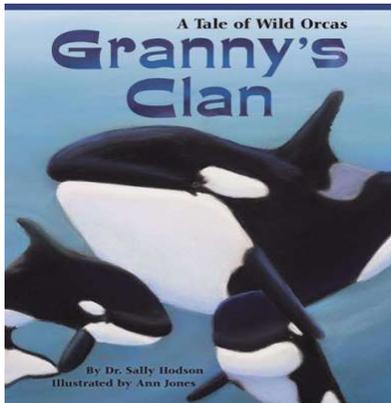


ACTIVITY GUIDE

GRANNY'S CLAN: A TALE OF WILD ORCAS

Written by Dr. Sally Hodson



Granny's Clan: A Tale of Wild Orcas

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Granny's Clan: A Tale of Wild Orcas takes young readers on a real-life adventure with a wild orca family as they welcome a new baby, "see" with sounds, hunt for salmon, play, communicate, face dangers and encounter humans. As the largest of the dolphins, orcas are very intelligent, unique individuals who live complex social lives. Granny's family spends all of their lives together and their family relationships are crucial to their survival. Orca families share food, communicate with each other and care for their little ones. An orca grandmother babysits, teaches and plays with her grandkids just as human grannies do.

After reading *Granny's Clan: A Tale of Wild Orcas*, use these activities to learn more about orcas and their lives in the sea. Each activity offers fun, interactive experiences that enrich and expand concepts presented in the book.

Activities

- ✚ Can be used in any setting with groups of any size
- ✚ Can be adapted for different grade levels (K-4) and for students with different abilities
- ✚ Develop scientific inquiry, critical thinking and problem-solving skills through questions and discussion
- ✚ Offer interdisciplinary content (reading, science, language, writing, art, math, social studies)
- ✚ Emphasize experiential, hands-on learning through investigation and exploration
- ✚ Enhance social skill development through cooperative learning and teamwork
- ✚ Demonstrate how scientists learn about the lives and behavior of animals in the wild
- ✚ Encourage creative thinking and expression through art, story-telling, drama and role-play
- ✚ Support different learning modalities (auditory, visual and kinesthetic)
- ✚ Offer experiences for multiple intelligences (verbal-linguistic, visual-spatial, interpersonal, bodily-kinesthetic, musical-rhythmic, logical-mathematical, intrapersonal, naturalist)
- ✚ Correlate with national and state educational standards

BE CREATIVE! Use your imagination to change or make up new learning activities.

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BLOWHOLES AND BLUBBER

INTRODUCTION

Orcas are warm-blooded mammals that spend their lives in a cold sea. Like humans, they need to stay warm. Under their skin, orcas have a thick layer of fat called **blubber**. Blubber provides insulation that keeps heat in and cold out. Blubber fat can also be burned as energy when orcas can't find food. Orcas breathe air like humans but spend most of their time underwater.

On top of their heads, orcas have **blowholes** that are like nostrils. When they surface to breathe, a muscle flap on their blowhole opens to let in air. When they dive underwater, this muscle flap closes to provide an air-tight seal. Orcas are *voluntary* breathers - they have to think about taking each breath. Humans are *autonomic* breathers - we breathe without thinking about it. When they rest, orcas cannot sleep like humans. They rest with half their brain while the other half stays awake to breathe.

Orcas have smooth skin and sleek, streamlined bodies that help them move easily through water without drag. Their distinctive black and white colors break up their outline and hide them while hunting. Instead of legs, orcas have tail **flukes** that help them swim fast and travel long distances. Instead of arms, orcas have paddle-shaped **pectoral fins** that help them turn, steer and touch their family. The **dorsal fin** on their backs acts like a rudder that helps them steer and keep their balance. Orcas have a mouthful of 40-56 conical-shaped teeth that they use for grasping and tearing their food. Orcas swallow their food without chewing.

KEY CONCEPTS

- Blubber provides insulation that helps orcas stay warm in cold water.
- Orcas are voluntary breathers, while humans breathe automatically.
- An orca's blowhole controls breathing while surfacing and diving.
- An orca's body shape is adapted for efficient breathing and swimming.
- Orcas use their fins and tail flukes to travel, maneuver and touch each other.

INQUIRY QUESTIONS

- Why do humans and orcas need to stay warm in cold environments?
- How do humans stay warm in winter? In cold water?
- Why does blubber provide the best insulation in cold water?
- What would happen if a hungry orca burns up too much blubber for energy?
- Why does an orca need to be aware of breathing? Why can humans be unaware?
- Do you think orcas dream? What do you think they might dream about?
- Why do orcas have large torpedo-shaped bodies and smooth skin?
- How does an orca's black and white color provide camouflage?
- Why are fins more useful than hands if you live in the sea?
- If you had fins and a tail, what could you do that you can't do with arms and legs?

ACTIVITY 1: Staying Warm with Blubber (Be a Scientist)

In this activity, students make predictions and conduct an experiment to learn how blubber helps orcas stay warm in the cold sea.

Materials Needed: 2 half-gallon Ziploc freezer bags, Crisco, rubber glove, duct tape, stopwatch, bucket of water & ice

Preparation:

1. **To make blubber glove:** Fill one Ziploc bag with about 1-2 cups of Crisco. Turn another empty Ziploc bag inside-out and attach to bag w/Crisco. Zip inner bag to outer bag so Crisco is sealed between. Squish Crisco around evenly. Seal edges with duct tape.
2. Use rubber glove by itself.
3. To try other insulation materials (bubble-wrap, cotton balls, foam packing balls), make additional gloves and fill with insulation materials.
4. Fill bucket with water and ice.

Directions:

1. Ask each student to “**Be a Scientist**” and do an experiment to learn how insulation works. Like detectives, scientists ask questions and investigate to find answers. This science toolkit can be used to learn about any field of science.

Be a Scientist TOOLKIT

ASK	<i>What do you want to know?</i>	What is best insulation in cold water?
THINK	<i>How can you find out?</i>	Test different kinds of insulation
EXPLORE	<i>What did you do? Observe?</i>	Blubber glove experiment
SHARE	<i>What did you learn?</i>	Which insulation kept hand warmest

2. Students pair up into teams and take turns as **tester** and **recorder**. One student tests glove while the other records time and test results.
3. Each student team makes predictions about different kinds of insulation on **Staying Warm with Blubber** worksheet.
4. Students conduct **Blubber Glove** experiment.
 - o Place bare hand in ice water and remove it when cold. Record time on worksheet.
 - o Insert one hand in blubber glove. Place hand with blubber glove in bucket of ice water.
 - o Remove hand when cold and record time on worksheet.
 - o Test rubber glove the same way. Record time on worksheet.
 - o Repeat until all student teams have a chance to test the gloves.
5. Complete questions on worksheet.

ACTIVITY 2: Make Life-sized Orca Dorsal Fins

In this activity, students create life-size dorsal fins for Granny, Ruffles, Suttles and Mako.

Materials Needed: black poster board, white & gray acrylic paint, scissors, blank index cards, tape

Directions:

1. Draw a life-size dorsal fin and saddle-patch for each orca on poster board.
Dorsal fins sizes: Ruffles J-1 (6 ft. tall), Granny J-2 (3 ft.), Suttles J-40 & Mako J-39 (2ft.).
2. Cut out and paint dorsal fin/saddle patch for each orca. Make a nametag to identify each orca dorsal fin. Attach dorsal fins to wall or make a stand for each dorsal fin.
3. Find dorsal fin shapes and saddle-patch photos for each orca at the Center for Whale Research: http://www.whaleresearch.com/orca_ID.html

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STAYING WARM WITH BLUBBER

Name	Date
-------------	-------------

Directions:

Student teams take turns as tester and recorder.

TESTER: Make a prediction about how long you can hold hand in ice water before it gets cold. Test bare hand, blubber glove, rubber glove and gloves with other materials.

RECORDER: Record time with stopwatch. Write results on worksheet. Switch jobs and repeat.

MATERIALS	PREDICTIONS <i>How long before your hand gets cold in ice water?</i>	RESULTS <i>Record time hand held in water</i>	WHICH IS BEST? <i>Which is best way to stay warm? Number from best to worst (1 = best)</i>
Bare hand			
Blubber glove			
Rubber glove			

What did you learn?

Which is the best insulation?

Why do you think so?

Why did we test the water with a bare hand?

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SEEING WITH SOUNDS

INTRODUCTION

Orcas travel with their families in a dark undersea world. Like other dolphins, orcas use sounds to navigate, find food, communicate and stay together. Sounds travel faster and farther in water than in air. Orcas use a special adaptation called **echolocation** to “see” with sounds. Sound echoes provide orcas with information about an object’s size, shape, speed, distance and direction. From nasal sacs beneath their blowholes, orcas produce rapid, high-pitched sonar clicks. These sounds pass through the orca’s **melon** (forehead) where they are focused into a narrow beam of sound and projected forward into the water. When these sound waves hit an object, echoes bounce back to the orca. ECHO . . . ECHO . . . ECHO . . . The orca’s jawbone receives these sound waves and sends them to the orca’s ear and brain. When scanning distant objects, orcas echolocate slowly. As they get closer, their sound clicks speed up.

Resident orcas of Granny’s clan eat fish and use echolocation sounds to find salmon, their favorite food. Residents are very noisy as they echolocate for salmon and talk with each other. **Transient** orcas, another clan of killer whales, eat seals and other sea mammals. They hunt silently, sometimes turning off their echolocation clicks to sneak up on seals. Seals listen for orca sounds to figure out whether resident or transient orcas are approaching. They stay in the water when resident orcas pass by but quickly climb out onto rocks when transient orcas approach.

KEY CONCEPTS

- Orcas use sounds to navigate, find food and locate family in their dark underwater world.
- Echolocation helps an orca to “see” with sound echoes that provide information about an object’s identity and location.
- Different orca clans use sounds or silence to help them catch their food.

INQUIRY QUESTIONS

- How does echolocation help orcas survive in a dark underwater environment?
- How do orcas “see” with sounds?
- What different ways do humans “see” in the dark?
- How would your life be different if you had to use sound echoes to navigate?
- Why is echolocation more effective than orca eyesight in locating fish in dark waters?
- How do seals use sound as an early warning that transient orcas are hunting nearby?

ACTIVITY 3: Echoes Show the Way

In this activity, students learn how to use sounds to find their way and locate objects in a dark environment.

Materials Needed: blindfolds, blank index cards, tape, clickers (like those for dog training)

Preparation: Write name cards for *orca*, *salmon* & *rocks*

Directions:

1. To see a diagram of echolocation in action, go to:
<http://www.whaleresearch.com/facts.html>
2. Assign students to play different roles: **ocean circle**, **salmon**, **rocks**, **orcas**.

3. In a large open area, ask “*ocean*” students to form a circle to represent the ocean. The ocean boundary keeps the “*orca*” inside.
4. Distribute name cards to students who will play *orca*, *salmon* and *rocks*. Tape name cards on chest.
5. Blindfold one *orca* and ask to wait outside *ocean* circle. Ask “*rocks*” to stand, sit or lay inside circle. Ask “*salmon*” to walk slowly inside circle.
6. Guide blindfolded *orca* into the center of the ocean circle.
7. Give *orca* a clicker. *Orca* clicks to discover what’s in its path. *Salmon* move slowly and say “*salmon*” whenever the orca clicks nearby. *Rocks* don’t move and call out “*rock*” whenever the *orca* clicks nearby.
8. *Orca* follows *salmon* by listening to the sounds of their voices. *Orca* tries to find *salmon* while avoiding rocks. When the *orca* tags a *salmon* by touching it, the *salmon* is caught and leaves *ocean* circle.
9. Add additional *orcas* inside circle.
10. Switch roles and repeat role-play.

Discuss: Was it hard to find your way and locate objects without your eyesight? Why? Was it easier to catch salmon with several orcas?

ACTIVITY 4: Who’s Out There?

In this activity, students learn how seals recognize the difference between **resident** orcas that eat only fish and **transient** orcas who hunt seals.

Materials Needed: black construction paper, black index cards, tape

Preparation: Cut out dorsal fins for resident and transient orcas to wear. Make seal name cards.

Directions:

1. Line up chairs facing each other in two long rows. Chairs represent “*rocks*” and the area between is the “*sea*.”
2. Divide students into two groups – **orcas** and **seals**.
3. *Orcas* and *seals* tape on their name cards.
4. *Orcas* practice echolocation sounds (click . . . click . . . click) and calls (eek . . . eek . . . eek).
5. *Seals* are given instructions to move about the sea searching for fish.
6. *Orcas* are divided into 3-4 groups. The first *orca* group is given whispered instructions (to be transients or residents) so that seals cannot overhear.
7. **ORCA INSTRUCTIONS:**
 If *Resident orcas*: Echolocate and call out to each other. Ignore *seals*.
 If *Transient orca*: Move quietly through the *sea*. Try to sneak up on an unsuspecting *seal*. If you tag *seal*, *seal* is caught and leaves *sea*.
SEAL INSTRUCTIONS: Watch and listen to approaching *orcas*. Transients or residents? You can ignore noisy *orcas*. Quiet *orcas* want to hunt you, so get out of the water onto the rocks (chairs). If tagged by an *orca*, *seal* leave the *sea*.
8. Repeat role-play. *Seals* return to water and continue to fish.
9. Give different instructions to the next group of *orcas*.

