment or interactions with other sea lions. Other reasons are because of interactions with humans. Burning fossil fuels, like coal, oil and natural gas, releases to carbon dioxide in the atmosphere. This excess carbon dioxide acts like a heat-trapping blanket and contributes to warmer ocean waters, including along the California coast. Warmer waters can lead to more toxic algae blooms and more sea lions with Domoic acid toxicosis.



LESSON THREE Continued...

8. Share that sea lions get sick and injured for many reasons. Some reasons are because of changes in the environment or interactions with other sea lions. Other reasons are because of interactions with humans. Ask the class to share things they can do to make the ocean safer for sea lions. Some examples might be using less plastic, driving less so they do not contribute to climate change, calling **marine mammal** rescue hotlines if they see an injured sea lion, or keeping their distance if they see sea lions at the beach.
9. With more domoic acid toxicosis predicted with future climate change, students can help sea lions like Gumdrop by reducing the amount of carbon emissions they emit by carpooling, walking or riding their bikes instead of driving. By doing their part to reduce carbon emissions and address climate change, students are also helping sea lions. Students are the next generation and by also helping educate their parents and peers, they can create a chain reaction that can help slow down climate change.

Assessment

Ask students to write down the most interesting diagnosis and **symptom** they learned about today. Check for comprehension of these key terms and provide guidance where there may be misunderstanding. Ask students to write down and then share any wonders, or questions, they have after today's lesson.

Ocean
Conservation
Activity
Replace plastic straws
with reusable ones



LESSON FOUR

Turning the Tide



PATIENT STORY

NAME: Hoppie

AGE: Male Californian Pup

DIAGNOSIS: Malnutrition and
maternal separation

TREATMENT: Feed fish

RESOURCE 4.1

Introduction

Life by a Whisker familiarizes students with different types of **Marine Protected Areas** and the role they have in protecting sea lions from the threats described in Lesson 2. This lesson will teach students about the history, restrictions, and success of current marine sanctuaries and marine parks.

Lesson Overview and Enduring Understanding

By examining case studies from the U.S. and Australia, students will learn how passionate advocates helped establish marine sanctuaries and parks. They will also explore these **Marine Protected Areas'** positive impacts on marine species, including sea lions.

Next Generation Science Standard Alignment

Science and Engineering Practices:

Asking Questions and Defining Problems

Constructing Explanations and Designing Solutions

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas:

LS4C: Adaptation

LS2C: Ecosystem Dynamics, Functioning, and Resilience

ESS3C: Human Impacts on Earth Systems

Crosscutting Concepts:

Cause and Effect

Systems and System Models

Influence of Engineering, Technology, and Science on Society and the Natural World

Materials

- | | | |
|-----|-----------------------------------------|------------|
| 4.1 | Hoppie's Portrait | Page 38 |
| 4.2 | Marine Protected Areas Map | Page 39 |
| 4.3 | Rookery Photo | Page 40 |
| 4.4 | Marine Protected Area Case Study | Page 41-42 |
| | Coloured pencils, markers or crayons | Prop |

Preparation

- Hoppie's Portrait (Resource 4.1), **Marine Protected Areas** Map (Resource 4.2), and Rookery Photo (Resource 4.3) may be projected or printed to display for the class.
- Print 1 copy of the Marine Protected Area Case Study and cut sea lion species' section (Resource 4.4).

Anticipatory Set

Display Hoppie's Portrait (Resource 4.1) in front of the class. Ask students to answer the question "What animal



LESSON FOUR Continued...

is this?” out loud to review previous lessons. If they do not answer “sea lion,” briefly review **marine mammals, pinnipeds, and sea lions**. If students answer correctly, ask, “What is wrong with this picture?” Look for answers that note this is a pup that should be with its mom, in the ocean, or on an island. Guide the discussion with questions like, “How old is this sea lion?” or “Where do you think sea lion pups live?” They should come away with the recognition that this is a sea lion pup who should still be in its mom’s care.

Procedure

1. Display the Marine Protected Areas of the World Map (Resource 4.2). Share that there are different names for **Marine Protected Areas (MPAs)**, including “marine reserve,” “marine sanctuary,” or “marine park”. Each MPA has special rules visitors, businesses, and the government must follow. Ask the class what they think those rules might be and why that rule is important. When they’re done guessing, share the following activities if they were not mentioned: extracting resources, mining, construction, flying aircrafts at low elevations, and sometimes fishing. Explain MPAs are one solution to protecting sea lions from human impacts. MPAs are designated by the government, but community members or scientists recommend areas that need protection.
2. Ask students to brainstorm the pros and cons of MPAs. After they are done sharing, explain that MPAs have many positive benefits, including protecting habitats and species so animal populations can grow. These effects can spill over

into adjacent areas, meaning areas alongside MPAs may also have larger populations of marine species that spill out from the MPA. However, MPAs can have negative effects, such as limiting fishing and harvesting for people who rely on these resources for important cultural traditions. MPAs can also limit recreational activities, such as collecting shells or fishing.

3. Display the Rookery Photo (Resource 4.3) and explain this is the Channel Islands Marine Sanctuary where California sea lions **haul out** to have their pups. Share that the animal from the Patient Photo in the opening was a pup that should have been in the Channel Islands Marine Sanctuary.
4. Separate students into their Lesson 1 groups and assign each group the sea lion species they focused on in Lesson 1. If you did not partake in Lesson 1, divide the class into 7 groups and assign each group a different sea lion species. Pass out the **Marine Protected Area Case Study** (Resource 4.4) that accompanies each sea lion species.
5. Explain to students that they will work as a group to design an MPA for their sea lion species. Each group has 10-15 minutes to prepare to share the answers to the following questions using the information on their case study sheet:
 - Why did you choose this area?
 - What rules does your area need?
 - How do humans use this area? How will people feel about this new MPA?
6. Come back together as a class and have each group share their MPA and how it will help their sea lion species. Each member should have the opportunity to share at least one answer. Ask students to write down a few interesting things they learned from other groups’ presentations.
7. After hearing from everyone, give the groups 5 to 10 minutes to share and reflect on the interesting things they learned and make any changes or additions to the new MPA they just designed.



