

Introduction: Salmon in Alaska

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| <p>To introduce students to the work they will do with <i>Alaska's Wild Salmon</i>, we suggest they read "Introduction – Salmon in Alaska" on page 7. You can use the Questions For Discussion and Activity Ideas listed below to pique student interest in salmon and help them realize that what they are going to learn will apply directly to their everyday lives.</p> | |
| Key Concepts | |
| <p>Salmon are a crucial part of life for nearly all Alaskans. Alaska is the last great stronghold for healthy stocks of wild salmon. Each one of us is responsible for helping to sustain this resource.</p> | |
| Chapter Objectives | |
| <p>Students will:</p> <ul style="list-style-type: none">· think about the importance of salmon to them, their families, and their community;· wonder why Alaska is the last great stronghold for healthy stocks of wild salmon;· think about what they can do to help assure sustainable stocks of wild salmon in Alaska. | |
| Terms Students Should Understand | |
| <p>stocks - naturally occurring populations of animals that breed and exist as genetic units. A salmon stock is usually associated with a specific watershed.</p> | |
| Background for Teachers | |
| <p>What is meant by "wild" salmon in the title of this book?</p> | <p>Scientists define wild salmon as "indigenous species that are the progeny of streambed spawners." Wild salmon are the product of naturally occurring stocks of salmon breeding in natural habitats.</p> |
| <p>Why is it important to distinguish specific stocks or populations of fish?</p> | <p>Pacific salmon have geographically specific stocks. Each stock has adapted over time to specific watershed conditions such as water temperature and</p> |

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| | <p>flow, size of spawning gravel, rearing habitats, and necessary patterns of seasonal migrations. Salmon from one watershed may not be able to complete their life cycle successfully in another system.</p> |
| <p>Questions For Discussion</p> | |
| <p>1. Why do we see salmon only at certain times of the year? Where do they go in winter? In early spring?</p> | <p>We see adults in streams and rivers in the summer and fall as they return from the ocean to spawn, but much of the salmon's complete life cycle (see page 16 in <i>Alaska's Wild Salmon</i>) is hidden from us unless we look carefully. Eggs are buried in gravel while they develop during the winter, young salmon are camouflaged and hide from us while they are in the streams, smolts soon go to the sea to live for nearly all of their adult lives.</p> |
| <p>2. What's the student holding in the picture on page 7?</p> | <p>She is looking at a series of vials containing salmon eggs in their development stages from egg to fry. (See Chapter 2 of <i>Alaska's Wild Salmon</i>.)</p> |
| <p>3. What are some of the regulations or practices you know about that help take care of Alaska's wild salmon stocks?</p> | <p>The Alaska Board of Fisheries allocates and regulates state salmon fisheries. Subsistence fishing is regulated by both state and federal boards. In both cases, there are rules and regulations established for the harvest of all salmon in Alaska.</p> <p>The Alaska Department of Fish and Game plays a part through in-season monitoring and adjustments to regulations in order to meet prescribed escapement goals.</p> <p>Students may be familiar with the sport fishing regulations summary for their region, or commercial fishing regulation books. (See chapters 6 & 7 in <i>Alaska's Wild Salmon</i> for discussions of various regulations and the agencies responsible.)</p> |
| <p>4. What are some of the ways in which wild salmon are important to people in all parts of Alaska? To people in other parts of the world?</p> | <p>The answer to this question will vary by student. In rural areas, students may be familiar with all possible uses for the fish. In urban areas, many students have little knowledge of salmon or their</p> |

