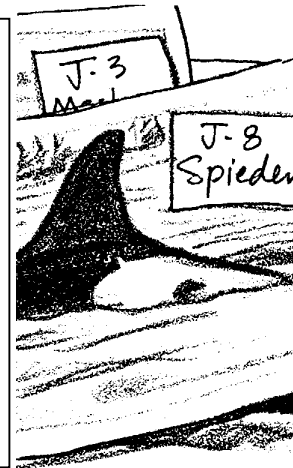


# Orca Photo I.D.

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Orca whale illustrations graciously donated by Albert Shepard. Orca whale catalogue pictures used with permission from The Whale Museum, Friday Harbor, Washington.

## Key Concepts

1. Individual orca whales can be recognized by saddle patches and characteristic markings on their dorsal fins.
2. Population information can be derived once individuals are identified.
3. Orca societies are matriarchal; orca whales stay with their mother their entire lives.



## Background

The study of the orca whales in the Pacific Northwest and Vancouver Island started in the early 1970's when oceanariums were collecting live orca whales to display in captivity. After some 62 orca whales had been taken from local waters, residents started to worry about depletion of the population. Although government agencies monitoring the capture of the orca whales assumed the local population to be in the thousands (meaning that a decrease of 62 animals was relatively insignificant), they commissioned a population study to be conducted by Dr. Michael Bigg. Much to the officials' surprise, there were less than 400 orca whales in waters off British Columbia and Washington. After these findings were reported in 1976, no more orca whale capture permits were issued for Washington or British Columbia waters. Most orcas now are captured in Iceland.

Dr. Bigg pioneered the photo identification of orca whales after discovering that nicks, scratches and marks on the dorsal fins and saddle patches of the animals did not heal and were as indicative of individuals as human finger prints. To test his theory, Dr. Bigg marked two notches in the dorsal fin of one male orca whale with his jackknife after it was captured by an oceanarium. The whale was later released. More than twenty years later, this male still can be seen in the San Juan Islands in the summer time and identified by his characteristic twin notches. He is known as K-1 or Taku.

Even though most government funding for orca photo-ID research has ended and other funding is very difficult to obtain, scientists continue their work. They have discovered three populations of killer whales in the waters around Washington State and British Columbia: transient orca whales, offshore orca whales, and resident orca whales.

Scientists have identified about 170 transient orca whales. These whales visit inshore waters only occasionally and are called “transient” whales because they do not stay in inshore waters for long before moving on. The transients primarily feed on seals and porpoises and tend to travel in small groups of perhaps two or three whales. Researchers can distinguish them easily from other populations of whales partly by the tall, pointy triangular shape of their dorsal fins.

Researchers discovered the offshore population of orcas only recently. They have identified about 200 offshore whales around Vancouver Island. Scientists believe that these whales spend much of their time along the continental shelf in the Pacific Ocean where rich populations of fish thrive. They travel in large groups of thirty to sixty whales. Scientists know little else about these whales, but suspect they are fish eaters.

The whales captured by aquariums and most often seen by whale watchers are resident whales, a population that now numbers around 300 whales. These orcas are called “resident” whales because they spend much of their time each year in the inshore waters along Vancouver Island and in Puget Sound hunting salmon. All of the resident whales have been identified through photo i.d. and, over time, researchers have begun to piece together an understanding of the social structure of the resident whale population.

There are two communities of resident whales which never mix. The northern community contains about 200 whales who live along the British Columbia coast. The southern community contains about 100 whales who live in the waters of southern British Columbia and Washington State. All of the whales included in this photo i.d. lesson are from the southern community.

The southern community consists of three pods, called J, K and L pods. Each pod spends most of its time traveling alone or breaking up into smaller groups called subpods. Scientists hypothesized at first that the male bulls, identified by their very tall dorsal fins (about six feet tall!), led the pods of whales. The bulls very often travel ahead or to the sides of the pods, apparently as sentinels looking for danger or for fish. It soon became clear, however, that the social structure of the pods was matrilinear. Each orca spends its entire life with its mother, so each pod is led by a few older female orcas who travel with their sons, daughters, and their daughters’ offspring. The relationships among the whales appear to be very close; family groups tend to surface to breathe at the same time, especially when resting, and each pod uses unique calls when communicating.