LESSON FOUR Continued...

Assessment

Gauge each student's participation and input with their group as you walk around the room during the discussion. If you sense that students are struggling, ask them questions as you observe their group. As students share aloud with the class, ask questions that connect back to the threats that have resulted in the designation of MPAs.

Ocean Conservation Activity

Join a beach or river
clean up day



LESSON FIVE

Lend a Flipper



PATIENT STORY

NAME: Abagnale

AGE: Male Californian Adult

DIAGNOSIS: Trash caught around mouth

TREATMENT: Disentangle and feed
RESOURCE 5.1

Introduction

Life by a Whisker demonstrates the difference volunteers make in the survival of sea lions at The Marine Mammal Center. This lesson will teach students about what they can do to protect sea lions from the threats discussed in previous lessons and encourage students to get involved with conservation efforts in their communities.

Lesson Overview and Enduring Understanding

Students will learn about **community-based science** and its ability to engage the public in marine conservation. They will also learn about the direct action they can take at home, in their communities, and at the beach to protect sea lions and the ocean at large.

Next Generation Science Standard Alignment

Science and Engineering Practices:

Asking Questions and Defining Problems

Constructing Explanations and Designing Solutions

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas:

ESS3C: Human Impacts on Earth Systems

Crosscutting Concepts:

Systems and System Models

Materials

5.1	Abagnale's Portrait	Page 43
5.2	Solution Sheet	Page 44
5.3	Ocean Issues Case Studies	Page 45
5.4	A Day in the Life of a Youth Crew Volunteer	Video

Preparation

- Abagnale's Portrait (Resource 5.1) and Solution Sheet (Resource 5.2 may be projected or printed to display for the class).
- Print one copy of each Ocean Issues Case Study (Resource 5.3).
- Pull up A Day in the Life of a Youth Crew Volunteer (Resource 5.4) <https://youtu.be/2RoRynwWJIM>

Anticipatory Set

Display Abagnale's Portrait (Resource 5.1). Ask students, "What is wrong with this image?" Guide them to the consensus that this sea lion should not have trash around it before asking, "Where do you think the trash came from?" Pass sticky notes out to students and ask them to write down one word that describes how they feel when seeing this image. Have students partner up and discuss why they chose that word. Encourage students to practice silent, active listening



LESSON FIVE Continued...

by permitting each student 1 to 2 minutes of uninterrupted talking time before switching. This allows students to share their thoughts without influence from their peers. Once everyone has shared, reunite the class and allow students to share any unique feelings they heard from their partners.

Procedure

1. Ask the class to share what big issues they think are affecting the ocean now. With each issue, ask them to think of why that problem might have started and how it affects sea lions and other **marine mammals**. Discuss as a class how people may be a part of each issue.
2. Display the Solution Sheet (Resource 5.2) on the board. You can tailor the Solution Sheet by making your own version that has only one or some of the solutions. If the issues brainstormed by the class are on the Solution Sheet, recognize that they align.
3. Break students into small groups (as many groups as there are Ocean Issues on the board) and pass out the Ocean Issues Case Studies (Resource 5.3). You may need to devise your own case studies if you want to tailor the Solution Sheet (Resource 5.2) to address different ocean issues. Have each group study one ocean issue and brainstorm possible solutions before they share their findings with the class. As students share their solutions, write them on the Solution Sheet next to the appropriate Ocean Issue.

4. After students have shared their solutions, explain the difference between individual action and collective action. Individual action is something you do by yourself, without needing someone else to get the job done. Collective action is something you do with a large group. For example, picking up trash from the beach is an individual action and reducing the amount of trash in the ocean is collective action since accomplishing this requires effort from many people.
5. Now that students have come up with some of their own solutions, keep them in their small groups and watch A Day in the Life of a Youth Crew Volunteer (Resource 5.4). Ask students what kind of work the volunteer does and what ocean issues they're trying to improve. Ask the class what the ocean will look like or be like after this conservation action is done.
6. Still in their small groups, ask students to share something interesting they learned from A Day in the Life of a Youth Crew Volunteer (Resource 5.4). Ask students to share any new conservation action ideas they have after watching.
7. Display Abagnale's Portrait (Resource 5.1) and share he was rescued by The Marine Mammal Center because he had fishing gear entangled around his neck and mouth. It was removed by veterinarians at The Marine Mammal Center before dedicated volunteers helped rehabilitate Abagnale by feeding him fish and giving him antibiotics. Abagnale recovered and was released at Rodeo Beach in the Golden Gate National Recreation Area, California.

Assessment

To prompt reflection, ask students to write down how they feel about the ocean issues they talked about today, and if they are excited to do some of the conservation solutions they brainstormed. Ask students to write down and share with the class one individual action and one collective action they can take to help the ocean.



Whale Resource

What is a mammal, you ask? "Whale whale whale, let us show you..."

Warm blooded: mammals are warm-blooded, which means they make their own body heat.

Hair: mammals have at least a few hairs somewhere on body. Hair on non-human mammals is called fur.

Air breather: mammals breathe air.

Live birth: most mammals, except for platypus, give birth to live babies.

Eats milk: mammals eat milk when they're born and start to eat other things as they get older.



Manatees and Dugongs



Seals and Sea Lions



Polar Bears



Whales and Dolphins



Sea Otters

Seals vs Sea Lions

Compare the California sea lion and Pacific harbor seal below. What are the three main differences between them?