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| | <p>importance. Research on the Internet can broaden all students' understanding of the importance of wild salmon to Alaskans and to people in other parts of the world.</p> |
| <p>5. What do you know about the importance of salmon to other animals and living things near your home?</p> | <p>In the ocean, salmon are food for orcas, seabirds, sea lions, seals, beluga whales, porpoises, and other animals. In streams & rivers they are food for bears, gulls, mink, otter, and other animals. Nutrients from the carcasses of spawned out salmon are carried far into forest. See Section 2.</p> |
| <p>6. Imagine that there were no salmon, or only very small numbers of them, for one year in your community. How would you and your family be affected? How would your community be affected? What would happen if there were no salmon for several years, or for decades?</p> | <p>Students can discuss implications for food supply, livelihoods of families, income to support community services, disruption of traditions, etc. What would people eat instead of salmon?</p> |
| <p>Ideas for Activities</p> | |
| <p>1. As a class, in small groups, or as individuals who will report back to the class, ask students to list all the ways they encounter salmon in their lives. Ask how they think encounters with salmon might be different for people in other places (urban/rural, different regions of Alaska, different countries). What do salmon add to their lives?</p> | <p>Students might describe fishing for recreation, helping to harvest salmon, watching or studying salmon, eating or cooking it, participating in community celebrations, learning clan stories, wearing jewelry or clothing w/ a salmon theme, visiting a local hatchery or helping with stream surveys or salmon habitat restoration. They may describe family salmon recipes, fishing stories, art work and businesses in their community that use salmon (grocery stores, processors, smokeries, tee-shirt shops, fishing boats in the harbor, stores that sell hardware and gear, etc.). This could also be a homework assignment students could do individually or with their families.</p> |
| <p>2. Ask students to bring to class something representing one of their connections with salmon.</p> | <p>They might choose a favorite fishing lure, a piece of traditional regalia, a clan or family story, the recipe for a favorite salmon dish, a book or magazine article, or a piece of jewelry, clothing, or art.</p> |
| <p>3. Ask students to create something exemplifying their connection with</p> | <p>They might create a picture or diagram, a sculpture, a cartoon, a story, a children's</p> |

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| salmon. | story, a legend in the traditional style, a poster or brochure for advertising salmon, or an idea for a new saleable product. This could be something simple, or a long-term project to be completed as a culmination of the unit. |
| 4. Ask students to interview family or community members, or owners of local businesses about the importance of salmon in their lives. | The development of oral histories can give older Alaskans a chance to recount the historical importance of salmon in a way that will be personally relevant to students. Students could revisit the person they interview now in an activity for Chapter 5. |
| Resources Especially for Teachers | |
| http://www.ankn.uaf.edu/interview.html | This article on the Alaska Native Knowledge Network web site suggests guidelines for interviewing elders to gather material for use in the classroom. |
| Youth Source | This Oral History Unit Overview is on the Youth Source web site of the Heritage Community Foundation in Alberta, Canada |
| www.doingoralhistory.org http://www.oralhistory.org.uk/advice/ | There are many sites on the worldwide web that suggest ways to conduct oral histories (Search for “How to do oral history.”) |
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| Resources for Students and Teachers | |
| Fobes, Natalie. 1994. <i>Reaching Home: Pacific Salmon, Pacific People</i> . Seattle: Alaska Northwest Books | This book of photos and essays beautifully illustrates salmon evolution and biology, and the myriad connections between salmon and people in the Pacific Northwest. |
| Looking Ahead | |
| Ask students to think about why there are five different species of salmon in Alaska. How do they think salmon came to be different from, say, halibut or whitefish? | |

Chapter 1: How Salmon Evolved and Adapted



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| Key Concepts | |
| <p>Salmon and related species have evolved and changed over millions of years. Genetic diversity allowed different species and populations to adapt and survive under different conditions in various streams, lakes, and rivers. The genetic variety among these fishes is crucial to the survival of Alaska's salmonids.</p> | |
| Chapter Objectives | |
| <p>Students will be able to explain:</p> <ul style="list-style-type: none"> · how salmon and related fishes evolved over the ages; · some of the evolutionary benefits salmon have gained by adaptations such as being anadromous; · why genetic diversity and healthy habitats are essential to the survival of wild salmon in Alaska. | |
| Terms Students Should Understand | |
| <p>salmonids (sal-MON-ids) – salmon and the other species related to them, such as trout and whitefish <i>Oncorhynchus</i> (on-kor-IN-cus) – Latin name for the genus that includes salmonids anadromous (an-AD-ruh-mus) – a term describing fish that spawn in fresh water and spend part of their lives in salt water</p> | |
| Background for Teachers | |
| <p>How did salmonids evolve?</p> | <p>Between 50 and 100 million years ago, when the land masses which now surround the Atlantic Ocean were still joined together, a small fish, possibly resembling today's Arctic grayling, lived in the cold waters of what was to become Northern Europe. It was the Age of the Dinosaurs.</p> |

Scientists believe something happened to a group of these small fish that caused the numbers of their chromosomes to double in each cell. That change left all descendents of these fish with twice as many chromosomes in each cell as other members of similar ancient fish. This doubling of chromosomes is called *tetraploidization*. It is a component of evolution in many species, and allows increased diversity and adaptability. All the extra genetic material salmon gained may be why salmon are able to live part of their life in fresh water and part in salt water.