The life cycle of the orca whale is similar to that of humans. Females become reproductively mature at about fifteen years. They give birth to five or so young between age fifteen and age forty and then live to be about fifty years old, with some individuals living to be eighty or older.

Armed with information about how to distinguish whales, about orca society and about the life cycle of the whales, researchers have established a catalogue of resident orcas. They have assigned a letter and a number to each whale.

The letter represents the whale's pod and the number represents the individual whale. More recently, common names have been assigned.

The catalogue includes a photograph or drawing of each whale's dorsal fin. Researchers compare new photos with the catalogue pictures to identify recently sighted whales.

Scientists also have established family trees which show the ages of the individual whales and the deduced identities of their mothers. They do not know the identities of the fathers. Researchers believe mating probably takes place between males and females of different pods during superpod aggregations when J, K and L pods mix.

The whale populations continue to change as does our understanding of their lives and our impact on their well-being. When your students finish the photo i.d., you may wish to share with them changes in the whale pods as whales die and calves are born. One of the whales in this lesson, J-3, Merlin, was seen in 1995 with a sunken blowhole, a sign of lack of food, and then disappeared. Researchers assume he has died. On a happier note, two new calves were born in J-pod in the spring of 1996. Interestingly, the white saddle patches on these calves were tinged with pink because, like many newborn humans, these calves were jaundiced. As the summer of 1996 progressed, the calves gradually lost the unusual pink color.

Studies currently are underway to assess impacts whale watching may be having on the orca whales. In the past ten years the whale watching industry in Puget Sound has grown from about a dozen boats to nearly 100 vessels. The number of pleasure boaters following the whales has increased tremendously as well. So far studies do not indicate any definitive changes in the whales' behavior, but the commercial whale watching community has formed an alliance and is working to insure that their members observe the federal Marine Mammal Protection Act and do not approach the whales closer than 100 yards and do not harass them.

Scientists also are concerned about the impact dwindling salmon supplies may be having on the resident orca whales. Some whales are showing signs of lack of food, but this may be due to diseases as well as the possibility of salmon shortages.

If you would like to stay current on changes in the whale populations you can send for "Spirit of the Sound", the quarterly newsletter of the Whale Museum, Post Office Box 945, Friday Harbor, WA 98250, 1-800-946-7227. The original researchers also publish a new catalog every five years or so. The current catalog is *Killer Whales*, by John K.B. Ford, Graeme M. Ellis, and Kenneth C. Balcomb and is available at the Whale Museum and bookstores.

## Materials

For each pair of students:

- 1 set of whale pictures

NOTE: Follow the directions at the top of each "Whale Photo Master". You will need to cut the photographs apart. Each student team should have a set of 20 photos; some of the photos will be repeats.

- orca whale catalogue
- 1 copy student pages

## Teaching Hints

In "Orca Photo I.D.", your students compare 20 new orca photos of 12 whales taken in the field with catalogue pictures of orcas. This activity is designed to simulate actual photo I.D. research. It is most successful after the previous activity, "Field Studies of Whales".

For higher quality reproduction, you may wish to have the photos copied at a professional copy center and made into sets of whale photos which you can laminate for use year after year.

Students will need feedback on how accurately they are matching whale photos to the catalogue. Carry the key around with you to check student answers quickly. Remind students to use both the saddle patch and notches in the dorsal fin to insure the correctness of their matches.

You may wish to introduce this activity by doing the following human finger print activity with your students. Have each student use a pencil to rub a shiny pencil-lead spot onto a piece of paper. Each student then rubs his or her right thumb on the lead to coat the right thumb print. Next, have each student carefully press the coated thumb onto a 3/4 to 1 inch wide strip of transparent tape. The print will be transferred to the tape. Then tape each print onto an index card and write the student's name on the card. You now have a class catalogue of thumb prints. Have each child create another thumb print, but this time do not have students label the prints with their names. Let them use the catalogue of thumb prints to help them identify the prints of their classmates. Discuss successful searching strategies as you discuss overall success of the identification efforts.