California sea lion

VS



Pacific harbor seal

Sea Lion Puzzle

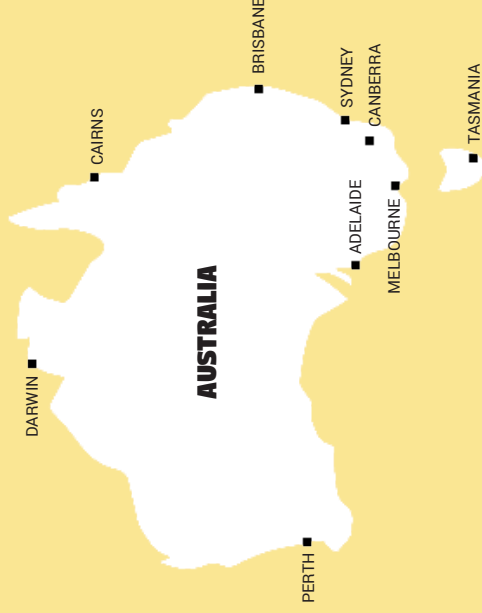
Australian Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

AUSTRALIAN SEA LION



Australian sea lions are endangered. Their numbers are still low after they were commercially hunted in the 18th Century.

Australian sea lions are incredibly smart, but need our help to survive.

WHY DO YOU THINK AUSTRALIAN SEA LION COLONIES HAVE SUCH DIFFERENT FEEDING STRATEGIES?

AUSTRALIAN SEA LION COLONIES HAVE UNIQUE FEEDING STRATEGIES. SOME FEED ON THE OCEAN FLOOR, WHILE OTHERS FEED IN THE WATER COLUMN.

Australian sea lions eat things like penguins, sharks, fish, octopus, and squid.

Australian sea lions are endemic to Australia, meaning they aren't found anywhere else in the world!

Sea Lion Puzzle

California Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

California sea lions often can slow their heart rate when they dive, which lets them stay underwater longer.

About half of all California sea lions are born on June 15th!

CALIFORNIA SEA LIONS ARE VERY SOCIAL. WHY DO YOU THINK THEY OFTEN HAUL OUT IN LARGE NUMBERS?

CALIFORNIA SEA LIONS ARE ONE OF THE FASTEST MARINE MAMMALS AND CAN SWIM UP TO 25 MILES PER HOUR.

California sea lions eat things like schooling fish, octopus, and squid.

California sea lions used to be hunted. They're a species of "least concern" now, so their populations are larger now, but they're sometimes accidentally harmed by fishing nets.



THE AMERICAS & CANADA

Sea Lion Puzzle

Galapagos Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

GALAPAGOS SEA LION

Galapagos sea lion numbers go down when waters get warm, which means less fish to eat. These sea lions are endangered.

Why might Galapagos sea lions work together to hunt?

GALAPAGOS SEA LIONS WORK TOGETHER TO CATCH FAST FISH LIKE TUNA. THEY EAT LOTS OF FISH SPECIES, BUT MOSTLY SARDINES.

Female Galapagos sea lions take turn watching groups of pups on the beach while other mothers leave the hunt.

Galapagos sea lions are only found on the Galapagos Islands!



Sea Lion Puzzle

Japanese Sea Lion

RESOURCE 1.4



RESOURCE 1.5

Sea Lion Fact Sheet

JAPANESE SEA LION

Japanese sea lions were once harvested for medicine and goods and captured to use in circuses.

WHY MIGHT SCIENTISTS WANT TO BRING BACK THE JAPANESE SEA LION?

SOME SCIENTISTS WANT TO BRING BACK THE JAPANESE SEA LION, OR RELOCATE SIMILAR SPECIES INTO THIS SEA LION'S OLD HABITAT.

Japanese sea lions went extinct around the early 1950s. They're one of the most recent marine mammal extinctions to occur.



JAPAN

Sea Lion Puzzle

New Zealand Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

NEW ZEALAND SEA LION

New Zealand sea lions were once hunted. Recently, pups have been hurt by bacterial infections. New Zealand sea lions are endangered.

WHY DO YOU THINK NEW ZEALAND SEA LION MOTHERS MOVE THEIR PUPS OFF THE BEACH AFTER 6 WEEKS?

MOTHERS MOVE PUPS FROM THE BEACH INTO NEARBY VEGETATION WHEN THEY'RE 6 WEEKS OLD. MOTHERS TAKE TURNS WATCHING PUPS SO OTHERS CAN HUNT.

New Zealand sea lions eat things like fish, octopus, squid, and other sea lions and seals.

New Zealand sea lions are only found in New Zealand!



NEW ZEALAND

Sea Lion Puzzle

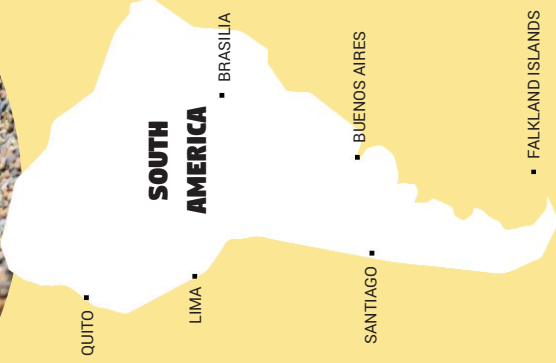
South American Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

SOUTH AMERICAN SEA LION



South American sea lions are extinct in some places due to habitat loss. They're protected from harvesting in Argentina and the Falkland Islands.

WHY MIGHT SOUTH AMERICAN SEA LIONS HAUL OUT CLOSE TOGETHER IN LOWER TEMPERATURES AND ON SANDY BEACHES?

SOUTH AMERICAN SEA LIONS BREED IN THE SOUTHERN PORTION OF THEIR RANGE AND TRAVEL NORTH FOR THE REST OF THE YEAR.

South American sea lions eat a variety of fish, squid, and octopus.

Sea Lion Puzzle

Steller Sea Lion



RESOURCE 1.5

Sea Lion Fact Sheet

Males don't eat for 1-2 months while they defend beach territories during the breeding season!

Steller sea lions tend to hunt at night and dive deeper and longer as they age. They eat fish, squid, octopus, seals, sea lions, and sea otters.

WHY ARE STELLER SEA LION NUMBERS DIFFERENT ON THE EAST AND WEST SIDES OF THEIR RANGE?