Scientists have identified a few species of ancient fishes that were most likely salmonids. The earliest of these fossils identified to date is *Eosalmo driftwoodensis*, which lived about 50 million years ago. Another early salmonid was *Smilodonichthys*, the sabertoothed salmon (page 8). *Smilodonichthys* existed between 10 and 15 million years ago, during the middle Miocene epoch. From evidence in the fossil record, we know it was a filter feeder which probably used its large tooth in displays or fighting when breeding. It grew to a length of more than 6 feet and had a single large fang extending beyond the snout.

How do we know salmon evolved and didn't start out the way they are now?

The fossil record provides many examples of earlier salmonid species, and the study of DNA allows us to find the relative times in the past when species diverged.

Why should we worry that salmon won't evolve and adapt to changes in the environment today?

Pacific salmon are very adaptable, but today too much climate change may be happening too fast. It takes hundreds of thousands of years for a species to evolve. Our present species of salmon have managed to survive in the North Pacific during the past six million years. Individual stocks must have faced, and sometimes been destroyed by, glaciers, volcanoes, rock slides, huge flood events, massive changes in sea level caused by continent-wide ice sheets, and other natural forces. Over a number of generations, one stock might perish, but others could adapt and colonize new

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| | <p>habitat as opportunity occurred. Today, human activities and other natural cycles are causing rapid changes in habitat, water quality, and water quantity. Climate change may modify freshwater and ocean conditions on a large scale. Salmon cannot adapt or evolve to so many changes over so short a time.</p> |
| <p>What physiological changes must take place for a young salmon that grew up in fresh water to survive in salt water?</p> | <p>Salmon just emerged from the gravel are called <i>fry</i>. Pink and chum salmon fry migrate very quickly to estuary areas and out to sea, Their period of change from freshwater to saltwater species is very brief. This change, called <i>smoltification</i>, takes longer in other Pacific salmon and involves much greater change in the young fish.</p> <p>Fry of chinook, coho, and sockeye salmon spend more time in fresh water (See chart on p. 17 of <i>Alaska's Wild Salmon</i>). When they migrate to the ocean they must first re-orient themselves from seeking cover and hiding in the stream margins, to swimming in the surface of flowing waters. They continue to swim upstream, but the increased current speed and large flows of spring soon wash fry into estuary areas.</p> <p>Estuaries are very fertile mixing zones, where the sea and fresh waters mingle. Here the young smolt undergo physiological changes that adapt them to life in saltwater. They become tolerant of increased amounts of salt, they change color and loose their parr marks, and they grow rapidly. Within a few weeks or months at the most, surviving salmon smolts are ready to head to the sea, where they will feed and grow into adults.</p> |
| <p>Questions For Discussion</p> | |
| <p>1. What are some of the evolutionary adaptations that help salmon and other fish live successfully in water?</p> | <p>Fish have streamlined bodies that create little resistance in the water, gills to extract oxygen, scales for flexibility of movement and protection</p> |
| <p>2. From the perspective of a salmon, why would you, as a species, go through all of the changes required to survive?</p> | <p>It was not a choice for salmon to do as they do. Remember that they evolved in an ever-changing world. They had to adapt to survive. Some populations of</p> |