Discuss: Why do you think it’s important for seals to be able to recognize the difference between resident and transient orcas? Why do seals use sound as an early warning signal to alert them that transient orcas are hunting nearby?

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WHO'S WHO?

INTRODUCTION

Like people, each orca looks a little different. Over the years, scientists have photographed and identified all the individual orcas in Granny's clan. They discovered that each orca has a natural "***fingerprint***" with unique orca features such as: the **size** and **shape** of the **dorsal fin**, the shape of the gray **saddle patch** and any **nicks** or **cuts**. By recognizing individual animals, scientists can count the orca population, understand their family relationships, interpret their behavior, learn about how they use their habitat and predict their food requirements. This orca family album is called a **photo ID** catalog. Each orca has been given a 3-part *orca ID*: a **letter** (indicates family pod - **J, K or L**), an individual **number**, and a **name**. For example: Granny is J-2.

KEY CONCEPTS

- Scientists can recognize and identify individual orcas using photo ID.
- Each orca has a unique set of features (dorsal fin, saddle-patch, nicks/scars) that is like a "***fingerprint***."
- An orca's ID includes pod letter, individual number and name.
- Humans have names, physical features, numbers and fingerprints that help identify them.

INQUIRY QUESTIONS:

- How do scientists recognize individual orcas?
- How are orca and human fingerprints similar? Different?
- Why is it important for scientists to be able to recognize individual orcas?
- What clues do other people use to recognize and identify you?
- If you were an orca, how would you be able to recognize individual humans?

ACTIVITY 5: Orca Trading Cards

In this activity, students learn how to identify individual orcas in Granny's clan.

Materials Needed: blank index cards, markers, colored pencils, glue

Directions:

1. Students observe and compare orca differences.
Go to the Center for Whale Research to look for ***orca fingerprint*** clues:
http://www.whaleresearch.com/orca_ID.html
Dorsal fin Size: Adult male – 6 ft. Adult female –3 ft. Juvenile – 2 ft.
Dorsal fin shape: wavy, pointed, curved, tall
Saddle-patch: gray, open or closed swirls
Nicks or scars
2. Each student is assigned an orca in Granny's clan.
3. Distribute **Orca Trading Cards** with the pod letter and number of student's assigned orca.
4. Students identify and learn more about their orca, such as: name, age, sex, relatives, etc.
Go to Orca Adoption Program at The Whale Museum to find information about each orca:
<http://www.whale-museum.org/programs/orcadoptio/whalelist.html>

5. Students complete an **Orca Trading Card** for their assigned orca, including a drawing of the orca's dorsal fin and saddle-patch.
6. When the **Orca Trading Card** is complete, glue to blank index card.
7. Display and share **Orca Trading Cards** on bulletin board.

ACTIVITY 6: My Orca ID

In this activity, students learn how to create an individual orca ID.

Materials Needed: Inkpad, art materials

Directions:

1. Distribute and complete **My Orca ID** worksheet.
2. Students imagine that they are members of Granny's clan and create their own orca identity.
3. Draw yourself as orca and create your own "**orca fingerprint**" with your own unique dorsal fin and saddle patch.
4. Join one of the pods and give yourself an orca name, letter (J, K, or L) and number.

Discuss: Compare your human and orca fingerprints with other students. How are they similar? Different? What are examples of how we identify individual humans? (photos, fingerprints, Social Security #, driver's license, birth certificate, etc.)

ACTIVITY 7: Make Orca Dorsal Headband

In this activity, students make an orca dorsal fin headband with characteristics similar to their individual orca ID.

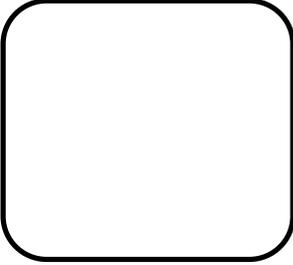
Materials Needed: black construction paper, tape, markers, glue sticks, stapler, scissors, elastic

Directions:

1. Draw a dorsal fin pattern on poster board to make template.
2. Use template to draw outline (about 12" high) on black construction paper. Make two copies for each student.
3. Each student cuts out their two dorsal fins.
4. Tape fins together along front of dorsal. On back of dorsal, run tape part way down. Leave rest open to spread over head.
5. Personalize with your own "**orca fingerprint.**"
6. Cut out 1-2" wide strips about 18" long of black construction paper for headband.
7. Attach headband to bottom side of dorsal fin with staples facing out.
8. Staple 6" strip of elastic to one side. Measure on head to fit. Staple elastic on other side.
9. Decorate with name, art materials and stickers.

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ORCA TRADING CARD

ORCA ID	Orca Relatives:
Name _____	
Pod _____ Number _____	
Age _____ Birth year _____	
Male or Female _____	
About:	Dorsal fin and saddle-patch
	

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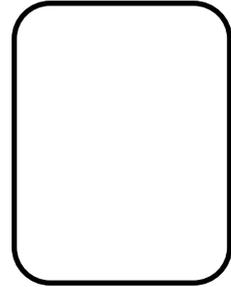
MY ORCA ID

My Human Name

My Human Fingerprint

Use inkpad to place your human fingerprint.

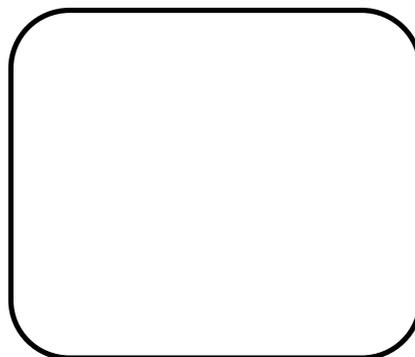
My Human Self-Portrait: Draw your human self.



Imagine that you are an orca in Granny's clan. Draw yourself as orca and create your own "**Orca Fingerprint**" with your own unique dorsal fin and saddle patch. Join one of the pods and give yourself an orca name, letter (J, K, or L) and number (choose any number over #200).

My Orca Pod _____ My Orca Number _____ My Orca Name _____

My orca dorsal fin and saddle-patch



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ALL IN THE FAMILY

INTRODUCTION

There are many different kinds of human and animal families. In Granny's **clan**, there are three big family groups called **pods**. Each pod (J, K and L) is led by the oldest female. Orcas in Granny's clan spend all of their lives with their mother and her family. Many generations of relatives live together, like a family reunion all the time. Males leave for a short time to mate with females in other families, but return to help raise their nieces and nephews. An orca family works together to find food, care for each other and teach the young ones.

Like human children, young orcas need to learn lots of skills. But they don't go to a school building to learn. Their school is the sea and their teachers are their grannies, moms, uncles, aunties, older brothers and sisters. If you went to **orca school**, you would learn skills like: how to use echoes to navigate, how to understand your family's calls, how to find your favorite kind of salmon and how to swim safely around boats. Sometime young orcas babysit their younger siblings and cousins. Snack time includes a fat tasty salmon. There's always time for play and games to practice breaching, tail-slapping and spy-hopping.

KEY CONCEPTS

- Orca families and human families help provide basic needs.
- The three big families in Granny's clan are called **pods**.
- Young orcas must learn and practice many skills to survive.
- Older family members teach and babysit younger orcas.

INQUIRY QUESTIONS

- What makes a family? Why is family important?
- Who lives in Granny's family? Who lives in your family?
- What different ways do orca families help each other survive?
- How is your human family similar to an orca family? Different?
- How would your life be different if you lived in an orca family?
- What would it be like to grow up with no family?
- Do you think a young orphaned orca could survive without family? Why? Can a human?
- Why do young humans and orcas need to learn so many things as they grow up?
- What would happen if a young orca or human didn't have any teachers?
- How do you think games help young orcas and humans learn things?

ACTIVITY 8: Family Totem Pole

In this activity, students create a classroom totem pole to tell the story of Granny and her family and make individual totem poles to tell their own family stories.

Totem poles were carved and painted by Native American tribes in the Pacific Northwest to celebrate family history and important events in their lives. A totem pole placed at the entrance of a family home told that family's story and ancestry using animal symbols, called "**totems**." A totem pole story is read from top to bottom.

Directions:

Granny's Clan Totem Pole

Materials Needed: coffee cans, construction paper, tape, glue, decorations, paint, markers, crayons

Directions:

1. Ask students to identify story characters, animals, symbols and other objects that tell about Granny and her clan.
2. Stack empty coffee cans on top of each other to make large totem pole. Tape together.
3. Cut construction paper into horizontal strips, with a different color for each totem section.
4. Assign students to work in small teams to design each totem pole section. Draw orcas, salmon, story characters, symbols, other animals, etc.
5. Wrap a totem story strip around each can and glue. Add other decorations.

My Family Totem Pole

Materials Needed: empty paper towel rolls, construction paper, tape, glue, decorations, paint, markers, crayons, craft sticks

Directions:

1. Ask students to identify objects and symbols that represent their family's story and history.
2. Each student gets an empty paper towel roll to use as totem pole.
3. Cut construction paper into horizontal strips, with a different color for each totem section.
4. Design each totem pole section with drawings, pictures, objects, symbols and photos that tell their family's story and history.
5. Wrap totem story strips around the towel roll and fasten with glue or tape.
6. Glue two craft sticks to base so the totem pole can stand upright. Add other decorations.
7. Write a story about your family totem pole. Share your totem pole with other students.

ACTIVITY 9: Family Story Quilt

In this activity, students learn how quilts are created and used to tell a story. A quilt is a type of blanket made of many fabric squares stitched together. Quilts can be used to tell a visual story like a photo album or memory scrapbook. Story quilts celebrate an individual's life or a family story.

Materials Needed: drawing & construction paper, large piece of poster board, markers, crayons, paint, glue or tape

Directions:

Granny's Family Story Quilt

1. Each student designs and contributes a drawing showing a story picture about Granny and her family for Granny's ***Family Story Quilt***. Add one or two words inside each square to describe story scene and sign story quilt picture.
2. Assemble student story squares for quilt and glue to poster board. Create a border for quilt and display on the wall.

My Family Story Quilt

1. Each student creates ***My Family Story Quilt*** to tell their own family story.
2. Divide drawing paper into 16 squares (4 across and 4 down).
3. Draw a picture inside each square that tells something about your family history and experiences. Draw pictures of your family, relatives, pets and home. Show favorite family activities, foods, vacations, holidays, celebrations, games, important family events and family treasures (home run baseball from Mets game or Grandma's china teapot).
4. Add one or two words inside each quilt square to describe the story scene.
5. Glue quilt on construction paper to make a border. Write your family name at top of border.

ACTIVITY 10: Family Story Box

In this activity, students create a family story box with objects (photos, drawings, objects) that represents their family's history and experiences.

Materials Needed: shoeboxes, wrapping paper, tape, ribbons, drawing paper, crayons, markers, photos, index cards, glitter

Directions:

Granny's Story Box

1. The class decorates a shoebox with wrapping paper for Granny's **Family Story Box**.
2. What objects would tell her family story?
3. Students fill Granny's **Family Story Box** with orca treasures.

Granny's Family Story Box Treasures

Draw, find photos, collect objects and write about treasures for Granny's Family Story Box.

- Activities orca family does together
- Favorite orca family games
- Favorite orca family foods
- Favorite family celebrations and traditions (superpose, greeting ceremony)
- Photos or drawings of orca family and relatives
- Favorite orca family stories
- Orca family history
- Favorite orca toys
- Orca family home

My Family Story Box

1. Each student decorates a shoebox with wrapping paper and other materials for their **Family Story Box**.
2. Students create and gather objects for their **Family Story Box**.
3. Students fill their **Family Story Box** with family treasures (drawings, photos, writings and small objects) that tells about their family story.
4. Each student picks one "family treasure" to share with class. Write a story about it.

My Family Story Box Treasures

Draw, find photos, collect objects or write about as many of these as you can for Family Story Box.

- Activities your family enjoys doing together
- Favorite family games
- Favorite family foods
- Favorite vacations
- Favorite family holidays, celebrations,
- Favorite family traditions (tooth fairy, Father's Day pancake breakfast)
- Photos or drawings of your family and relatives
- Favorite family stories
- Family history, country of ancestors
- Family treasures (home run baseball from Mets game)
- Objects that represent your family history (china teapot from your great-grandmother)
- Things that makes your family special (all have green eyes or can speak Spanish)
- Your favorite toys from childhood
- Certificates, awards, report cards
- Your family home
- Family pets

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GREAT GRANNIES

INTRODUCTION

Grandmothers play a very special role in the lives of their families. Grandmothers tell family stories, share adventures, teach skills, play games, babysit, pass on family traditions and spend time with their grandkids. In Granny's clan, an orca grandmother also plays a special role in her family. Like humans, orca females stop having babies at about 50 years of age, but live for many more years. During her long life, an orca grandmother acquires knowledge and experience that can help her family survive. An orca granny often babysits, plays with and helps care for the little ones in her pod. She may share her mothering skills with a new mother in her family or spend extra time with a young orphan who has lost his mother.

Scientists believe that Granny (J-2) was born in 1911, making her over 100 years old and the oldest member of her clan. Granny was born just after the first airplane took flight and the first Model T Ford car was built. Granny's age is estimated from studying her family tree and historical photos. Orca families come together for an orca celebration called a ***superpod***. At this gathering, orcas play, socialize and seem to have lots of fun.