STELLER SEA LION

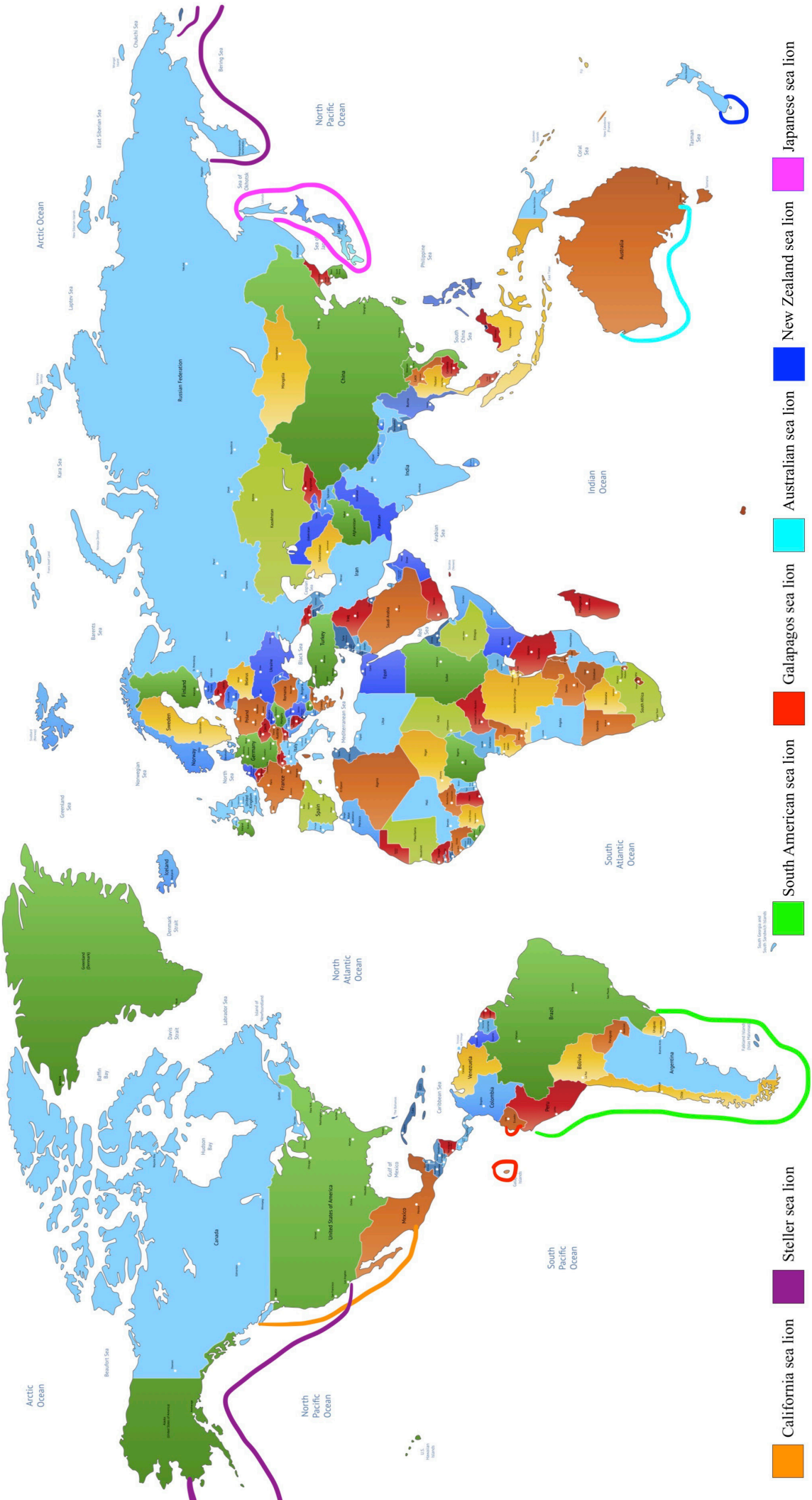


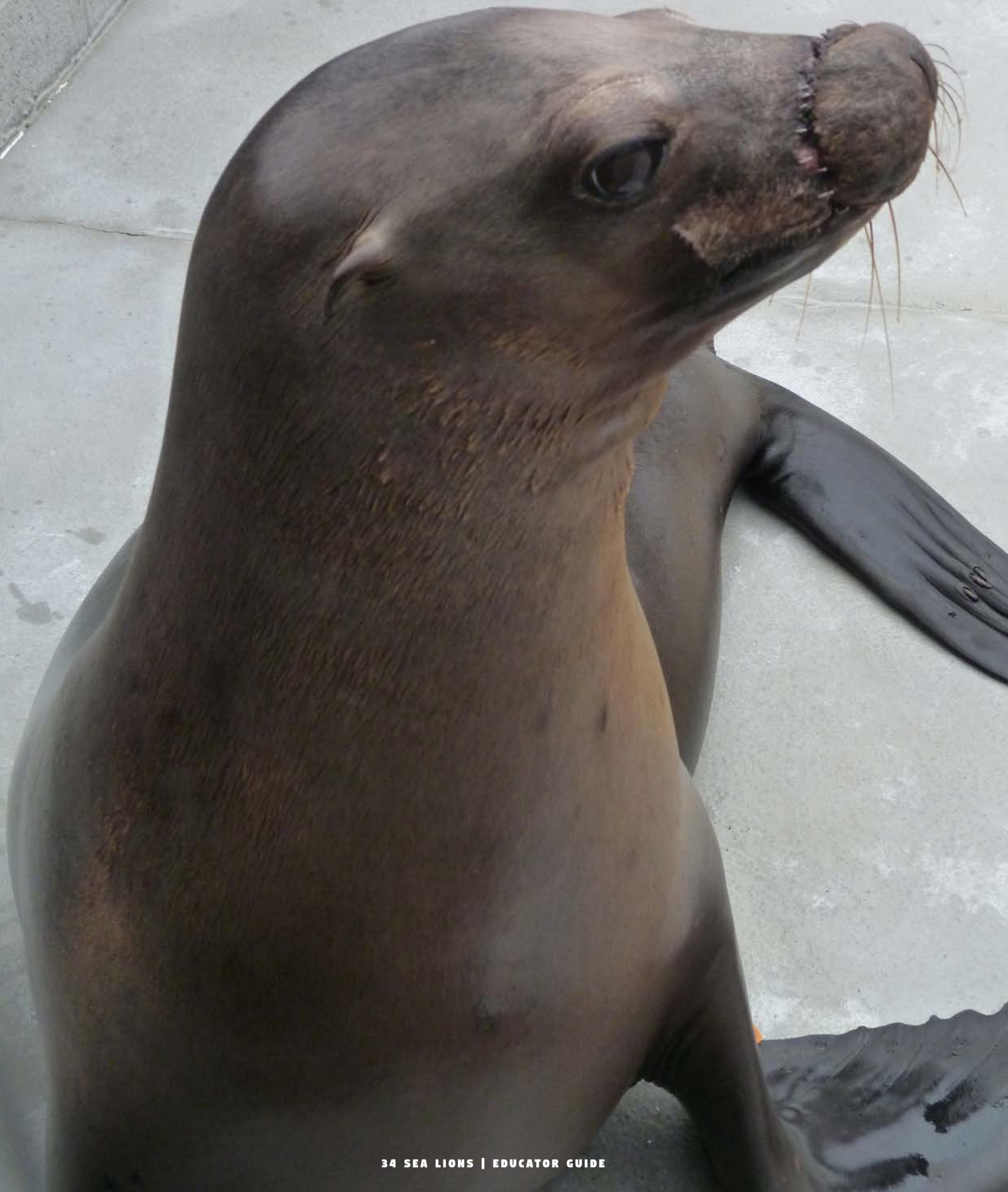
MOTHERS CAN IDENTIFY THEIR PUPS BY SOUND AND SMELL, EVEN IN CROWDED BREEDING COLONIES.