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| | <p>salmonids did not migrate to the sea. Some became extinct. Others became the cutthroat trout, Dolly Varden char and rainbow trout we know as freshwater fish. (It is interesting to note that fully a third of all rainbow trout migrate to the ocean and return to fresh water as steelhead. Dollies and cutthroats also may migrate to the sea for brief periods.)</p> <p>What all anadromous fishes find in the ocean is an enormously rich smorgasbord of food (more than could be found in their natal fresh waters). There must be advantages to each species of salmonids in the way they live. Each has adapted to fill its specific niche during all stages of its life cycle. For Pacific salmon, it is an advantage to breed in fresh water and migrate to salt water.</p> |
| <p>Ideas for Activities</p> | |
| <p>1. Have students do a web search using “evolution of fishes” and similar terms in a search engine.</p> | |
| <p>2. The study of glaciers is a great way to help students understand the changing surface of the earth.</p> | <p>See web site in Resources, this chapter.</p> |
| <p>3. Have students use modeling clay to make "fossil" imprints of natural objects.</p> | |
| <p>Resources Especially for Teachers</p> | |
| <p>www.pbs.org BBC Evolution Web site Biology and Evolutionary Theory</p> | <p>These three web sites have good information for teaching about evolution.</p> |
| <p>Joseph Taylor III. 1999. <i>Making Salmon: An Environmental History of the Northwest Fisheries Crisis</i>. Seattle: University of Washington Press.</p> | <p>This is perhaps the best documented work on the history of the salmon crisis in the Pacific Northwest. Informative and a good read!</p> |
| <p>Salmon & Survival</p> | <p>The primary purpose of this site is to address the failure of hatcheries to solve the crisis of declining salmon stocks, but in the process it provides good information about how salmon evolved and adapted—and why that ability is important to their survival.</p> |
| <p>Glaciers</p> | <p>This web site from the South Dakota Alliance for Distance Education offers</p> |

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| | several lesson plans for teaching about glaciers. |
| Resources for Students and Teachers | |
| Biology and Evolutionary Theory | This site introduces the basics of evolution. |
| Matsen, B. and R. Troll. 1994. <i>Planet Ocean, A Story of Life, the Sea, and Dancing to the Fossil Record</i> . Ten Speed Press. 133 pp. See also Web site: http://www.trollart.com/ | Many students will be attracted by the highly visual “Weird Science” approach to evolution and weird fish by Ketchikan artist Ray Troll. |
| Jim Licatowich. 1999. <i>Salmon Without Rivers: A History of the Pacific Salmon Crisis</i> . Washington, D.C.: Island Press. | Chapter 1 of this book traces the evolution of salmon and their adaptation to the changing geologic landscape in the Pacific Northwest. |
| Physical Geography | This site on basic physical geography at Okanagan University College in British Columbia has good basic information on such topics as natural selection and evolution, and factors influencing distribution of species. |
| California's Salmon and Steelhead | This site contains the full text of <i>California's Salmon and Steelhead</i> edited by Alan Lufkin and published by University of California Press, 1996. Chapter 6, entitled “Why All the Fuss About Preserving Wild Stocks?” has an excellent subsection on ‘Natural Selection’ and the genetic importance of wild fish. A short search route is to type the book title into Google or another search engine. |
| Entering “Pacific wild salmon, evolution and adaptation” into a web search engine will yield a great deal of information. Adding additional descriptors such as “survival” and others can focus the search. The following website is an example: Preserving Salmon Biodiversity | You can also reach this article on Preserving Salmon Biodiversity by searching the archives on the American Scientist web site. |
| Looking Ahead | |
| Ask students how they or members of their family or community distinguish between different species of fish they may catch. Why is it important to be able to tell what species a fish belongs to? | |

Chapter 2: Pacific Salmon Biology



| Key Concepts | |
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| <p>Over millions of years Alaska's wild salmon have developed a complex life cycle that allows them to thrive and expand into new areas. Each of the five species has developed distinct physical characteristics, different habitat needs, and different timetables for spawning and rearing. All five species are a crucial part of the food web that binds together Alaska's land and oceans.</p> | |
| Chapter Objectives | |
| <p>Students will be able to explain:</p> <ul style="list-style-type: none">· the life cycle of salmon and their stages of development;· the importance of salmon at each stage in their life cycle to the entire ecosystem;· differences among the five species of wild salmon, and rainbow and cutthroat trout;· why these differences are so important to the survival of Alaska's wild salmon;· how salmon expand into new areas and why it is important that they do. | |
| Terms Students Should Understand | |
| <p>redd - the nest or depression a female salmon makes in the gravel of a river or stream (for depositing her eggs). milt - the fluid containing sperm that male salmon produce. alevin - the first life stage of a salmon after hatching from the egg. At this point a yolk sac is still attached to the young fish's abdomen, providing a ready made</p> | |

source of food.