KEY CONCEPTS

- Human and orca grandmothers are important to their families.
- Orca grandmothers have experience and knowledge that can help their families survive.
- Both humans and orcas celebrate and play with their families.

INQUIRY QUESTIONS

- Why is your grandmother important to your family?
- What do you like to do with your grandmother?
- How do orca grannies help their families?
- How are human and orca grannies similar? Different?
- Imagine in the future that you are a grandparent. What would you be like?
- If you were an orca, would you like to have Granny as your grandmother?
- Why do humans celebrate birthdays? What do you like to do on your birthday?
- Why do you think orcas have superpod celebrations?
- If you were an orca, how would you celebrate Granny's 100th birthday?

ACTIVITY 11: Granny's Life Story

In this activity, students explore the lives of grandmothers in human and orca families through interviews.

Directions:

1. Discuss why human and orca grandmothers are important to their families.
2. Ask students to share their earliest memories of their grandmothers.
3. Explain what an interview can tell us about another's life story.

Granny's (J-2) Life Story

1. Imagine that you could interview Granny, the great-grandmother orca of J pod.
2. With another student, role-play an interview with Granny. One student plays Granny, while the other is the interviewer.
3. Ask questions and record answers on **Granny's (J-2) Life Story** worksheet. Switch roles.

My Granny's Life Story

1. Ask students to interview their grandmothers (or other senior relatives).
2. Discuss and practice asking interview questions.
3. Ask the questions and record answers on **My Granny's Life Story** worksheet.
4. Assign a projected date to complete interviews. Interviews can be done in person or phone.
5. Ask each student to share one special thing they learned about their grandmothers.

ACTIVITY 12: Granny's Memory Scrapbook

In this activity, students make scrapbooks to share and record the life stories of both orca and human grandmothers.

Materials Needed: drawing paper, art supplies, glue, yarn

Directions:

Granny's (J-2) Scrapbook

1. Design a 100th Birthday Scrapbook for Granny (J-2) that tells her life story in pictures and words. Use drawing and construction paper to make a scrapbook. Fold pages in half for scrapbook interior.
2. Create drawings and include some answers from your imaginary interview with Granny.
3. Make and decorate cover. Assemble pages and tie with yarn.

My Granny's Scrapbook

1. Use drawing and construction paper to make a scrapbook that tells your grandmother's story in words and pictures. Fold pages in half for scrapbook interior.
2. Include your grandmother's answers to interview questions, create drawings and add photos of your grandmother. Make and decorate cover. Assemble pages and tie with yarn.
3. The Legacy Project offers a great **Generations Scrapbook** that is ready to use. Download from: <http://www.legacyproject.org/activities/genscrapbook.pdf>

ACTIVITY 13: Make an Orca Bookmark

Materials Needed: poster board, drawing and construction paper, photos, markers, crayons, colored pencils, glue, stickers, ribbons and yarn

Directions:

1. Cut out bookmark template 6" long and 2" wide from poster board.
2. Use template to make bookmark copies on construction paper for each student.
3. Draw Granny (J-2) or other orcas on bookmark or glue orca photos on bookmark.
4. Decorate and color both sides of bookmark with markers, colored pencils, ribbons, yarn.
5. Add your name or a message. Laminate bookmark.

ACTIVITY 14: Make a Birthday Card for Granny's 100th Birthday

Materials Needed: construction paper, drawing paper, ribbons, glue, glitter

Directions: Use construction paper to make a birthday card for Granny. Design cover. Write a birthday message to Granny. Draw scenes or pictures of Granny. Add photos. Sign your card.

*Celebrate Granny's 100th birthday with a party. Create orca invitations and decorate the classroom with orca decorations. Serve orca-shaped cookies.

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GRANNY'S (J-2) LIFE STORY

Name	Date

Directions:

1. Imagine you are talking with Granny (J-2), the real orca great-grandmother of J pod.
2. One student acts plays the role of Granny and the other acts as interviewer and records answers to questions.
3. When the interview is completed, switch roles and repeat.

INTERVIEW QUESTIONS

1. What's it like to live in an underwater world?
2. What does it feel like to be an orca?
3. How do you stay close to your family?
4. What games do you play?
5. What food do you like best?
6. What skills did you have to learn?
7. What's it like to sleep with half your brain awake?
8. What are you afraid of?
9. What is your happiest memory of your childhood?
10. What do you like to do with your grandkids?
11. What was your life like as a young orca?
12. What did your grandmother teach you?
13. What's different about growing up today from the time you grew up?
14. What do you want your children and grandchildren to remember about you?
15. What do you think of humans?
16. What question would you like to ask humans?
17. What message would you like to give humans?

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MY GRANNY'S LIFE STORY

Name	Date
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INTERVIEW QUESTIONS

Directions:

Set a time to meet with your grandmother in person or by telephone. If your grandmother isn't available, find another senior relative, neighbor or friend to interview. Ask the interview questions and record your grandmother's responses.

My Grandmother's Name _____

1. When were you born?
2. Where were you born?
3. Where did you grow up?
4. What is your happiest memory of your childhood?
5. What is the most important lesson your grandmother (or parents) taught you?
6. What did you do for fun?
7. What was your favorite subject in school?
8. Did you have any pets?
9. What was your favorite toy?
10. What was your favorite book?
11. Who was your best friend?
12. How did your family celebrate holidays?
13. What was the best gift you remember getting as a child?
14. What did you want to be when you grew up?
15. What was your first job?
16. What's different about growing up today from the time you grew up?
17. What advice would you give me?
18. What do you want your children and grandchildren to remember about you?

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HOME SWEET HOME

INTRODUCTION

Every plant, animal and human needs a place to live. Our **habitat** provides us with what we need to survive: food, water, shelter, space and safety. A plant or animal's habitat can be a pond, a coral reef, a forest, a meadow, an ocean, a desert, a sandy shore or a kelp forest.

Granny and her clan are called **residents** because they spend most of their time in their Salish Sea home range. Their habitat provides salmon and space for their family to survive. Another group of orcas, called **transients**, sometime pass through the home range of the residents. Transients live in small family groups that travel along the entire Pacific coast. Unlike Granny's clan who eat only fish, transients hunt marine mammals like seals, porpoise and whales. When transients and residents travel through the same area, they avoid each other, with one group leaving if the other is present.

Like orcas, humans have habitats that help us survive. Our human habitats include our homes, yards, neighborhoods, stores, parks, roads and towns.

KEY CONCEPTS

- All plants, animals and people need a habitat to meet their survival needs.
- Habitats provide food, water, shelter, space and safety.
- Different orca clans share the same ocean habitat but live different lifestyles.

INQUIRY QUESTIONS:

- Why does every plant, animal and human need a habitat?
- How does a habitat help a plant or animal survive?
- Could you live in an orca's habitat? Could an orca live in your habitat? Why?
- Why do you think resident and transient orcas avoid each other?
- If a plant or animal loses its habitat, can it survive?
- How does your home help you survive? Food? Water? Shelter? Clothing? Space? Safety?

ACTIVITY 15: Wanted: Habitat for Orcas

In this activity, students design an ideal habitat for the orcas in Granny's clan.

Directions:

1. Ask students to close their eyes and imagine that they are orcas in Granny's clan. Visualize an ideal habitat. *What do orcas need to survive? How can they get it? What does it look like?*
2. Distribute **Wanted: Habitat for Orcas** worksheet.
3. Ask students to describe and draw pictures of their ideal orca habitat.
4. Help the orcas write an advertisement for an ideal orca habitat.
5. Give Granny and her clan a deed to their idea habitat.

ACTIVITY 16: How Many Fish?

In this activity, students calculate how many salmon the orcas of Granny's clan will need in their ideal habitat.

Directions:

Use this information to calculate an **Orca Food Budget** for Granny's clan:

- Each orca eats about 15 Chinook salmon each day
- Each salmon weighs an average of 20 lbs. each
- 365 days per year
- 87 orcas in Granny's clan

How many Salmon are needed each year by Granny's clan?**Daily Food Budget**

_____ Total number of orcas in Granny's clan
X _____ # of salmon eaten by each orca per day
_____ Total # salmon needed by clan each day

Yearly Food Budget

_____ Daily # of salmon eaten by clan
X _____ # of days per year
_____ Total # of salmon needed by clan per year

How many lbs. of salmon does an orca eat each day?

_____ # of Chinook salmon eaten by an orca each day
X _____ Average weight of each Chinook
_____ Total # lbs. of salmon needed by an orca each day

How many lbs. of salmon are needed each year by Granny's clan?**Daily Food Budget**

_____ Total number of orcas in Granny's clan
X _____ # of lbs. salmon eaten by each orca per day
_____ Total # lbs. of salmon needed by clan each day

Yearly Food Budget

_____ Daily #lbs. of salmon eaten by clan
X _____ # of days per year
_____ Total # lbs. of salmon needed by clan per year

ACTIVITY 17: Create an Orca Habitat Wall Mural

In this activity, students transform a classroom wall into an undersea orca habitat.

Materials Needed: roll of butcher paper, tape, scissors, paints, markers, construction paper, glue, crepe paper, crayons, string, yarn, brushes

Directions:

1. Cut a long piece of butcher paper and tape to classroom wall.
2. Make a general sketch for the mural.
3. Paint background blue-green. Paint rocks, plants, birds and animals on mural.
4. Assign students to draw and cut out orcas and other animals. Try to create 3D effect.
5. Make kelp from green crepe paper. Draw animals and rocks.
6. Hang kelp and animals from ceiling or attach to mural.

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WANTED: HABITAT FOR ORCAS

Name	Date

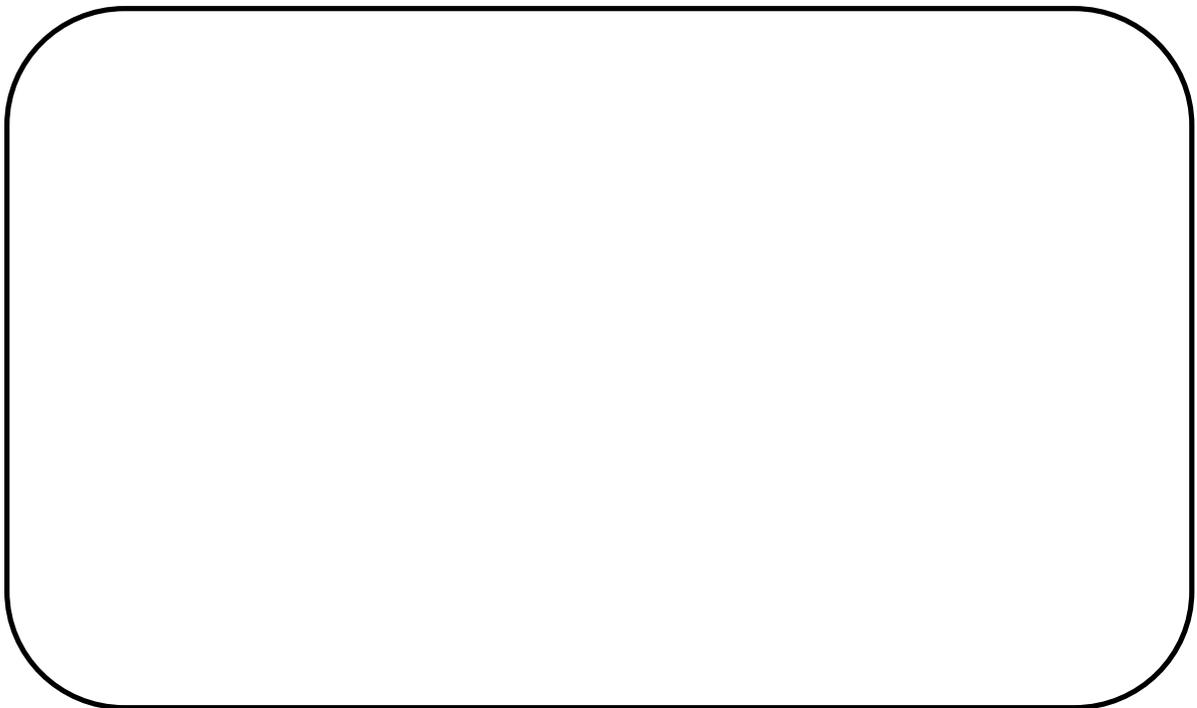
ORCA HABITAT CHECKLIST

Imagine that you are an orca in Granny's clan. Describe what you need in your habitat to survive.

Food	_____
Clean water	_____
Safety	_____
Space	_____

Draw a picture of Granny's clan in their ideal habitat. Label each part of their habitat.

ORCA HABITAT

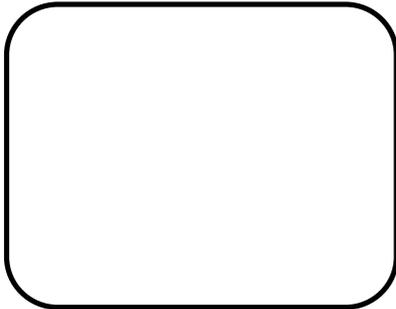


WANTED: HABITAT FOR ORCAS

Write a newspaper want ad for an ideal habitat for the orcas of Granny's clan.