## Key Words

**dorsal fin** - fin on dorsal or top side

**pod** - small herd or social group of whales

**saddle patch** - light colored area posterior (behind) the dorsal fin of orca whales

## Extensions

1. After students have successfully matched the whales, your class may wish to adopt an orca whale for a year. The Whale Museum at Friday Harbor, Washington, has an adoption process that will send your class a certificate of the whale they choose, an information sheet and current research newsletter. The small fee goes to education and preservation. See the address and phone number in the Background.
2. If you live near the Pacific Northwest coast, consider an orca whale watching trip. Contact the nearest aquarium or marine science center to locate whale watching charters.
3. Have your students make a life size male dorsal fin.
4. Show and discuss the movie “Free Willy”.

## Answer Key

1. There are twenty photographs.
2. There are six whales for which there are more than one picture.  
There are three whales copied three times and three whales copied twice.
3. The students have photographs for twelve whales. (Two of the whales are in the same photograph.)
4. Students will list various characteristics that they used to tell the whales apart. Accept their answers. The upcoming text and questions teach the students the characteristics researchers use.
5. There are six male orca whales in the photographs.

6. One can tell orca whales apart by looking for:
  - a. nicks and scratches on the dorsal fins
  - b. differences in the shapes and markings on saddle patches
  - c. tall dorsal fins which indicate males and small dorsal fins which indicate females and juveniles.

#### Analysis and Interpretation

1. Student answers will vary. Most will be able to identify only a few whales correctly the first time through.
2. a. and b. Student answers will vary. They will have different reasons for finding some whales easy to identify and other whales difficult to identify.
3. Pods J, K, and L are represented. These are southern Puget Sound resident pods.
4. In addition to difficulty in locating the whales, bad weather, and sea sickness, photographers also have to have “camera angles” that allow the distinctive patterns to be visible in the photos.
5. From photos, researchers can gain information about familial relationships (who’s related to whom), possible ages, and associations (which individuals or groups “hang out” together).
6. NOTE: The family trees in the student pages are partial family trees. There are additional whales in these pods. See the book *Killer Whales* if you would like the entire catalogue of whales.

Answers continue on next page.

6.	Whale	Year born	How old today?	Who is its mother?	Who are its offspring?		
	J-8 (Spieden)	1933			1. J-4 (Mama)		
	J-6 (Ralph)	1956					
	J-3 (Merlin)	1953					
	J-5 (Saratoga)	1938					
	K-1 (Taku)	1955		K-7 (Lummi)			
	K-3 (Sounder)	1954			1. K-14 (Les) 2. K-16 (Opus)		
	K-7	1910			1. K-1 (Taku) 2. K-11 (Georgia)		
	K-40 (Raggedy)	1963		K-18 (Kiska)			
	L-11.	1959		L-35			
	L-10 (Okum)	1959		L-12 (Alexis)			
	L-28 (Misky)	1949				1. L-38 (Dylan) 2. L-85 (Mystery)	
	L-38 (Dylan)	1965			L-28 (Misky)		

#### Acknowledgments:

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Whale catalogue pictures used with permission from The Whale Museum.

## Orca Photo I. D.



Orca whales, also known as killer whales, are very social. Orca whales stay with their mothers their entire lives. They live in “families” and travel in groups called pods. Several families of orcas are found in a pod.

They have a life span very much like our own. Wild orcas generally live to be about 70 years old.

Some orcas feed on fish. Others eat seals and sea lions.

Orca research first began in Puget Sound, in Washington state. There, resident whales travel in pods and hunt salmon. Other orca whales, called transient whales, enter Puget Sound from time to time. These orca whales travel as individuals or in very small groups. The transient whales feed on seals and sea lions.

Scientists identify each whale with a letter and a number. The letter stands for its pod. The number stands for that whale. Many of the whales also have common names.

In the following activity, you will observe photographs of whales. The whales are from resident pods in Puget Sound. Your task is to identify each whale. Just like the whale researchers, you will match pictures to identify individuals.