Steller sea lions are the largest sea lion species. Males can weigh up to 2,500 pounds!

People used to hunt steller sea lions because they thought sea lions stole from their fishing nets. The Western population is near threatened, but the Eastern population is doing better.

Sea Lion Ranges

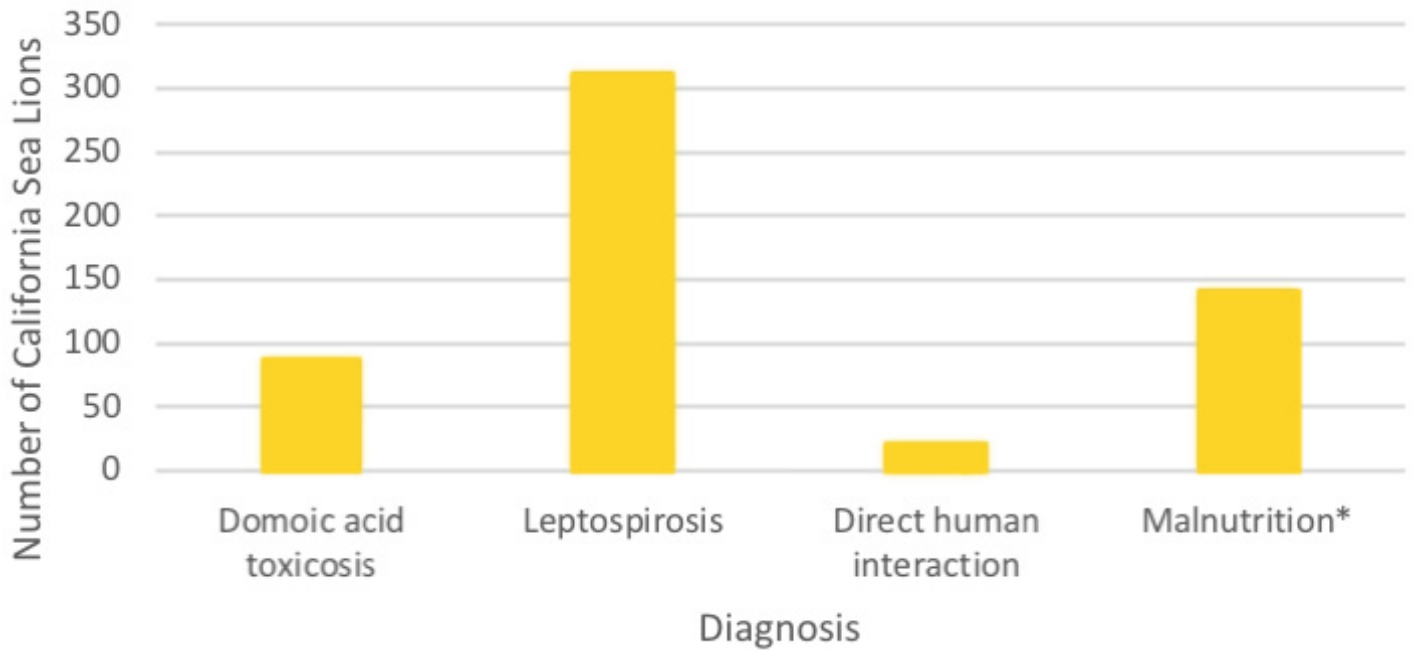






Patient Diagnosis Graph

California Sea Lion Diagnoses at The Marine Mammal Center (2018)



* We don't always know why an animal has malnutrition. It can happen because of other issues or because of direct or indirect human interaction.

Answer these questions about the graph:

- a. What information do you see on the graph?
- b. What did you learn from the graph?
- c. What questions do you have after looking at this graph?

Answer these questions about your diagnosis:

1. How do you think an animal would get this injury or illness?
2. How did humans contribute to this injury or illness?
3. How would you help this animal get better from this illness or injury?

Patient Diagnosis Graph

Continued...

Domoic Acid Toxicosis

Domoic acid toxicosis occurs when animals consume food that had been contaminated with domoic acid. Domoic acid is released by toxic algae blooms, which are often associated with warmer ocean waters. Domoic acid bioaccumulates, or accumulates in greater quantities as it is consumed by organisms going up the food chain. Domoic acid shrinks the hippocampus in sea lions, which causes them to experience disorientation and seizures. The **symptoms** of domoic acid are seizures, disorientation, head bobbing, and strange behavior, such as traveling a long distance from the beach and other typical sea lion habitat. Domoic acid toxicosis is treated by feeding patients uncontaminated fish and giving them ample fluids, which flushes the toxins out of their bodies. Patients are also given anti-seizure medications.