Example:

WANTED: Home in the Sea. Great ocean views. Salish Sea location. Friendly marine wildlife neighbors. Lots of tasty salmon. Clean water, free of toxins & sewage runoff. Room to play and raise young. Quiet area with little boat noise.



Write your own **ORCA HABITAT WANT AD**

DEED TO ORCA HABITAT

Design a deed to give Granny and her clan their orca habitat.

Example:

DEED
to
ORCA HABITAT
Let it be known that

Orcas of Granny's clan
J pod, K pod, L pod

and all their future grandchildren

are the true and legal owners
of their habitat in the Salish Sea.

By _____
Date _____



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WHAT'S FOR DINNER?

INTRODUCTION

Everybody eats. Plants, animals, orcas and people all need energy to survive. Plants are **PRODUCERS** who make their own food from sunlight and nutrients. Animals are **CONSUMERS** who eat plants and other animals. **Herbivores**, like deer and elephants, eat only plants. **Carnivores**, like orcas and wolves, only eat meat. **Omnivores**, like bears and people, eat both plants and animals. **DECOMPOSERS**, like bacteria and fungi, eat dead organisms.

What an animal eats depends on where it lives, what body parts it has and what food sources are available. Plants and animals are connected to each other in relationships called *food chains* and *food webs*. A **food chain** shows how food energy flows from one living organism to another in a simple direct link. A **food web** shows a network of food relationships between many different organisms in an ecosystem. At each step in a food chain, plants or animals use energy for growth, survival and reproduction. There are always fewer organisms eating at the end of a food chain than at the beginning. *For example:* Millions of plankton are needed to feed thousands of herring which can feed hundreds of salmon which can provide enough food for one orca.

KEY CONCEPTS

- Plants and animals need energy to survive.
- A **food chain** shows how food energy flows from the one living creature to another.
- A **food web** shows the energy relationships between many different plants and animals in an ecosystem.
- Orcas are consumers and carnivores. Humans are consumers and omnivores.

INQUIRY QUESTIONS

- Why do we need producers, consumers and decomposers in an ecosystem?
- How do herbivores avoid being eaten? How do carnivores succeed at catching prey?
- How would your life be different if you had to find your food instead of getting it at a supermarket?
- How is a human food chain similar to an orca's? Different?
- If a part of a food web is disturbed, what might happen?

ACTIVITY 18: Dinner at the Killer Whale Café

In this activity, students experience how energy flows through an orca food chain.

Materials Needed: For a class of 30 students, use:

- 150 green poker chips to represent **diatoms**, a tiny marine plant (phytoplankton)
- 50 blue poker chips to represent **copepods**, a tiny marine animal (zooplankton)
- 20 white armbands to represent **herring**
- 8 red armbands to represent **salmon**
- 2 black armbands to represent resident **orcas**
- 20 plastic bags for herring to collect diatoms and copepods, stopwatch

Directions:

1. Designate a defined circle area as the “*sea*.”
2. Assign role to each student with corresponding armband.
3. Place green (diatoms) and blue (copepods) poker chips throughout the *sea*.
4. Explain to students that they are going to role-play animals in an orca food chain.
Orca eats →salmon eats→herring eats →plankton (diatoms & copepods)
5. *Herring* go into *sea* with a bag to collect plankton. Pick up poker chips & collect in bags.
6. After 3 minutes, *salmon* are sent into sea to “catch” *herring*. Herring are caught by tagging.
Once tagged, *herring* surrender their bags of *plankton* to *salmon* and sit outside the sea.
7. After 3 minutes, *orcas* enter the sea and “catch” *salmon*. Salmon are caught by tagging.
Once tagged, *salmon* sit outside the sea. Stop game after 3 minutes.

Discuss: How many of each species survived? Why must there be more plankton than herring? More herring than salmon? More salmon than orcas? How did you avoid being eaten? What did you do to catch your food?

ACTIVITY 19: Tangled in a Web

In this activity, students explore how plants and animals interact in an orca food web.

Materials Needed: ball of string, tape, **Critter Cards**

Directions:

1. Ask students to sit in a circle on the floor.
2. Explain to students that they will demonstrate how a *food web* functions.
3. Put **Critter Cards** in the pile inside the circle.
4. One student gets the *Sun* card and sits in the middle of the circle.
5. Each student picks a card from the pile. Students use tape to attach cards to clothing.
6. The *Sun* gets ball of string and tosses it to a student sitting in the circle.
7. The student identifies his/her **Critter Card** name and tells what they eat.
8. The student holds onto string and tosses the ball to the student whose critter eats or is eaten by this critter.

Example: I am Seal. I eat Rockfish. Holds onto string and tosses ball to Rockfish. →
I am Rockfish. I eat crabs. Holds part of string and tosses ball to Crab. →
I am Crab. I eat Kelp. Holds part of string and tosses ball to Kelp. →
I am Kelp. I make food from sunlight and nutrients. Holds part of string and tosses ball to Sun. → I am Sun.

ACTIVITY 20: Make an Orca Mobile

In this activity, students create a mobile showing orcas fishing for salmon.

Materials Needed: cardboard paper towel roll per student, string, yarn, ribbon, construction paper, markers, crayons, glue, tape, hole-punch

Directions:

1. Use cardboard roll as mobile hanger base. Wrap with construction paper and decorate.
2. Draw and cut out at least four orcas (Granny, Ruffles, Suttles & Mako) and several salmon.
3. Punch holes and attach varying lengths of string or yarn to the top of each orca and salmon.
4. Tie ends of each orca and salmon to mobile base.
5. Arrange orcas and salmon to hang at different lengths from mobile base.
6. Run yarn through mobile base and tie to hang.

CRITTER CARDS

<p>BALD EAGLE</p> <p>I am Bald Eagle.</p> <p>I eat Salmon.</p>	<p>HARBOR SEAL</p> <p>I am Harbor Seal.</p> <p>I eat Rockfish.</p>	<p>ROCKFISH</p> <p>I am Rockfish.</p> <p>I eat Crab.</p>
<p>RESIDENT ORCA</p> <p>I am resident Orca.</p> <p>I eat Salmon.</p>	<p>COPEPOD</p> <p>I am Copepod, a tiny animal that floats in the sea.</p> <p>I eat Diatom.</p>	<p>DIATOM</p> <p>I am Diatom, a tiny plant that floats in the sea.</p> <p>I make food from Sunlight.</p>
<p>CRAB</p> <p>I am Crab.</p> <p>I eat Diatom.</p>	<p>HERRING</p> <p>I am Herring.</p> <p>I eat Copepod.</p>	<p>SALMON</p> <p>I am Salmon.</p> <p>I eat Herring.</p>

CRITTER CARDS

<p>SUN</p> <p>I am Sun.</p> <p>I give my energy to plants.</p>	<p>DOGFISH SHARK</p> <p>I am Dogfish Shark.</p> <p>I eat Crab and Herring.</p>	<p>SEA OTTER</p> <p>I am Sea Otter.</p> <p>I eat Sea Urchin.</p>
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<p>SEA URCHIN</p> <p>I am Sea Urchin.</p> <p>I eat Kelp.</p>	<p>OCTOPUS</p> <p>I am Octopus.</p> <p>I eat Crab.</p>	<p>BLUE HERON</p> <p>I am Blue Heron.</p> <p>I eat Snail and small fishes.</p>
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<p>ABALONE</p> <p>I am Abalone.</p> <p>I eat Kelp.</p>	<p>KELP</p> <p>I am Kelp.</p> <p>I make food from Sunlight.</p>	<p>SEA LION</p> <p>I am Sea Lion.</p> <p>I eat Octopus and Shark.</p>
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CRITTER CARDS

<p>SHRIMP</p> <p>I am Shrimp.</p> <p>I eat Copepod.</p>	<p>MINKE WHALE</p> <p>I am Minke Whale.</p> <p>I eat Herring.</p>	<p>SQUID</p> <p>I am Squid.</p> <p>I eat Shrimp.</p>
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<p>SEA STAR</p> <p>I am Sea Star.</p> <p>I eat Clam and Anemone.</p>	<p>ANEMONE</p> <p>I am Anemone.</p> <p>I eat Shrimp.</p>	<p>SNAIL</p> <p>I am Snail.</p> <p>I eat Kelp.</p>
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<p>JELLYFISH</p> <p>I am Abalone.</p> <p>I eat Kelp.</p>	<p>CLAM</p> <p>I am Clam.</p> <p>I eat Diatom.</p>	<p>GULL</p> <p>I am Gull.</p> <p>I eat Crab and Sea Urchin.</p>
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SALMON JOURNEY

INTRODUCTION

Salmon are sleek silvery fish with deeply forked tails. Salmon begin life in fresh water, migrate to the ocean and return to their home streams to spawn and die. Five species of salmon live in the Salish Sea – Chinook, Chum, Sockeye, Coho and Pink. Each salmon species has uses a different area of their stream habitat and migrates at a different time of the year. A salmon begins life as a tiny red **egg** in a gravel nest, called a **redd**, beside several thousand other eggs. The newly hatched salmon, called an **alevin**, carries its egg yolk attached to its belly, which feeds it until it grows bigger. When the egg sac is used up, the little salmon becomes a **fry** and gathers with other fry to find food and hide in pools of quiet water. When a young salmon grows larger and turns silvery, it becomes a **smolt**.

Now it's time to leave fresh water and spend time feeding and growing bigger in a coastal wetland called an estuary where the river meets the sea. After growing rapidly, **adult salmon** travel into the open ocean to join a large school with other salmon. After one to five years of life in the sea, salmon begin their journey back to their home streams. Once they get close to fresh water, salmon stop eating. They change color and shape to announce their arrival and to attract mates. As they travel, salmon smell their way back to their birth stream. When they reach their spawning grounds, they pair off and mate. After laying eggs and spawning, the adult salmon die. Their bodies provide ocean nutrients for the forest and food for many animals such as bears and eagles. All five salmon species are endangered because of overfishing, habitat loss, pollution and dams that block their return home. Salmon are the primary food of Granny and her clan whose survival depends on finding enough salmon to eat.

KEY CONCEPTS

- Five species of salmon (Chinook, Coho, Pink, Chum and Sockeye) live in the Salish Sea.
- The salmon life cycle involves many stages of growth and change.
- Salmon use their keen senses to find their way back to their birth stream to spawn and die.
- Salmon species are endangered because of loss of habit, overfishing, pollution and dams.

INQUIRY QUESTIONS

- Why do you think salmon return to their home stream?
- What do you think happens if salmon can't find their way back to their home stream?
- Why do orcas have to travel farther to find salmon?
- How do you find your way home?
- What do you think would happen if you couldn't find your way home?

ACTIVITY 21: Salmon Life Story

In this activity, students write and illustrate a picture book that tells the story of a salmon's life cycle in words and pictures.

To find pictures and information about salmon and their life cycles:

- Olympic Nat'l Park: <http://www.nps.gov/olym/naturescience/the-salmon-life-cycle.htm>

- Vancouver Aquarium:
<http://www.vanaqua.org/salmonales/english/learningcentre/lifecycle.php>
- Seymour Salmonoid Society: <http://seymoursalmon.com/lifecycle.php>

Materials Needed: construction paper, drawing paper, crayons, colored pencils, markers, yarn, hole-punch, scissors, glue

Directions:

1. Ask students to imagine they are writing the life story of a salmon told from the point of view of the salmon (a salmon's autobiography).
2. Distribute three pages of drawing paper to each student. Fold pages in half to make six interior book pages.
3. Create a page for each stage of a salmon's life cycle. Tell what happens during each stage with written stories and illustrations.
4. Use construction paper to make cover. Choose title, add your name and decorate cover.
5. When complete, assemble book pages. Punch two holes and bind with yarn. Yarn should be loose to open book and turn pages.

Discuss: Like salmon, people have life stages (baby, child, teen, adult, senior). At each life stage, people change and have different experiences. What would you be doing at each stage of your life?

ACTIVITY 22: Smells Fishy!

In this activity, students explore how salmon use smell to identify their home streams.

Materials Needed: 5 different liquid scents (garlic, lemon, vinegar, vanilla, citrus, etc.), paper cups, cotton balls

Preparation:

1. Assign and record a scent for each salmon species (Sockeye, Coho, Chum, Chinook, Pink).
2. **For each salmon species:**
Put a cotton ball soaked in assigned scent in each of 5 paper cups. Mark bottom of cups with salmon species ID. Lay out 5 cups of same scent on floor to make a scent trail for one salmon species.
3. Make four more trails with four different scents for other four salmon species.

Directions:

1. Ask students to imagine that they are salmon trying to find their home streams. They must use their great sense of smell to find their way home.
2. Divide students into five groups to represent five salmon species: Chinook, Sockeye, Chum, Coho and Pink.
3. Tell each group the name of the scent assigned to their salmon species (e.g. vanilla - Chum).
4. Ask one group at a time to find and follow their scent trail by smell. Match bottom of cups to check answers.

Discuss: Was it difficult to locate your scent? Do you think migrating salmon have difficulty? What would happen if a dam blocked their way?