fry - a young salmon just emerged from the gravel. The young fish must now find food in the surrounding fresh water and hide from predators.

smolt – a young salmon living in an estuary area prior to outmigrating to the ocean.

parr marks – dark brown vertical stripes on the sides of salmon fry before they become smolts. These markings help provide camouflage to protect the young fish in their rearing areas. They can also be used to identify the different species.

Pink salmon do not develop parr marks.

genes – long strands of genetic material responsible for passing on hereditary information in reproduction.

genetic diversity – the mix of genetic materials within a species or stock that allows for:

- variability of the individual, and
- adaptability to different conditions

by members of the population.

straying – the behavior in which some adult salmon spawn in streams where they were not hatched. Straying assures continued diversity in genetic materials among populations of wild salmon.

Researchers have found that up to one-third of chinook salmon may stray when they return to fresh water to spawn.

Background for Teachers

Why are healthy wild salmon runs important to the Alaska environment as a whole?

Salmon benefit many ecosystems. One study shows that more than 137 species of wildlife rely upon salmon for nutrients at one or more stages of the salmon life cycle. (“Pacific Salmon and Wildlife” by the Washington Department of Fish and Wildlife – See Resources later in this chapter) Without salmon, Alaska would have greatly decreased numbers of bears, sea lions, river otters, bald eagles, mergansers, kingfishers, arctic char, and other animals.

Research has traced isotopes of nitrogen and carbon, two important nutrients, from dead salmon into the ecosystems along rivers. Salmon may provide 18% of the

nitrogen in streamside trees, 25-30% of the nitrogen and carbon found in insects, and 25-40% of the nitrogen and carbon in young salmon, which feed on the insects.

Questions For Discussion

1. Why is it important that each female salmon builds several redds, each of which may be fertilized by a different male?

By depositing their eggs in more than one redd, female salmon increase the possibility that at least some of the eggs will survive to the next life stage. Having more than one male fertilize those eggs assures increased genetic diversity in the population.

The forces ranged against survival of a salmon's spawn are huge. From disturbance of the gravel by other spawning fish, to flood events that scour streambeds, to predation by dozens of other animals, the chances of survival from egg to fry is very small. As a general rule, in nature only 10 percent of any given life stage of wild salmon can be expected to survive to the next life stage. One estimate in *Salmonids in the Classroom* suggests that for every 2,500 eggs, two adult salmon return to spawn.

2. What would happen if all salmon returned to their home streams at the same time?

Salmon partition spawning times as well as areas of the stream. This use of the entire season for returning and spawning makes the most efficient use of any system's limited resources.

If all salmon returned at the same time, stocks could be mixed, habitats would be strained, and the biological and chemical resources of the systems could be taxed beyond the fishes' ability to survive.

Here's just one example: When too many salmon return to spawn and die in small systems at the same time, their rotting carcasses may use all available oxygen in the water. This would leave other fish and benthic macroinvertebrates (animals without backbones that are larger than 1/2 millimeter. They live on the bottom of waters, under rocks, mud, and weeds. They include crustaceans such as crayfish, mollusks such as clams and snails, aquatic worms and the immature forms of aquatic insects such as stonefly and mayfly nymphs) in the system