Leptospirosis

Leptospirosis is a bacterial infection affecting sea lion's kidneys. The **symptoms** of leptospirosis are holding the flippers over the abdomen and drinking water. These **symptoms** are often enough to correctly **diagnose** a sea lion with leptospirosis, but urine samples can also aid in diagnosing. Leptospirosis is treated with antibiotics and fluids.

Human Interaction

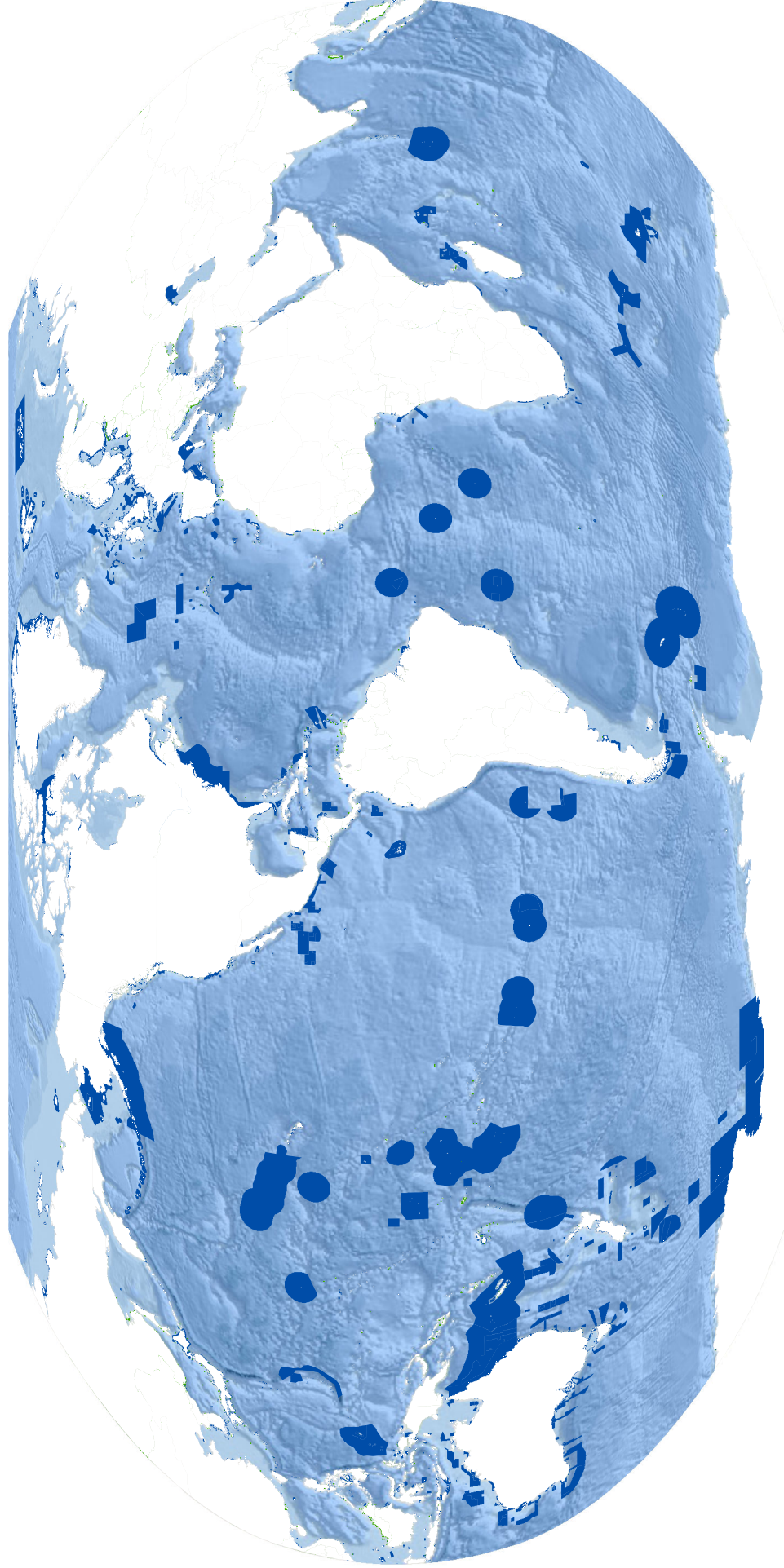
Human interaction can include a variety of direct and indirect human behaviors. Some sea lions suffer due to indirect human interactions, such as plastic entanglement or ingestion of ocean trash. Other animals are harmed by direct interactions including gunshot wounds. **Symptoms** vary, but include intestinal blockages, lacerations, and other traumas. Treatment also varies depending on the diagnosis, but can include surgery to remove entanglements or consumed debris, as well as sutures and antibiotics to treat trauma.

Malnutrition

Malnutrition occurs when an animal is underweight and hasn't been receiving proper nutrition. It can result from maternal separation (when a pup is separated from its mother), an inability to hunt independently (this occurs when yearlings first try to hunt on their own), or as a side effect of other **diagnoses**. The **symptoms** of malnutrition are low body weight and lack of blubber. Malnutrition is treated by feeding the patient formula or fish, even teaching it how to catch and eat fish if needed.