**Materials**

- set of whale photographs from a day of whale watching
- orca whale catalogue

**Procedure:**

Work with a partner. Suppose that you and your partner are whale researchers and you have returned from a long day of photographing orca whales. You have developed your film and printed the best photographs. Now it is time to try to identify the whales in your pictures.

Spread out the whale photographs. You may have seen some whales more than once and may have taken several photographs of them. See if any of the whale photos are perfect matches. Stack up the photos that you think are of the exact same whale.

1. How many total photographs do you have?
2. For how many whales do you have more than one picture?
3. So, how many different whales did you photograph that day?
4. What characteristics did you see on the whales that helped you tell them apart?

Scientists have figured out that each orca whale has characteristics that they can use to recognize that whale. The dorsal fin may have scratches, nicks or tears. When orca whale research began in the 1970s, one scientist, Dr. Mike Bigg, decided to find out whether or not the nicks he saw in the whales' dorsal fins stayed the same their whole lives. He heard about a whale that had been captured. He named it K-1, K because it lived with K pod, and 1 because it was the first whale from that pod that scientists named. He cut two large notches in its dorsal fin before the whale was let go. That whale still has those same two notches today! Look at your photographs and see if you can find a whale with two big cuts in its fin. That whale is known as K-1 or Taku.

In addition to looking at notches in the whales' dorsal fins, you also can look at the white areas on their backs by their fins. This area is called a saddle patch. Different whales have different shaped saddle patches and some have scratches in their saddle patch that stay with them their whole lives just as you keep the same fingerprint your whole life.

There is one more characteristic that will help you tell the whales apart. Male orca whales have a very tall dorsal fin. It can be about two meters tall (that's about six feet)! Females and juvenile orca whales have smaller dorsal fins.

5. How many male orcas are shown in your photographs?
  
  
  
  
  
  
  
  
  
  
6. List here the three things you can look for to tell your whales apart:
  - a.
  
  
  
  
  
  
  
  - b.
  
  
  
  
  
  
  
  - c.
  
  
  
  
  
  
  
  
  
  
7. Now, try to match your photographs to the drawings in the catalogue. Check with your teacher after you have matched the whales to see how many you have correct and to get hints on which ones you need to try to identify again. It takes a great deal of practice to learn how to identify the whales.

#### Analysis and Interpretation

1. How many whales did you identify correctly the first time through?
  
  
  
  
  
  
  
  
  
  
2. a. Which whales were easier to identify? Why?
  
  
  
  
  
  
  
  
  
  
- b. Which whales were more difficult? Why?

3. Which pods are represented?
  
4. What problems might researchers face when trying to get photographs of the whales?
  
  
  
  
  
  
  
  
  