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| | without the oxygen they need to survive. Encourage students to explore other possible examples. |
| 3. Bald eagles, seals, Dolly Varden trout, and other animals eat great quantities of mature salmon, young fry, or eggs. Why do we no longer offer bounties to kill these predators? How do we know they are not destroying our salmon runs? | “Our” salmon are theirs as well. Natural predation has always occurred. As we have learned more about the natural relationships between salmon and all their predators, resource managers have come to value the complete cycle of life involved with salmon and learned to limit our harvest to take only the surplus of salmon not needed to both renew the runs and recharge the ecosystems. |
| 4. The second paragraph on page 14 describes the habitat qualities each species of salmon needs for reproduction: <ul style="list-style-type: none"> · clean and well oxygenated water; · gravel of the correct size and depth; · constant cold water temperature; · water velocity of the correct speed; and <ul style="list-style-type: none"> · appropriate water depth. What kinds of things might disrupt one or more of these qualities and cause spawning or egg rearing to fail? | Students might suggest extreme hot or cold weather, too much or too little rainfall, human activities disrupting water flow, changes in the gravel layer, siltation, water depth, etc. |
| Ideas for Activities | |
| 1. Ask each student to choose an animal from the Pacific Salmon Food Web on page 19, then use words or drawings to describe in as much detail as they can how that animal gets salmon for food. | Be sure they include information on: <ul style="list-style-type: none"> · which stage or stages of salmon the animal feeds on; · how it’s equipped to catch and consume the fish; · what else it eats (Note that that often changes with the seasons); and · how it passes along nutrients from salmon to other animals or parts of the ecosystem. (Is it a predator on salmon, for example, and prey for some other animal?) |
| 2. Ask students to determine what species of salmon are found in waters near their community. They could research when the fish normally spawn, what parts of water bodies they use, and some characteristics of places where they spawn. They could gather information from their own experience and by interviewing parents, elders, fishermen and –women, biologists. | A great resource for this is the Alaska Department of Fish and Game <i>Wildlife Notebook</i> pages at: Wildlife Notebook |

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| and others. | |
| 3. Have students dissect a salmon. | See the study guide in Getting Into a Fish in Appendix A. |
| Resources Especially for Teachers | |
| C. Jeff Cederholm and David H. Johnston. 2000. <i>Pacific Salmon and Wildlife: Ecological Contexts, Relationships, and Implications for Managers</i> . Olympia: Washington Department of Fish and Wildlife | This study looks at the relationship between salmon and all fish, plants, and wildlife in Washington state. It is a clear, easy to read summary of the interrelationships between salmon and their habitats. The Washington Department of Fish and Wildlife web site posts an abstract and a link to the complete study at www.wa.gov/wdfw/hab/salmonwild |
| C. Groot and L. Margolis. 1998. <i>Pacific Salmon Life Histories</i> . University of British Columbia Press | This is the most authoritative biology text on Pacific salmon. |
| Video: <i>The Miracle of the Scarlet Salmon</i> -NATURE educational programming | This video follows one salmon from the egg through all life stages and its return to spawn. Good for all ages. Available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186. |
| Resources for Students and Teachers | |
| National Geographic | This “Pacific Salmon” lesson plan on the “expeditions” portion of the National Geographic Society web site can easily be adapted for middle school students. The site links to a slide show on the salmon life cycle, a simulation game, and puzzles. |
| Type “salmon life histories” or “Pacific salmon decomposing” into a web search engine. | |
| ADFG Teacher Resources | This web site links to the Wildlife Notebook series pages on salmon. You can also reach it through the Publications link on the Alaska Department of Fish and Game home page. |
| Looking Ahead | |
| Ask students to find topical maps of Alaska that show rivers, streams, surrounding oceans, the continental shelf, and other features. then on the basis of | Use any good map of geographic features. Or see <i>Alaska in Maps: A Thematic Atlas</i> , produced for Alaska schools. Maps in this reference show rivers. lakes. coastline. |

what they've learned about salmon biology, see if they can suggest some geographic reasons why Alaska can support many healthy stocks of wild salmon.

the continental shelf, ocean currents, and other features that relate to salmon biology and habitats.

Chapter 3 Alaska's Salmon Habitats



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| Key Concepts | |
| <p>Healthy watersheds are crucial to sustaining Alaska's wild salmon. Alaska is unique in that it has large quantities of healthy watersheds. We have the ability to sustain salmon populations by understanding and maintaining these watersheds.</p> | |
| Chapter Objectives | |
| <p>Students will be able to describe:</p> <ul style="list-style-type: none"> · geographical areas and terms of the essential environmental elements found in healthy watersheds; · how each element contributes to good salmon habitat; and · how the elements of salmon habitats are interconnected. <p>They will also be able to describe:</p> <ul style="list-style-type: none"> · human behavior that can threaten | |