Official MPA Map

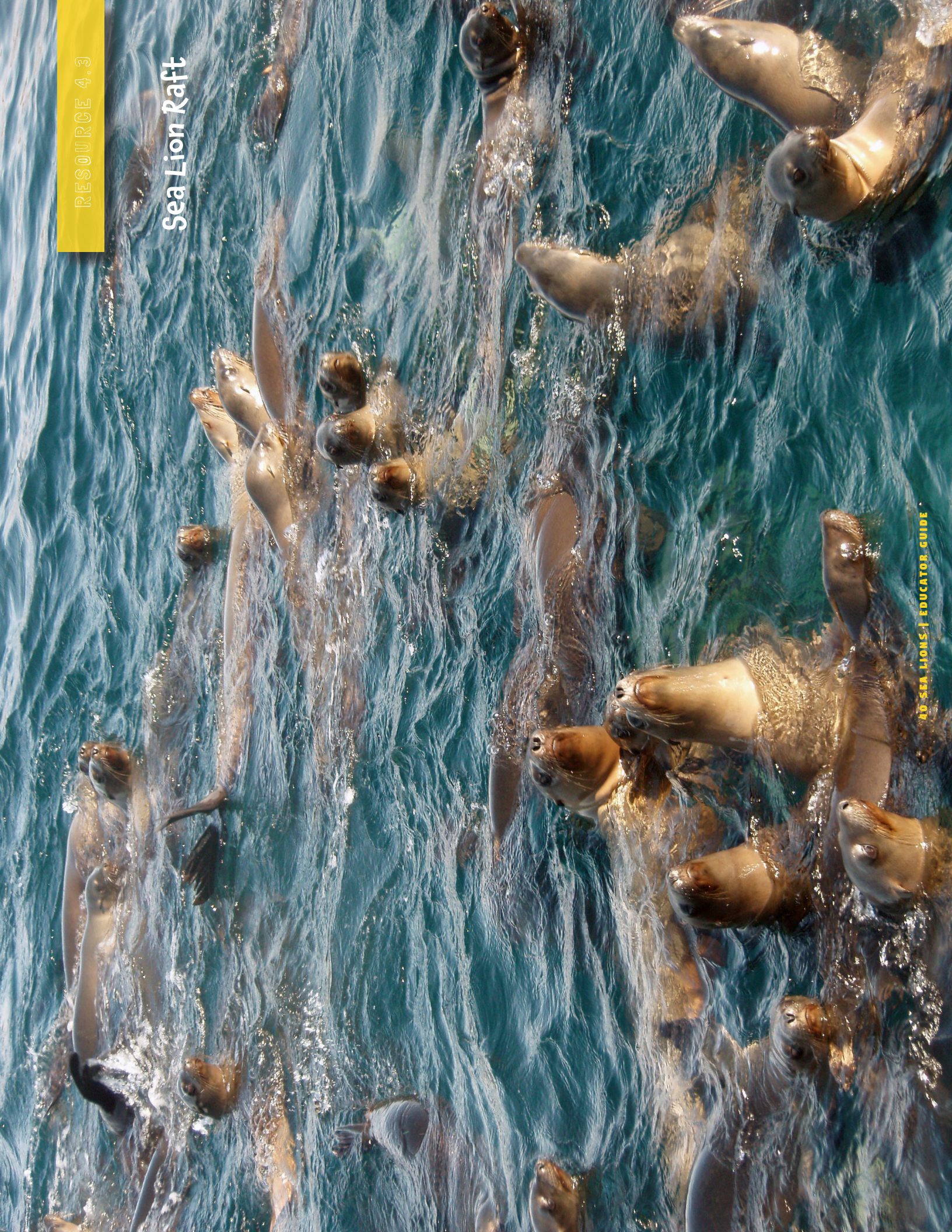


Source: UNEP-WCMC and IUCN (2019). Protected Planet: The World Database on Protected Areas (WDPA) [On-line], December 2019, Cambridge, UK: UNEP-WCMC. Available at www.protectedplanet.net



7.63% of the global ocean covered by protected areas
2.57% of the global ocean covered by no-take protected areas

Sea Lion Raft



Marine Protected Areas Case Studies



Australian Sea Lion

Australian sea lions are only found along the Southern Coast of Australia. They have a high pup mortality rate, which means many pups do not live to adulthood. This may be caused by aggressive adult males and food shortages. Entanglement in fishing nets and crayfish pots is another large threat.

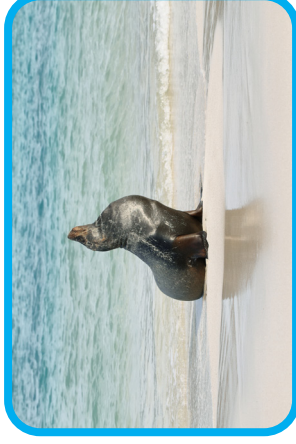
Recently, fish farms have been established near **haul outs** and feeding areas. Australian sea lions may be harmed by these farms and other human interactions.



California Sea Lion

California sea lions are found from Canada to Mexico. They breed on offshore islands. Many California sea lion pups strand on beaches because they are malnourished. They are overweight because of maternal separation, diseases, not enough available food, and changing ocean conditions. California Sea Lions are also affected by domoic acid toxicosis. This condition is caused by harmful algal blooms and give sea lions seizures.

Many groups rehabilitate sea lions and do research to understand the diseases that hurt them. This has helped the California sea lion population grow steadily so they are no longer threatened.



Galapagos Sea Lion

Galápagos sea lions are only found on the Galapagos Islands. They are hurt every few years by warm water brought by El Niño. This warm water makes food hard to find and many sea lions die. Galápagos sea lions are also exposed to diseases, entanglement, and habitat loss as nearby human populations grow. Galapagos sea lion numbers have decreased in the last 30 years, while more people visit the Galapagos Islands every year.



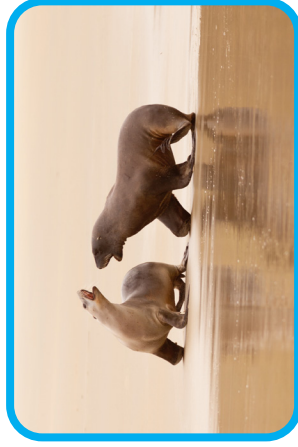
Japanese Sea Lion

Japanese sea lions were once found in the Sea of Japan. They went extinct by the early 1950's, and are one of the most recent marine mammal extinctions. Japanese sea lions were harvested for medicine and goods and captured to use in circuses.

South Korea, Russia and China are working to bring back Japanese sea lions. Some scientists want to recreate the Japanese Sea lion, or relocate similar species into its previous habitat.

Marine Protected Areas Case Studies

Continued...