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EXPLORE A KELP FOREST

INTRODUCTION

A kelp forest is an underwater forest filled with giant brown algae plants that provide food and homes for many different animals. Kelp forests are only found in cool, nutrient-rich, constantly-moving coastal waters. Kelp is large seaweed that grows very fast and has no roots, stems, leaves or flowers. Kelp **blades** look like leaves and use sunlight to produce food for the plant. A kelp **stipe** looks like a stem and provides support for the plant. Kelp attaches itself to rocky surfaces on the sea floor with a **holdfast** that resembles roots. Some animals use kelp as food or attach to it for safety, while others hide or hunt in the kelp forest. Granny's clan travels through kelp forests in search of salmon, their favorite dinner. Salmon, especially juveniles, can often be found hiding out and feeding in kelp forests. Sometimes the orcas use kelp as toys in their games.

KEY CONCEPTS

- A kelp forest provides habitats for a variety of animal species.
- Kelp plants don't have roots, stems, leaves or flowers.
- The kelp forest provides an important habitat for young salmon.

INQUIRY QUESTIONS

- What different ways does a kelp forest help the animals who live there?
- How is a kelp forest like a land forest? Different?
- How does a kelp forest help Granny and her clan survive?

ACTIVITY 23: Visit a Kelp Forest

In this activity, students design a travel brochure to tell visitors about the plants and animals that live in a kelp forest.

Materials Needed: drawing paper, markers, photos, glue, crayons, colored pencils

Directions:

1. Visit Monterey Bay Aquarium Kelp Forest to view kelp forest and animals.
<http://www.montereybayaquarium.org/videos/Video.aspx?enc=JTRsYWKpW4kWexwxCFGvKg==>
2. Look at sample travel brochures to see different designs and layout.
3. Fold over drawing paper into tri-fold sections. Use each section for different information.
4. Design your brochure.
What unique kelp forest plants and animals should visitors look for? What should visitors pack for their trip? Why is a kelp forest special? Who will be their guide? What should visitors watch out for? Describe food, weather, water temperature, length of trip, transportation.
5. Illustrate brochure with drawings or photos of kelp and kelp forest animals.
6. As tour guide, include a message from the animals asking the human travelers to travel gently through their home.
7. Display your travel brochures on a bulletin board.

ACTIVITY 24: Kelp Forest Diorama

In this activity, students create a miniature kelp forest ecosystem.

Materials Needed: shoebox or tissue box per student, construction paper, acrylic paint, photos, colored pencils, crayons, markers, string or monofilament fishing line, scissors, glue, tape, brushes

Directions:

1. Imagine you have been asked by the animals of a kelp forest to create a new home for them.
2. Select the plants and animals that will be in your diorama.

Kelp Forest Plants and Animals

Sea Otter – Dives for crabs and sea urchins and floats in kelp at surface.

Kelp Crab – Has a brown shell and clings to kelp for safety and eats it for food.

Sea Cucumber – Looks like pickle as it creeps along sea floor on tiny suction cup feet.

Blue Rockfish – Swims among kelp to search for shrimp and jellyfish.

Brown Snail – Eats and lives on upper blades of kelp plants.

Salmon – Hides in kelp to escape predators. Hunts shrimp and small fish for food.

Resident Orca – Swims through kelp to search for salmon to eat.

Harbor Seal – Dives in kelp for salmon and rockfish.

Red Abalone – Attaches to rocks and catches passing seaweed for food.

Sea Lemon – Yellow sea slug that lives on kelp, rocks and sea floor.

Bat Star – Lives on kelp forest floor and eats seaweed and small animals.

Transient Orca – Swims through kelp to search for seals.

Giant Kelp – Is largest kelp on Pacific coast and forms thick forests.

Gray Whale – Feeds in kelp beds for small animals that cling to kelp.

Red Sea Urchin – Lives on sea floor with body shaped like ball with long sharp spines.

Green Anemone – Looks like green sea flower and has poisonous tentacles around body.

3. Choose a box (tissue or shoe) and cut off front panels.
4. Plan layout of your habitat and make a list of materials you need.
5. Paint or glue construction paper to inside top, back and sides of box to resemble kelp forest.
6. Use green construction paper cut in squiggly lines or green pipe cleaners to make kelp. Hang from inside top panel.
7. Draw plants, animals and rocks. Attach some to background panel. Glue some to cardboard or construction paper for backing.
8. Make center, side and bottom tabs and attach to these plants, animals and rocks. Position and glue tabbed plants, animals and rocks to sides, bottom and back of box.
9. Hang other animals from top of box with thread or fishing line.

ACTIVITY 25: Make an Orca Windsock

In this activity, students design a windsock that shows a scene from *Granny's Clan*.

Materials Needed: construction paper, crepe paper streamers, yarn or string, markers, crayons, tape, glue, decorations (glitter, stickers, ribbons)

Directions:

1. On a piece of construction paper, design a scene from *Granny's Clan* story for your orca windsock.
2. Add photos, drawings and other decorations.
3. Roll up windsock into cylinder with slight overlap. Glue or tape edges together.
4. Glue/tape crepe paper streamers or ribbons around the inside bottom of windsock.
5. Punch two holes at the top. Loop string or yarn through holes and tie together to hang.

Granny's Clan: A Tale of Wild Orcas

Dr. Sally Hodson

CAN YOU SPEAK ORCA?

INTRODUCTION

There are thousands of different human languages. Many animals also have languages. Both humans and orcas use sounds and body language to communicate. Humans greet each other by saying hello or using body language such as a handshake or a bow. Some human cultures use “whistle” languages and some people with hearing problems use a “sign” language. Orcas from Granny’s clan also greet each other. When orca pods meet up after spending some time apart, they say hello in a special way. All of the orcas from one pod form a line at the surface and face the orcas from the other pod. Slowly both groups swim towards each other. When the two groups get close together, they dive, breach and play with great energy. This ***greeting ceremony*** is taught to young orcas and passed down from one generation to the next.

Orcas make echolocation clicks, whistles and calls. All the orcas in Granny’s clan share the same language but each family pod makes their calls with a different “accent” called a ***dialect***. Young orcas learn their language and dialect by listening to the adults in their family and practicing with each other. We can listen to orca calls using a ***hydrophone***, an underwater microphone that lets us eavesdrop on orca conversations. Although we don’t understand their language, scientists believe that orcas use their calls to share information, coordinate their activities, identify themselves and interact with each other. Orca calls sound like squeaks, squeals, squeaky doors, chirping birds, honking horns and mewing kittens.

KEY CONCEPTS

- Language is created by assigning meaning to words or sounds.
- People and animals use languages to communicate.
- Orcas use visual and sound languages to communicate and share information.

INQUIRY QUESTIONS

- What is a language? Why do people use language to communicate with each other?
- What different ways do people communicate with each other? (sign, pictograph, telephone)
- What different ways do animals communicate with each other? (sound, scent, movement)
- How do orcas communicate with each other?
- Why do humans and animals greet each other?
- Why do you think orcas pods have different dialects?
- How are human and orca languages similar? Different?
- If you were an orca, what would you want to communicate to people?

ACTIVITY 26: Orca Eavesdrop

In this activity, students listen to orca calls from Granny’s clan recorded by hydrophones.

Directions:

1. Listen and learn: <http://listen.orcasound.net/Home.aspx>
<http://orcasound.net/>
<http://orcasound.net/soundtutor/>
http://www.whaleresearch.com/audio_video.html
<http://www.youtube.com/watch?v=s5ZSvTfYYJQ>

Discuss: What do you think orcas are communicating to each other? Do you think it would be difficult to learn the language of orcas? If you could understand orca language, what would you say to them? What do you think they might communicate to you?

ACTIVITY 27: Greetings!

In this activity, students greet each other in a variety of different languages.

Directions:

Hello! Greetings!

1. On blank cards, copy each **HELLO!** word and its origin (language name, country or tribe) from the **HELLO! Language List**. Distribute a **HELLO!** card to each student.
2. Ask one student at a time to present a **HELLO!** word to the class. Ask the other students to guess its origin.

Orca Greetings

1. Imagine you are an orca in Granny's clan. Each pod (J, K and L) has been traveling separately for several weeks as they hunt for salmon. Now all three pods are coming together to greet each other.
2. Assign students to three groups: J pod, K pod or L pod and give each an ID card that identifies their pod. Tell students they will role-play the orca greeting ceremony.
3. Ask members of each pod to gather together as a group. Students practice saying their pod dialect. J pod = chirp-chirp K pod = mew-mew L pod = eek-eek
4. Members of J pod line up facing members of K pod. Both pods walk towards each other in a line. When they get close, J pod and K pod greet each other with their pod dialect. Then they greet each other with a human handshake.
5. J pod and K pod mix together and line up to face L pod.
6. L pod lines up and the two groups approach each other. When close, they greet each other with pod dialect. Then greet each other with a human handshake.

Discuss: How are orca greetings like human greetings? Different? How did you feel greeting others as an orca? As a human?

ACTIVITY 28: Create Orca Times Newspaper

In this activity, students imagine that Granny's clan and the other animals of the Salish Sea publish their own newspaper. Help them design and write this week's edition.

Directions:

1. Students create *Orca Times* newspaper. Design a banner. Create artwork. Find photos.
2. Write stories (News, Interviews, Sports, Weather, Interviews, Letters to the editor, Social Events, Advertisements for products animals might use).
3. Divide students into 6 teams, each with a different newspaper story assignment.
4. When stories are completed, assemble newspaper on classroom wall using butcher paper or create on computer.

ACTIVITY 29: Ode to an Orca

In this activity, students write poems about Granny and her clan and read them aloud.

Directions:

Using the **Ode to an Orca** worksheet, students write poems and practice reading them aloud. Host a **Poetry Slam** where students read their original poems to the class.

Granny's Clan: A Tale of Wild Orcas

Dr. Sally Hodson

HELLO! IN MANY LANGUAGES

HELLO!	Language	Pronunciation
Bonjour	French	
Ni hao	Chinese	
Hola	Spanish	
Oh see yoh	Cherokee	
Al salaam a'alaykum	Arabic	
Preevyet	Russian	
Namasthe	Hindi	
Guten Tag	German	
Konnichiwa	Japanese	
Salam	Persian	
Dakota	Sioux	
Aloha	Hawaiian	
Dobre rano	Czech	
Anyo	Korea	
Ciao	Italian	
Kalxti	Na'vi (Avatar)	(kal-t-i)
Shalom	Hebrew	
Jia Ora	Maori (New Zealand)	
Dia Dhuit	Gaelic (Irish)	
Jambo	Swahili	
Ya'at'eeh	Navaho	
Yasas	Greek	
NuqneH?	Klingon (Star Trek)	(nook-neck)
An nyeong	Korean	
Hand sign	American Sign Language	Salute from forehead - with thumb tucked

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ODE TO AN ORCA

An Ode is a poem written to someone or about a particular subject. Poetry uses word pictures and sounds. Every word counts. Poetry doesn't have to rhyme. Choose one of these forms and write a poem about Granny and her clan.

ACROSTIC

Poem that looks like a puzzle.

Directions: Write the name of the subject of poem vertically, with one letter on each line. For each line, write a phrase or sentence about the subject that begins with that letter.

EXAMPLE:

	O f the sea
	R acing after salmon
	C atching dinner
	A lways together

Write an Acrostic poem about the orcas of Granny's clan.

—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____

HAIKU

Poem that paints visual images with words and without rhyme.

Directions: Write three lines using this format.

- Line 1: Five syllables
- Line 2: Seven syllables
- Line 3: Five syllables

EXAMPLE:

	Orca family
	rises from the sea to breathe
	always together.

Write a Haiku poem about the orcas of Granny's clan.

Granny's Clan: A Tale of Wild Orcas

Dr. Sally Hodson

TELL ME A STORY

INTRODUCTION

Everyone has a story to tell. Through stories, we share our feelings, experiences and memories. Stories help us frame our view of the world. From stories we learn about the past, try to understand the present and imagine the future. Our lives are woven into a sea of stories about other people, cultures, animals, plants and places. We curl up with a book, listen to a bedtime story, tell stories around a campfire or watch TV and movie stories. Killer whales and northwest native peoples shared the seas for many thousands of years. Most tribes respected orcas for their intelligence, hunting skills and devotion to family. They did not harm orcas and told many stories about killer whales who helped humans and lived as fellow tribes in the sea. Many tribes celebrated orcas in their ceremonies and carvings and sang songs to them.

KEY CONCEPTS

- Stories are part of our lives and help us to understand ideas, feelings and lives of others.
- Northwest native tribes respected the orca and told stories about their strength, intelligence and devotion to family.
- A ***Talking Stick*** is a ceremonial staff that is passed around a group to give each person a turn to speak and be heard.

STORY DISCUSSION QUESTIONS

- Who are the main characters in ***Granny's Clan: A Tale of Wild Orcas***?
- What is your favorite scene? Why?
- Who is your favorite character? Why?
- What did you enjoy most about the story?
- What did Suttles and Mako learn from Granny in the story?
- What are the different salmon species that share the sea with Granny's clan?
- What animals did Granny's family swim past during their travels?
- What dangers did Suttles and Mako face in the story?
- How do you think Suttles and Mako felt when the speedboat almost ran over them?
- Why do you think Granny and her clan came near the people?