  
5. What other types of information about orca societies do you think researchers can gain from photos?

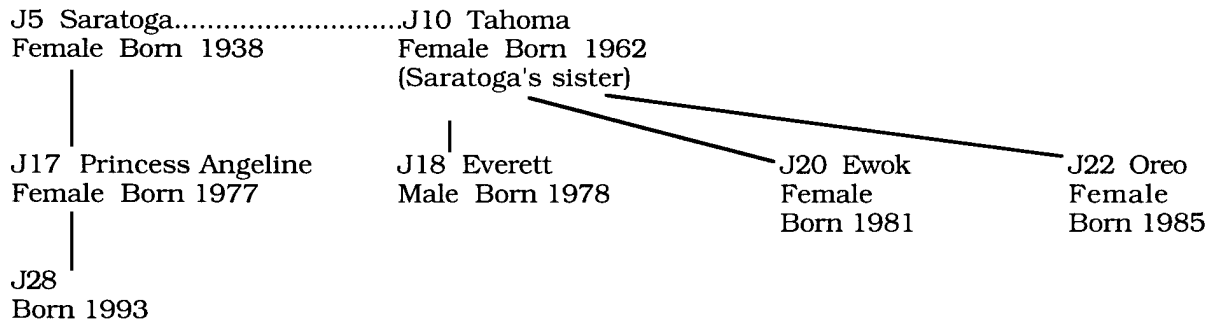
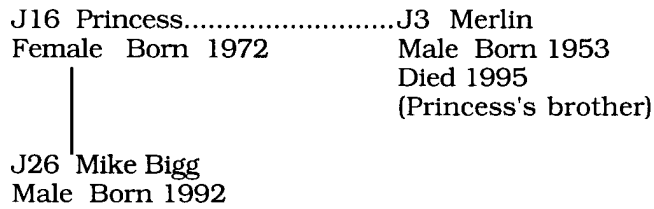
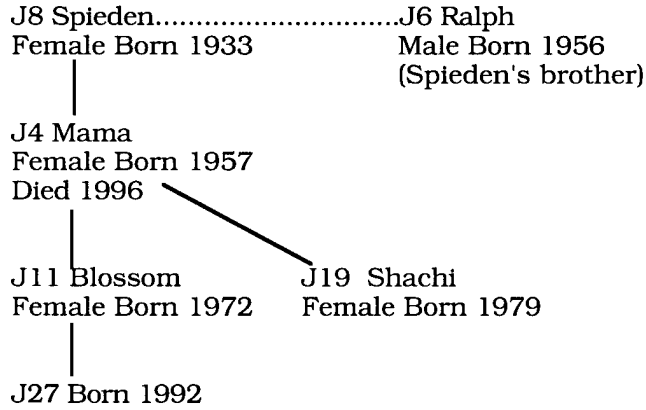
There probably were other whales traveling with these whales you photographed. Since you know that orca whales spend all their lives swimming with their mothers in a family group, you can make some guesses about what other whales might have been swimming with the whales in the pictures.

Use the family tree to figure out who else is in the whales' families. You also can figure out the whales' ages.

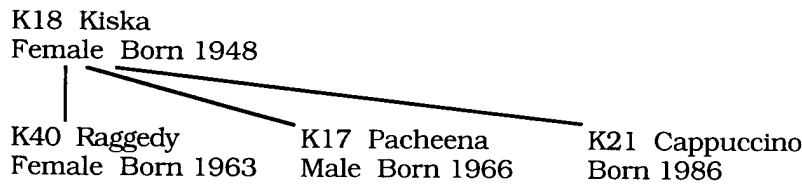
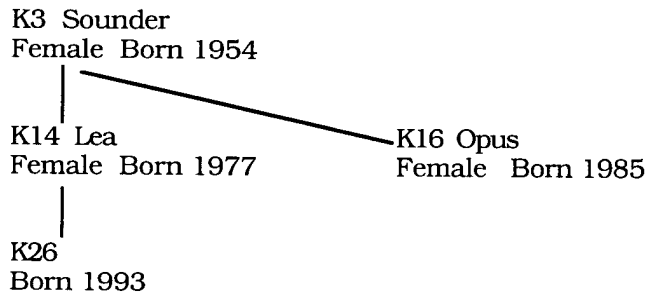
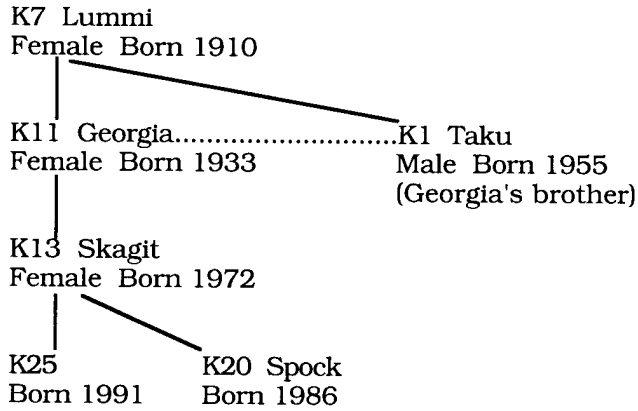
6.

Whale	Year born	How old today?	Who is its mother?	Who are its offspring?
J-8				1.
J-6				
J-3				
J-5				
K-1				
K-3				1. 2.
K-7				1. 2.
K-40				
L-1				
L-10				
L-28				1. 2.
L-38				

J-POD FAMILY TREES



K-POD FAMILY TREES



## L-POD FAMILY TREES