New Zealand Sea Lion

New Zealand sea lions mostly breed on islands far south of New Zealand. Fishing boats work where sea lion mothers hunt. Fishing boats go after some of the same species sea lions eat. Sometimes, sea lions are accidentally caught by boats, but new technology is making this happen less. There isn't much human interaction on breeding islands, but diseases have killed a lot of pups. A new breeding colony is starting on an island much closer to New Zealand. Humans live on this island and depend on the ocean to gather food and earn a living by taking tourists on fishing trips. Most of the island is covered by a national park used for hiking and backpacking.



South American Sea Lion

South American sea lions are found from Peru to Brazil. They breed in the south and travel north the rest of the year. South American sea lions were hunted commercially, but today are protected from harvesting in Argentina and the Falkland Islands. Construction in breeding and **haul out** areas has wiped out South American sea lions in some areas.



Steller Sea Lion

Steller sea lions breed in the Pacific Ocean from Japan to California. They used to be hunted for meat, fur, and oil and were killed because fishers thought sea lions stole from their nets. All Steller sea lions were once considered threatened, but protection by the Endangered Species Act has helped the population living near the U.S. and Canada do much better. Steller sea lions are endangered in Russia, where there are no laws to protect them. Steller sea lions that live along Russia and the Northwestern Pacific Ocean are not recovering like other population of Steller sea lions.



Solution Sheet

Ocean Issues	Ocean Solutions
Plastic Pollution	
Human Interactions	
Climate Change	
Habitat Loss	
Fishing	

Ocean Issues Case Studies

Direct Human Interaction

Humans can have a bad effect on marine mammals by hurting them, disrupting their feeding, or separating moms and pups. This happens when people or dogs get too close or touch animals on the beach. In the United States it is illegal to feed or harass wild marine mammals.

Plastic Pollution

Almost all trash in the ocean is plastic. Plastic hurts ocean animals and habitats. Large pieces, like plastic bags, can wrap around marine mammals so they can't swim, breathe, or eat. Large pieces break into smaller pieces that can be accidentally eaten by marine mammals.

Climate Change

Using coal, oil, and natural gas releases Carbon Dioxide (CO₂) into the atmosphere. The ocean absorbs this extra CO₂ and becomes more acidic, making it hard for animals like mussels and clams to grow shells. CO₂ also acts like a blanket, making land, air, and water hotter. This helps melt ice caps and makes it hard for animals to find food.

Indirect Human Interaction

Humans can harm marine animals without interacting with them directly. Constructing buildings on or near the beach destroys habitat where animals live. Ships transporting goods can hit animals and make noise and waves that are disturbing to marine animals.

Overfishing

New commercial fishing gear makes it quicker, cheaper, and easier to harvest fish. Many fish are harvested faster than they reproduce. This makes fish numbers go down so it's hard for fishers and animals to find fish to catch. Without lots of fish in the ocean, ecosystems and economies around the world are in trouble.

Bycatch

Bycatch is when animals and fish are accidentally caught in fishing gear. Animals that are accidentally caught can get choked or injured in fishing gear. People are trying to reduce bycatch by making gear that lets animals escape if they are not meant to be caught.



INDEX

Credit of Involvement

**IF PRINTING
THIS EDUCATION
GUIDE PLEASE
CONSIDER THE
ENVIRONMENT
AND PRINT ON
RECYCLED PAPER**

WRITERS & CONTRIBUTORS

Dirk Holman

Manager | Great Australian Bight Marine Park

Karina Abou-Chakra

Educator | The Marine Mammal Center

Alana Springer

Educator | The Marine Mammal Center

Jennifer Walker

Educator | The Marine Mammal Center

PHOTOGRAPHERS

Sean Bogle, Marie DeStefanis, Bill Hunnewell, Conner Jay, Kerri Stephens © The Marine Mammal Center; Lieutenant Elizabeth Crapo, Sam Farkas © NOAA; Eric Hopson © USFWS; © Vince Smith; © Department of Conservation NZ; Claire Fackler © NOAA/NOS/NMS/CINMS

GRAPHIC DESIGN

Stephanie Mason

Digital Content Producer | Hammer Productions

DISTRIBUTION

K2 Studios

Definition Films

ADDITIONAL RESOURCES

The Marine Mammal Center

<https://www.marinemammalcenter.org>

NOAA

<https://www.noaa.gov>

Australian Marine Conservation Society

<https://www.marineconservation.org.au>

Australian Marine Parks

<https://parksaustralia.gov.au>

Take 3 for the Sea

<https://www.take3.org/>

Head of Bight

<http://headofbight.com.au>

EDUCATION RESOURCES

Page 05

Resource 2.2 contributed by 5 Gyres Science to Solutions [5gyres.org](https://www.5gyres.org)

Page 39

UNEP-WCMC and IUCN (year), Protected Planet:[The World Database on Protected Areas (WDPA)/The Global Database on Protected Areas Management Effectiveness (GD-PAME)] [On-line], [Dec 2019], Cambridge, UK: UNEP-WCMC and IUCN

PRODUCTION TEAM

David Gross

Producer | Definition Films

Sarah Beard

Producer | Definition Films

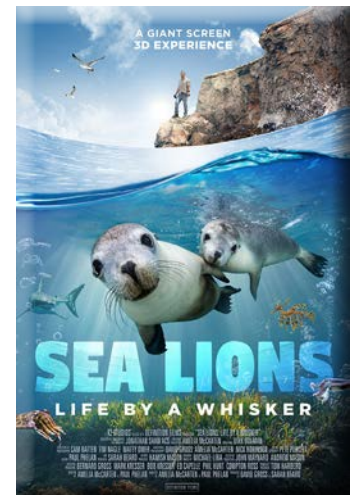
Amelia McCarten

Writer Director | Definition Films

Paul Phelan

Writer Director | Definition Films

Based on the 3D film experience 'Sea lions: Life by a Whisker'



Please note: This publication may be reproduced for classroom use only. This publication may not be reproduced for storage in a retrieval system or transmitted in any form by any means-electronic, mechanical, or recording without prior permission.

CREATED BY



BASED ON THE FILM

SEA LIONS

L I F E B Y A W H I S K E R