ACTIVITY 30: Story Circle

In this activity, students make a ***Talking Stick*** and use it to create a story. Some tribes used a ***Talking Stick*** at gatherings when people came together to tell stories, make decisions, teach children or solve disputes. A ***Talking Stick*** is a carved ceremonial wooden staff that is passed around a circle from one member to another so all can speak and be heard. According to tradition, only the person holding the stick is allowed to speak, while others in the circle listen.

Materials Needed: wooden stick, yarn, feathers, beads

Directions:

1. Wrap yarn around bottom & top of ***Talking Stick*** and decorate with feathers & beads.
2. Students sit in a circle of chairs.
3. One student holds the ***Talking Stick*** and begins the story of the "Further Adventures of Suttles and Mako."

4. After several sentences, that student passes the *Talking Stick* to the next student who adds several more sentences to the story, then stops.
5. Each student adds to the story until the last person brings ends the story to a conclusion.

ACTIVITY 31: Story Treasure Hunt

In this activity, students work together on a story treasure hunt using a map and clues.

Materials Needed: blank index cards, *Granny's Clan* book, drawing paper, markers, pencils

Directions:

1. Assign each student to write one sentence from *Granny's Clan* on a blank index card.
2. Divide class into two groups.
3. **Group A:** Hide the story cards out of sequence throughout the classroom. (Group B is not in room)
Draw a story treasure map showing the exact location where all the story cards are hidden.
4. **Group B:** Work as a team to use the story treasure map to find the hidden story cards. Assemble the story cards in the correct sequence to match the story.
5. Check Group's B's story sequence with book. Group A & B exchange roles and repeat.

ACTIVITY 32: Orca Rangers Comic Strip

In this activity, students learn how to write and illustrate a story using a comic strip format.

Materials Needed: markers, crayons

Directions:

1. Students use the *Orca Rangers Comic Strip* worksheet to create a comic strip story featuring *Orca Rangers*. These characters can be superheroes, real orcas or way-cool kids who help orcas and other sea critters.
2. Write a four sentence story about the *Orca Rangers*. Give your comic strip story a title.
What is happening in your story? Who are your story characters?
3. Use one sentence to describe each story panel in a four-panel story sequence. Each sentence will be the caption for one of the comic strip story panels.
What action is happening in each panel? What does the background look like in each panel?
4. Add a speech bubble to each story panel. *What are the characters saying in each panel?*
5. Draw and color each panel.
6. Check your comic strip story. *Do you think readers can follow your story from one panel to the next? Do you think readers will enjoy your comic strip story?*

ACTIVITY 33: Make an Orca Story Mask

In this activity, students create an orca mask for a story character from *Granny's Clan*.

Materials Needed: black, white & gray construction paper, glue, craft sticks

Directions:

1. **For body:** Draw and cut out 8 inch diameter oval from black construction paper. Cut 10 inch diameter oval from white construction paper. Position with overlap, so white oval forms lower jaw below black head of orca. Glue together.
2. **For eyes:** Draw and cut out two white circles and two smaller black circles. Glue smaller black circles on larger white ones. Position eyes on either side of black oval face and glue.
3. **For eye patches:** Draw and cut out white triangles (with rounded edges). Position and glue on either side of black oval above and to the side of eyes.
4. **For teeth:** Draw and cut out small gray triangles and glue beneath upper edge of orca jaw.
5. **For pectoral fins:** Draw and cut out black triangles and glue on outside edge of lower jaw.
6. **For tail flukes:** Draw small tail flukes, position behind orca head and glue.
7. Glue a craft stick on back of mask to make handle.

Granny's Clan: A Tale of Wild Orcas

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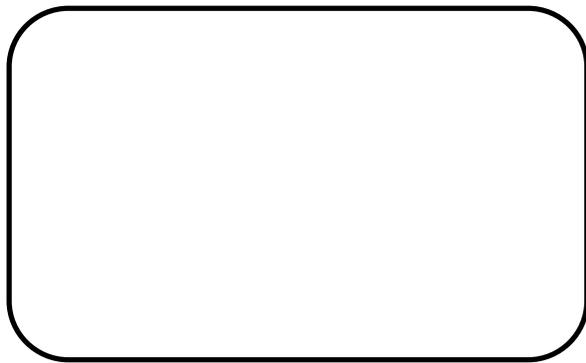
ORCA RANGERS COMIC STRIP

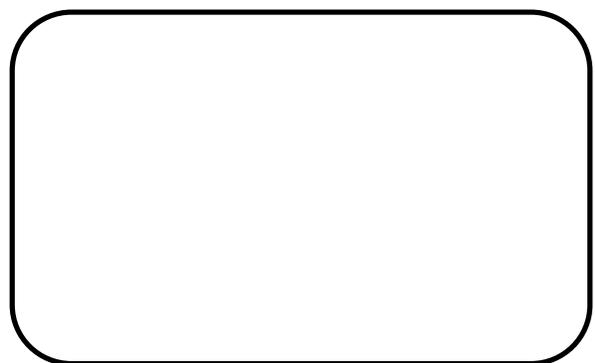
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Directions:

1. Write a four-sentence story about how the **Orca Rangers** help orcas and other sea critters. Give your strip story a title. *What is happening in your story? Who are your story characters?*
2. Use one sentence to describe each story panel in a four-panel story sequence. Each sentence will be the caption for one of the comic strip story panels. *What action is happening in each panel? What does the background look like in each panel?*
3. Add a speech bubble to each story panel. *What are the characters saying in each panel?*
4. Draw and color each panel.
5. Check your comic strip story. *Do you think readers can follow your story from one panel to the next? Do you think readers will enjoy your comic strip story?*

COMIC STRIP TITLE _____









Granny's Clan: A Tale of Wild Orcas

Dr. Sally Hodson

FOLLOW THAT WHALE!

INTRODUCTION

Granny and her clan are always on the move. Each day, these orcas travel 75 to 100 miles through the Salish Sea searching for food. We see the orcas as they surface to breathe, chase a school of salmon, leap from the water to play or float quietly as they rest. But the orcas only spend about 5% of their time at the surface. The other 95% of the time, they are underwater and out of our view. One way to protect these endangered orcas is to track their movements and learn more about how they live their lives and where they find food.

Throughout the Salish Sea region, people help orca scientists who track Granny's clan by watching for orcas. People on whale-watching boats, ferries, freighters, Coast Guard ships and fishing boats as well as people on shore are always on the lookout for orcas. Whenever they see orcas, people can contact a special sightings network to report their orca observations. With hundreds of people watching for orcas and gathering information about their movements, scientists have learned much more about where orcas travel and how they use their habitat. Another tool that helps scientists locate the orcas is a network of underwater hydrophones that turn on whenever the orcas pass by.

KEY CONCEPTS

- Granny's clan travels 75-100 miles per day through their home range to search for food.
- People on boats and along the coast of the Salish Sea watch for orcas and report their sightings to scientists.
- Scientists use information from these sightings to learn about orca travel patterns and habitat use.

INQUIRY QUESTIONS

- Why do scientists want to track the movements of the orcas of Granny's clan?
- Why do orcas travel so far each day?
- What can we learn from tracking orca travel movements?
- How do the orcas stay together and find their way while traveling?
- Why do humans travel? How do we stay together? How do we find our way?
- Where do you have breakfast, lunch and dinner? Where do you sleep? Go to school? Play?
- How is human and orca travel similar? Different?
- Why is it important for the US and Canada to work together to protect the orcas and their habitat?

ACTIVITY 34: Track a Pod (Be a Scientist)

In this activity, students learn how scientists track an orca pod and follow their activities.

Directions: Take a virtual trip to the Salish Sea to learn how scientists follow the orca whales.

1. Join a team of scientists as they track the orcas:
<http://www.whaleresearch.com/encounters.html>
2. Read about recent orca sightings:
<http://www.orcanetwork.org/sightings/map.html#recent>
3. Learn how to report an orca sighting:

4. Learn about orca calls
<http://www.orcanetwork.org/sightings/reportpage.html>
5. Listen to orca calls from hydrophones as the orcas pass by:
<http://listen.orcasound.net/Home.aspx>
6. Follow blogs that track orca activities:
<http://whale-of-a-porpoise.blogspot.com/search?q=>

ACTIVITY 35: Wish You Were Here

In this activity, students design a postcard and stamp and write messages about taking a trip to see the orcas of Granny's clan.

Materials Needed: blank index cards, colored pencils and markers, glue, drawing paper

Directions:

1. Students imagine that they are taking a boat trip to watch orcas and track their movements.
2. Each student designs a postcard and stamp using **Wish You Were Here** worksheet.
3. On the postcard, students write messages to their families or friends describing what it's like to spend a day watching and tracking the orcas of Granny's clan. *What was their day like? What did they see? What did the orcas do? How far did they travel?*
4. Create a design for the stamp. Include country name (USA) and give it a value. (e.g., \$.44 or 44 fish)
5. Address the postcard to a friend or relative and glue on stamp.

ACTIVITY 36: Design an Orca Passport

In this activity, students design a passport for an orca in Granny's clan.

Materials Needed: markers and stickers

Directions:

Orcas travel back and forth through US and Canadian waters. They are protected in both countries. Students select a story character from Granny's clan and use **Orca Passport** worksheet to create a passport.

Granny's Clan: A Tale of Wild Orcas

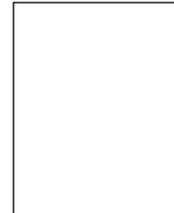
Dr. Sally Hodson

WISH YOU WERE HERE

DESIGN AN ORCA STAMP

Directions:

Design a postcard and stamp about watching the orcas.
Write your message. Address postcard. Glue on stamp.



DESIGN AN ORCA POSTCARD

<i>Message</i>	<i>Address</i>	<i>Stamp</i>
	<hr/> <hr/> <hr/> <hr/>	

Draw a picture about your whale-watching trip



Granny's Clan: A Tale of Wild Orcas

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ORCA PASSPORT

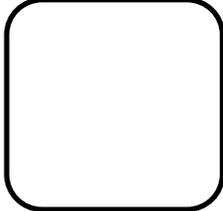
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Materials Needed: drawing and construction paper, glue, stamps, crayons, markers, colored pencils

Procedure: Create an **Orca Passport** for one of the orcas in Granny's clan. Fold construction paper in half to make passport cover and decorate. Design passport stamps for US and Canada. Glue **Orca Passport** page to inside page.

SAMPLE

United States	Canada
ORCA PASSPORT	
Orca Name	_____
Orca Pod	_____
Orca Number	_____
Weight	_____
Length	_____
Birth Year	_____
Birth Place	_____
Description	_____
Reason for Visit	_____

	
Orca Dorsal fin & Saddle-patch ID	

	
United States	Canada

Granny's Clan: A Tale of Wild Orcas

Dr. Sally Hodson

ORCAS ON STAGE

INTRODUCTION

Why do we call orcas “**killer whales**”? When early Spanish explorers observed transient orcas hunting whales, they named them “*whale killers*.” It is thought that this name was incorrectly translated into “**killer whale**.” Although there is no record of an orca in the wild harming a human, many people were afraid of them. During the past forty years, scientists learned many things about orcas that have changed people’s attitudes toward them. The ***Free Willy*** movies introduced **Keiko** (a.k.a. Willy) and the story of a captive orca set free by his human friends. After their appearance as wild orcas in the *Free Willy* movies, Granny and her family became famous throughout the world. Now hundreds of thousands of people go on whale-watching trips each year to see orcas in the wild.

KEY CONCEPTS

- Orcas are called “killer whales” because early explorers observed orcas hunting whales.
- In the past, people feared orcas although no orca in the wild has harmed a human.
- People changed their attitudes towards orcas after learning more about them.

INQUIRY QUESTIONS

- Do you think use of the name “killer whale” has caused people to be afraid of orcas? Do you think orcas are afraid of people? Why or why not?
- Why do you think people changed their attitudes towards orcas after seeing them in the wild? Watching the ***Free Willy*** movies? Reading and learning about orcas?

ACTIVITY 37: Reader’s Theatre

In this activity, students adapt ***Granny's Clan: A Tale of Wild Orcas*** into a Reader’s Theatre script.

Directions:

1. Identify two types of roles for the reader’s theatre: **narrators** tell the story, **characters** are in the story. Most students will be **narrators**. All students will be the **chorus** for sound effects. Granny is the only **character**.
2. Assign each **narrator** one sentence of the story to read. Assign one student to be Granny.
3. Write out entire script from ***Granny's Clan*** using this format:
Narrator 1: First sentence of story (“In cold dark waters . . .”
Granny: Second sentence (“Little One . . .”)
Narrator 2: Third sentence (“Granny slips beneath her littlest great-grandchild.”)
Narrator 3: Fourth sentence (“With a gentle push, she lifts him to the surface.”)
Narrator 4: Fifth sentence (“The baby opens his blowhole and takes his first breath.”)
Narrator 5: Sixth sentence (“A new life begins.”)
Narrator 6: Seventh sentence (An old life continues.”)
4. Sound effects are read by all narrators. **Chorus** (“WHOOSH! WHOOSH! WHOOSH!”)
5. Each student gets a copy of the entire script with their lines highlighted.
6. Students practice their lines using a clear, strong, expressive voice.
7. The entire group practices the script to improve timing and performance.
8. At the time of the reader’s theatre performance, students sit in a semi-circle facing the audience and read their parts. Students can wear **Orca Costumes** (see Activity 40).

ACTIVITY 38: Orca Puppet Show

In this activity, students create a puppet show performance of *Granny's Clan: A Tale of Wild Orcas*.

Materials Needed: cardboard, cereal box or larger box, blank index cards, poster board, poster paints, wooden dowel, fabric scraps, glue, wrapping paper, yarn, craft sticks, glue, photos, markers, colored pencils, copy of *Granny's Clan*

Preparation:

For Theatre

1. Cut off top of box. This will be bottom of theatre. Cut out rectangular opening on one side for stage. Cut out piece of cardboard and tape to back as stand.
2. Paint outside of theatre or cover with wrapping paper. Decorate sides and top of stage.
3. Cut out curtains and attach to wooden dowel. Hang from top of stage. Tie with yarn.
4. Design and decorate background scenes on poster board for stage. Attach craft sticks to hold up at back of stage behind puppets.

For Puppets

1. Draw each orca from the story on index cards or poster board. Color with markers or glue on felt shapes. Add 3D fins and tail. Glue orca puppet to craft sticks.
2. Draw salmon puppets and other animals that appear in the story. Cut out and attach to craft sticks.

Directions:

1. Assign students to different roles: **narrators** read the story, **puppeteers** act out scenes with puppets and **stagehands** organize puppets and background panels for each scene.
2. Perform story with puppet actors. *Puppeteers* sit behind stage and hold up puppets to act out scenes. Change *puppeteers* and background scenes at each scene change.
3. After practice, students perform puppet play for class of younger students.

ACTIVITY 39: Lights! Camera! Action!

In this activity, students watch a movie about orcas and write a movie review.

Directions:

1. Watch a movie about orcas.
Free Willy movies: <http://www.imdb.com/title/tt0106965/>
The Whale – story of Luna (L-98) from Granny's clan: <http://www.thewhalemovie.com/>
2. Write a movie review using the **Movie Review** worksheet. Share with class.
3. Hold an **Oscars for Orcas** Award Festival. Create **ORCA** awards for a variety of different categories. Design orca-shaped awards and cover with gold metallic paper. Create ballots to vote for favorites (picture book, diorama, puppet, costume, totem pole, trading card, passport, and poem, mobile, windsock, etc.)

ACTIVITY 40: Make an Orca Costume

In this activity, students make an orca costume to use for role-play or drama activities.

Materials Needed: brown grocery bag per student, scissors, black construction paper, glue

Directions:

1. Stand paper bag on open side. Cut large hole in closed end (for head opening).
2. Cut vertical line from top hole to bottom (for front opening).
3. Cut holes on each side (for arm openings).
4. On black construction paper, draw and cut out dorsal fin, tail flukes and 2 pectoral fins. Make tabs for each.
5. Fold tabs and attach dorsal fin to middle of back, tail flukes to bottom edge of back and pectoral fins on each side above armholes.

Granny's Clan: A Tale of Wild Orcas
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LIGHTS! CAMERA! ACTION! Movie Review

Name	Date
------	------

MOVIE TITLE _____

Movie Characters _____

Movie Story _____

Did you like it? Why or Why not? _____

What was your favorite part? _____

What was your least favorite part? _____

Did you like the ending? _____

Did you like the characters? _____

Did you like the story? _____

What did you learn about orcas? _____

Granny's Clan: A Tale of Wild Orcas

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WATCH FOR WHALES

INTRODUCTION

Watching orcas whales in the wild is a thrilling experience. For a brief time, we peek into their lives as they search for food, play, travel and interact with each other. Each year, hundreds of thousands of people watch Granny and her clan from whale-watch boats, private boats, kayaks and shore locations. Whenever we go whale-watching, we are visiting orcas in their home. Some people forget that their boats can harm orcas or disrupt their activities. Sometimes boats approach too fast, too close or cut across an orca's path. Boats can make too much noise, separate orca families or interfere with their fishing and resting. Orcas need space and quiet to find food, socialize and care for their young. ***Be Whale Wise*** rules have been created that help boats and their people be courteous and respectful guests when visiting the orcas' home.

KEY CONCEPTS

- Whale-watching boats are visiting the orcas in their home.
- Boats watching whales can interfere with orca feeding, navigation and communication.
- Whale watching regulations were created to protect orcas from careless boaters.

INQUIRY QUESTIONS

- Why do you think people like to watch orcas?
- How does boat noise interfere with orca echolocation? Communication? Travel? Rest?
- Why do boats get too close to orcas? What might happen?
- How would you think orcas feel when boats get too close? Approach too fast? Separate them from their families?
- How do you feel when traveling in a car with your family and another car cuts you off?
- How should a guest behave when visiting someone's home?
- How can whale-watching boats be good guests while visiting the orca's home?
- Why do we need whale-watching rules to protect orcas?

ACTIVITY 41: **Get Off My Tail!**

In this activity, students experience whale-watching from human and orca viewpoints.

Materials Needed:

Index cards, tape, markers, painter's tape to outline sea

Preparation:

1. Make role-play name cards (12 whale-watch boats, 8 orcas, 4 pleasure boats)
2. Outline 5' x 12' sea area with painter's tape.

Directions:

1. Watch a You Tube video to go on a virtual whale watch trip.
<http://www.youtube.com/watch?v=G8kcMXjPiIQ&feature=related>
2. Learn about ***Be Whale Wise*** rules: <http://www.bewhalewise.org/>
3. Assemble students in a designated "sea" area.
4. Assign students to be *orcas*, *whale-watch boats* or *pleasure boats* and distribute role-play name cards.
5. Instructions for **Traffic Jam** role-play:

Whale-watch boats and pleasure boats: Move close to orcas. Speed up slow down. Cut across the orcas' path. Make loud noises.

Orcas: Try to move through sea area, talk and listen to each other and stay together. Role-play for five minutes.

6. Instructions for **Be Whale Wise** role-play.

Whale-watch boats & pleasure boats: Keep to side of orcas. Move slowly, stop or keep steady pace. Don't cut in front of orcas. Stay quiet so orcas can echolocate and hear each other.

Orcas: Travel through sea area. Try to talk and listen to each other and stay together. Role-play for 5 minutes.

Discuss: Was it difficult for the orcas to move through the sea with all the boats in their way? Why? Was it easier for the orca family to stay together when the boats stayed to the side? Why?

ACTIVITY 42: Turn Down the Noise

In this activity, students experience what it's like to be an orca trying to communicate a message with loud background noise from boats.

Materials Needed: recorded boat motor (or loud sounds) on device with variable volume controls

Directions:

1. Ask students to sit in a long row. Tell them they will be given a whispered message and then should pass it on to the next person beside them. Recorded sounds will be played during the message relay.
2. As first student begins whispering the message, start playing the recorded motor sounds.
3. As the message passes from one student to the next, keep raising the volume until the background noise is too loud for the whispered message to be heard.
4. Ask the last person to state the message received and compare to the original message.

Discuss: Was it difficult to hear the message as the background noise increased? Why? Do you think the orcas can hear each other when boat motors get too loud? How would they be able to communicate and navigate? What happens when you try to listen to someone talking to you in a noisy place?

ACTIVITY 43: Orcas Rule Poster Contest

In this activity, students design a poster that explains responsible boater behavior around orcas.

Materials Needed: Be Whale Wise brochure <http://www.bewhalewise.org/>
Poster board, markers, crayons

Directions:

1. Ask students to imagine they are orcas from Granny's clan. Create a poster that tells humans and boats how to behave when they travel through orca home waters. Use ideas from **Be Whale Wise**.
2. Think about: loud boat noise, boats too close to orcas, chasing or harassing orcas, approaching too fast. How close should boats get? How fast or slow?
3. Hang posters around classroom and hold a poster contest. (best art, best message)

Granny's Clan: A Tale of Wild Orcas

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DANGER AHEAD!

INTRODUCTION

The orcas of Granny's clan face many threats to their survival. These orcas have been given special protection as an endangered species in the United States, Canada and the state of Washington. Why are they in such danger?

Food Shortage - Lack of salmon means Granny and her clan have to travel much farther to find enough food to eat. The number of salmon has decreased over 90% in the last 100 years because of overfishing, dams and loss of salmon habitat.

Toxins - Toxic chemicals pollute the seas where Granny and her clan live. These dangerous chemicals don't break down and are passed from one animal to another up the food chain. When an orca eats a salmon, toxins are stored in the orca's blubber. These toxins are released into the orca's body when the orca gets hungry and burns fat. Then the orca may get sick and die from infection.

Boat Traffic - Because so many people want to see Granny and her clan, dozens of boats crowd the waters whenever the orcas make an appearance. Too many boats chasing the orcas can stress them, separate families and interfere with their feeding, resting, traveling and socializing.

Noise - Many different boats travel the waters where Granny and her clan live. Fishing boats, pleasure boats, whale-watch boats, ferry boats, cruise ships, Navy ships, freighters and tankers pass through the Salish Sea each day. Loud noise from all these boats can interfere with orca echolocation and communication and even cause serious injury to the orcas.

KEY CONCEPTS

- Lack of salmon, toxic pollution, boat traffic and noise are dangers facing Granny's clan.
- Decrease in salmon populations make it difficult for Granny's clan to find enough food.
- Toxic chemicals in the sea build up in the food chain and cause orcas to become sick.
- Boat noise interferes with orca navigation and communication.
- Whale-watching boats sometimes travel too close to orcas.

INQUIRY QUESTIONS

- What happens to orcas when they can't find enough food? What would happen to you if you couldn't find enough food?
- What happens to orcas when they can't use their echolocation to navigate because of too much boat noise? How would you feel if you couldn't find your way home?
- What happens to orcas if they get sick from toxic chemicals? What happens to you when you get sick?
- What happens if orcas can't communicate with their families? What would happen if you couldn't talk with your family?
- What happens if whale-watching boats get too close to orcas? What happens if bikes or cars travel too close to you while you're walking?
- Do you think people would miss the orcas of Granny's clan if they disappeared?
- If Granny could speak to humans, what do you think she might say? Ask humans to do? Not do?

ACTIVITY 44: Wheel of Danger

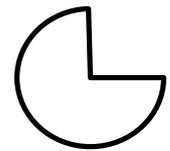
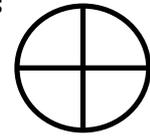
In this activity, students design a spinner that reveals the dangers that threaten Granny's clan.

Materials Needed:

Drawing and construction paper, paper fasteners, markers, crayons, scissors, compass

Directions:

1. Draw and cut out two large circles of equal size.
2. Divide one circle into 4 quarter sections.
3. Draw and color a different scene on each quarter that shows how human actions endanger the orcas of Granny's clan (food shortage, toxins, noise & boat traffic).
4. Write name of the danger on each section.
5. Mount circle on construction paper.
6. Use second circle as wheel cover.
7. Cut one quarter section from second circle to make window.
8. Decorate cover and label **ORCA Wheel of Danger**.
9. Use brass fastener to attach cover to base.
10. As you turn the wheel, the open quarter reveals different scenes in the window.



ACTIVITY 45: CAN YOU SURVIVE? Orca Survival Game

In this activity, students play a game in which they take on the roles of orcas and encounter challenges to their survival.

Materials Needed: Game board, dice, game pieces, and game cards

Preparation:

1. Game can be played on game board or as life-sized game.
 2. **Game Board**
For game board: Mount game board (see **Game Board**) on thick poster board and laminate.
For life-sized game: Change game into a life-sized version by enlarging each game board square to 2 X 2 ft. and arranging them into same configuration on classroom floor.
 3. **Game Pieces**
Make game pieces. Create different orca cut-out figures or use multi-colored playing pieces from another game.
For life-size game: Game pieces can be students wearing orca paper-bag costumes.
- Game Cards**
Print and cut out **DANGER** cards and **SURVIVE** cards (see **Game Cards**). Place in two piles on board.

Directions:

Game Rules

Goal of game is to **SURVIVE** the challenges and live another day.

For life-size game: Use same rules for game play.

1. Throw dice to choose first player. Continue taking turns clockwise from first player.
2. First person rolls the dice. Begin at **START** and move the number of spaces on the dice.
3. If you land on **DANGER** card, pick one and follow its directions. Return card to pile.
4. If you land on **SURVIVE** card, pick one and follow its directions. Return card to pile.
5. If you land on any other card, stay until your next turn.
6. Each player survives and wins when reaching the **END**.
7. Create new **SURVIVE** cards and **DANGER** cards to add to the game.

CAN YOU SURVIVE?

ORCA SURVIVAL GAME BOARD

START		DANGER CARD	People wave at you from shore	Play in bow wave of passing tanker	Pass seals resting on rocks	SURVIVE CARD	
Time for a fishing lesson		Avoid meeting transient orcas				Family changes direction	
SURVIVE CARD		SURVIVE CARD	Tail slap!	Lots of fishing boats nearby		Research boat takes your photo	
Your clan gathers into a <i>superpod</i>				Share a fish with your cousin		DANGER CARD	
Carry a salmon on your head		<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>CAN YOU SURVIVE?</p> </div>		DANGER CARD		Breach!	
Spy-hop!				<div style="border: 1px solid black; padding: 5px;"> <p><i>Granny's Clan: A Tale of Wild Orcas</i> Dr. Sally Hodson</p> </div>	Swim past group of kayaks		Lots of salmon ahead!
DANGER CARD		SURVIVE CARD	Time to rest with your family	Boats make a lot of noise today		SURVIVE CARD	
Your family searches for salmon		Time to play in the kelp				Listen for family calls	
Travel by the light house	Time to practice <i>ECHO</i> -location	DANGER CARD				END	Pass a whale-watch boat

CAN YOU SURVIVE? ORCA SURVIVAL GAME CARDS

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DANGER! CARDS

DANGER!
Salmon overfished. Not enough left for you. Go back 2 spaces.

DANGER!
Toxins in the water get stored in your blubber. Go back 2 spaces.

DANGER!
Too many boats crowd your family on a holiday weekend. Go back 1 space.

DANGER!
Your baby cousin gets sick from toxins and bacteria. Go back 2 spaces.

DANGER!
Sonar blast from Navy ship causes your family to leave area. Go back 2 spaces.

DANGER!
Development damages an estuary that is prime salmon habitat. Go back 1 space.

DANGER!
An oil spill from a freighter leaks into the water. Go back 1 space.

DANGER!
A cruise ship dumps raw sewage into the sea. Go back 1 space.

SURVIVE! CARDS

SURVIVE!
Volunteers restore a salmon spawning habitat. Go forward 1 space.

SURVIVE!
Lots more young salmon survive to reach the sea this year. Go ahead 1 space.

SURVIVE!
Most boats follow the *Be Whale Wise* rules and give you space. Go ahead 1 space.

SURVIVE!
A marine sanctuary is created to protect your habitat. Go ahead 2 spaces.

SURVIVE!
A dam is demolished to let a river run free. Salmon return. Move ahead 1 space.

SURVIVE!
Your clan has been given protection as an endangered species. Move ahead 2 spaces.

SURVIVE!
A new baby is born in your family. Move ahead 2 spaces.

SURVIVE!
Volunteers clean up a beach. Move ahead 1 space.

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HELP WANTED – How You Can Help

INTRODUCTION

Orcas in Granny's clan face many threats to their survival. They have been given special protection as an endangered species in the United States and Canada. Why are they endangered?

- Salmon, their primary food is hard to find because of overfishing, dams and habitat loss.
- Toxins and chemicals from human activities pollute the seas and cause illness and death.
- Boat traffic and loud noise causes stress and interferes with echolocation, communication and feeding.

If we want Granny's great grand-children to survive, we can make sure they have enough food, swim a clean sea and have space and quiet.

WHAT DO YOU THINK?

- Do you think humans realize that their everyday activities may cause orcas and other species to become endangered?
- Do you think other people would like to learn more about Granny and her orca clan? What did you learn that you can share with them?
- What can you do at your home, school and community to help Granny's clan?
- Do you think Granny and her clan take care of their marine environment?
- Do you think Granny and her family waste food? Pollute the sea? Make a lot of noise?
- How would you feel if your family was endangered? What would you do?

HOW YOU CAN HELP

- **Learn** more about orcas
 - **Share** what you know about orcas
 - **Care** for our shared environment
- 1. Recycle, reuse, reduce
- 2. Restore salmon streams and habitats.
- 3. Conserve water at home and school.
- 4. Keep the ocean clean from pollutants & garbage.
- 5. Save energy at home, school and when driving.
- 6. Put waste in the right place (oil, detergents, kitty litter, chemicals, pesticides, etc.)
- 7. Limit use of pesticides, herbicides & toxic chemicals.
- 8. Clean up a beach, park or trail.
- 9. Learn more about orcas and the ocean environment.
- 10. Find your special, favorite place in nature. Get to know it well. Visit often. Take care of it.
- 11. Give orcas and other wildlife enough space. Watch them with respect.
- 12. Design a T-shirt with art and a message about Granny's clan.
- 13. Make a Help Wanted poster to help Granny's clan.
- 14. Protect endangered species and preserve critical habitat.
- 15. Share what you learn about orcas with your family, friends, school and community.
- 16. Support organizations that help us learn about and protect orcas. (see **Resources**)
- 17. Hold an Orca Fair at school to teach other kids about orcas. Include demonstrations, activities, art and projects.

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RESOURCES

LISTEN TO WILD ORCAS

Listening for Orcas - <http://listen.orcasound.net/Home.aspx>

Center for Whale Research - http://www.whaleresearch.com/audio_video.html

Salish Sea Hydrophone Network - <http://orcasound.net/?bildnuosrb>

Orca Sound Tutor - <http://orcasound.net/soundtutor/>

Orca Song 2008 - <http://www.youtube.com/watch?v=UHTD6M3y91U&feature=related>

Sound Waves - <http://www.youtube.com/watch?feature=endscreen&v=j63A761DWzU&NR=1>

WATCH WILD ORCAS

Center for Whale Research - http://www.whaleresearch.com/audio_video.html

Southern Residents (CWR) <http://www.youtube.com/watch?v=zJVxP7gZ4HQ&feature=related>

Mother & Son <http://www.youtube.com/watch?v=nPrfAu7NqmQ&feature=related>

From research boat - <http://www.youtube.com/watch?v=USqvq5MRpnM&feature=youtu.be>

Voice of the Orcas - <http://www.youtube.com/watch?v=I1tKddgDfG0>

Super pod - <http://www.youtube.com/watch?v=gg5EA2RNM0k&feature=youtu.be>

Wild Orcas - [http://www.youtube.com/watch?v=GscPkWe_kqc&list=LLtpOW-](http://www.youtube.com/watch?v=GscPkWe_kqc&list=LLtpOW-95oEbPlucc69Thxlw&index=36&feature=plpp_video)

[95oEbPlucc69Thxlw&index=36&feature=plpp_video](http://www.youtube.com/watch?v=GscPkWe_kqc&list=LLtpOW-95oEbPlucc69Thxlw&index=36&feature=plpp_video)

Wild Orcas - http://www.youtube.com/watch?v=ySdMT8fZi_0&feature=related

Orca Spy hop - <http://www.youtube.com/watch?v=XK3N52KSHUI&feature=relmfu>

Watching orcas from shore - <http://www.youtube.com/watch?v=D2FPIJjfEMY&feature=email>

Orcas Hunting: <http://www.youtube.com/watch?v=Y2FznZysvXY&feature=relmfu>

At Lime Kiln Park- <http://www.youtube.com/watch?v=U5tnzl7x5uo&feature=related>

Orca Sing 2008 - <http://www.youtube.com/watch?v=NgsUbg9PuaU>

ORCA MOVIES

Call of the Killer Whale movie: <http://video.pbs.org/video/1099394282/>

The Whale movie: <http://www.thewhalemovie.com/>

Free Willy - <http://www.youtube.com/watch?v=Y6bSTWtAo0U>

Free Willy Story: Keiko's Journey Home - <http://www.youtube.com/watch?v=YYyU3USJ-8E&feature=related>

ORCA BOOKS for Younger Readers

Storm Boy - Paul Owen Lewis, Tricycle Press, 1995.

Davy's Dream - Paul Owen Lewis, Tricycle Press, 1988.

In the Company of Whales - Alexandra Morton, Orca Book Publishers, 1993.

Siwiti - Alexandra Morton, Orca Book Publishers, 1991.

A Pod of Killer Whales - Vicki Leon, London Town Press, 2006.

Keiko's Story - Linda Moore Kurth, Millbrook Press, 2000.

Springer's Journey - Naomi Black, San Juan Publishing, 2006.

ORCA BOOKS for Older Readers

Orca - The Whale Called Killer - Eric Hoyt, E.P. Dutton, 1981.

Killer Whales of the World - Robin Baird, Voyageur Press, 2002.

Orca: Visions of a Killer Whale – Peter Knudtson, Greystone Books, 1999.
Killer Whales (2nd Ed) – John Ford, Richard Ellis, Ken Balcomb, UBC Press/UW Press, 2000.
Orcas in Our Midst – Howard Garrett, Orca Network, 2011.
Gone Whaling – Douglas Hand, Simon & Schuster, 1994.
Listening to Whales – Alexandra Morton, Ballantine Books, 2002.

ORGANIZATIONS

Center for Whale Research - <http://www.whaleresearch.com/>
The Whale Museum - <http://www.whalemuseum.org/index.html>
Orca Network - <http://www.orcanetwork.org/index.html>
Orca Lab - <http://www.orcalab.org/>
Orca Trust - <http://www.orcaresearch.org/>
SeaDoc Society - <http://www.seadocsociety.org/>
The Whale Trail - <http://thewhaletrail.org/>
Killer Whale Tales - <http://killerwhaletales.org/>
American Cetacean Society - <http://acsonline.org/>
Ocean Futures Society - <http://www.oceanfutures.org/>
People for Puget Sound - <http://pugetsound.org/>
Be Whale Wise - <http://www.bewhalewise.org/>

OTHER

Port Townsend Marine Science Center - http://www.ptmsc.org/orca_project.html
Seattle Aquarium - <http://www.seattleaquarium.org/page.aspx?pid=999>
Monterey Bay Aquarium - <http://www.montereybayaquarium.org/>

NOAA- National Marine Fisheries Service -
<http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/>
NOAA - Office of Protected Resources –
<http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/killerwhale.htm>

ORCA BLOGS (to follow orca sightings)

Orca Network's Sightings Network - <http://www.orcanetwork.org/sightings/map.html#recent>
Whale of a Purpose - <http://whale-of-a-porpoise.blogspot.com/>
Center for Whale Research - <http://www.whaleresearch.com/encounters.html>

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ALIGNMENT WITH EDUCATIONAL STANDARDS

National Science Education Standards K-4

Content Standard A: Science as Inquiry

- Ability to Do Scientific Inquiry
- Understanding about Scientific Inquiry

Content Standard C: Life Science

- Characteristics of Organisms.
- Organisms and their Environments
- Life Cycles of Organisms

Content Standard F: Science in Personal and Social Perspectives
Characteristics and Changes in Populations

- Changes in Environments

National Council for Teachers of English/International Reading Association

Standard 1: Students use a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard 3: Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features.

Standard 4: Students adjust their use of written, spoken and visual language to communicate effectively with different audiences for a variety of purposes.

Standard 5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for different purposes.

Standard 8: Students use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge.

Standard 12: Students use spoken, written and visual language to accomplish their own purposes.

National Council for the Social Studies – Thematic Strands

Strand I: Culture - Experiences that provide for the study of culture and cultural diversity.

Strand II: Time, Continuity and Change - Experiences that provide for the study of the ways humans view themselves in and over time.

Strand III: People, Places, Environments – Experiences that provide for the study of people, places and environments.

Strand IV: Individual Development and Identity – Experiences that provides for the study of individual development and identity.

Standard V: Individuals, Groups and Institutions – Experiences that provide for the study of interactions among individuals, groups and institutions.

Standard VIII: Science, Technology and Society – Experiences that provide for the relationships among science, technology and society.

Standard IX: Global Connections – Experiences that provide for the study of global connections and independence.

National Council of Teachers of Mathematics Standards

Number and Operation

- Understanding numbers, relationships among numbers, and number systems.
- Understand meanings of operations and how they relate to one another.
- Compute fluently and make reasonable estimates.

Data Analysis and Probability

- Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them.
- Develop and evaluate inferences and predictions that are based on data.

Ocean Literacy: Essential Principles and Fundamental Concepts

Essential Principle 1: Earth has one big ocean with many features.

Essential Principle 5: The ocean supports a great diversity of life and ecosystems.

Essential Principle 6: The ocean and humans are inextricably interconnected.

Essential Principle 7: The ocean is largely unexplored.

Common Core Standards – Mathematics

Operations and Algebraic Thinking

- Represent and solve problems in addition and subtraction.
- Represent and solve problems involving multiplication and division.
- Solve problems involving the four operations and identify and explain patterns in arithmetic.

Measurement and Data

- Represent and interpret data

Common Core Standards – Reading (K-4)

Key Ideas and Details

- Read closely to determine what text says explicitly and to make logical inferences from it, cite specific textual evidence when writing or speaking to support conclusions drawn from text.
- Determine central ideas or themes of a text and analyze their development, summarize key supporting details and ideas.
- Analyze how and why individuals, events and ideas develop and interact over the course of a text.

Craft and Structure

- Interpret words and phrases as they are used in a text.
- Analyze the structure of texts, including how specific sentences, paragraphs and larger portions of the text relate to each other and the whole.
- Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

- Integrate and evaluate content presented in diverse media and formats, including visually and qualitatively, as well as in words.

Common Core Standards – Language (K-4)

Conventions of Standard English

- Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.

Knowledge of Language

- Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening.

Vocabulary Acquisition and Use

- Demonstrate or clarify the meaning of unknown and multiple meaning words and phrases by using context clues. Analyzing meaningful word parts and consulting generalized and specialized reference materials.

Common Core Standards - Writing (K-4)

Text Types and Purposes

- Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization and analysis of content.
- Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details and well-structured event sequences.

Production and Distribution of Writing

- Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach.
- Use technology including the internet to produce and publish writing and to interact and collaborate with others.

Common Core Standards - Speaking and Listening (K-4)

Comprehension and Collaboration

- Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- Integrate and evaluate information presented in diverse media and formats including visually, quantitatively and orally.

Presentation of Knowledge and Ideas

- Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organizations, development and style are appropriate to task, purpose and audience.
- Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.