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| <p>elements of good salmon habitat;</p> <ul style="list-style-type: none"> · steps they and their communities can take to assure healthy salmon spawning, rearing, and growing areas; and · the major salmon-producing areas in Alaska. | |
| <p>Terms Students Should Understand</p> | |
| <p>watershed – an area of land in which all the water that falls as snow or rain collects and eventually flows into a larger body of water</p> <p>habitat partitioning – the natural allocation among different species of salmon of areas in a stream that are suitable for spawning and rearing</p> | |
| <p>Background for Teachers</p> | |
| <p>What’s so important about watersheds?</p> | <p>We all live in a watershed. It is often difficult for students to perceive that their activities have an impact on the places where they live. From rural surface water systems to city water and sewers, students should explore their use of water as part of watershed studies.</p> <p>While most of Alaska’s watersheds remain healthy, for many students living in metropolitan areas, local impacts on watersheds can be as glaring as in any city. Because we tend to settle along water bodies, human impacts can be greater than we might think.</p> <p>While industry must have clean waters to function, and regulations exist to assure that <i>point source pollution</i> is in check, often our individual impacts go unnoticed. These cumulative impacts of humans on waters and watersheds are usually from what is called <i>non-point sources</i>. These are general, everyday sources of pollution that can affect the health of watersheds.</p> <p>An improperly installed sewage system can back up and affect the quality of drinking water in a village. Pet owners walking their dogs along lake shores can lead to closure to swimming. Cat litter discarded along beaches or into streams can spread disease in wildlife. Changing oil in the driveway or spreading waste oil</p> |

to contain dust on roads can pollute drinking water in an aquifer. The over application of fertilizers on lawns near lakes can lead to explosive growth of water plants and eutrophication (the process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen).
See also Appendix B, Fish Habitat in Alaska, in this guide.

Questions For Discussion

1. How does habitat loss relate to the decline of salmon?

Most biologists agree that loss of habitat is a primary reason for the decline of salmon populations in the Pacific Northwest. The other four “Hs” of salmon loss (listed on the back cover of *Alaska’s Wild Salmon*) are all significant in these declines in the Lower 48 and Canada. In Alaska, the fact that our salmon habitat remains healthy is a primary reason that virtually all of our salmon runs are healthy, year after year. For this to be true, ALL parts of the habitat used in the wild salmon’s life cycle must remain healthy.

2. How will climate change affect salmon habitat?

Scientists do not know. It is safe to say that there will be changes in salmon populations and production due to climate change, but it is likely that some populations will decline and others increase in number. Remember that salmon are adaptable to some change, but they cannot change their basic habitat needs.
For example, as ocean temperatures warm, all Pacific salmon require more feed to grow. Accordingly, salmon retreat from warmer waters and become more tightly packed and dependent upon the forage resources of the North Pacific. This could strain ocean food resources, leading to fish that spawn later and are smaller in size.

3. The map caption on p. 28 of *Alaska’s Wild Salmon* states that “in Alaska, small streams produce more salmon than large

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| <p>“rivers.” In terms of what you know about the salmon life cycle, is this surprising or not?</p> | |
| <p>Ideas for Activities</p> | |
| <p>1. Ask students to look at stream habitat near their school and decide which salmonid species this system is likely to support.</p> | <p>They can refer to pp. 11-13 of <i>Alaska's Wild Salmon</i> for habitat requirements of different species, and to p. 23 for information on some species habitat preferences.</p> |
| <p>2. Assign individuals or a group of students to gather more information about the major salmon producing areas listed on p. 28 of <i>Alaska's Wild Salmon</i>. Where does their community fit in?</p> | <p>See, among other references:</p> <ul style="list-style-type: none"> · graphs of commercial salmon harvest by region, map showing intensity of sport fishing by region, and use of subsistence resources, in <i>Alaska in Maps: A Thematic Atlas</i> · information about salmon harvests on the Divisions of Commercial Fisheries, Sport Fish, and Subsistence on the Alaska Dept. of Fish and Game web site - ADF&G · information about Alaska communities on the Alaska Department of Community and Economic Development “Community Database Online” - Community Database Online |
| <p>3. Have students compile oral histories for possible indications of climate change in their community. Are local glaciers melting rapidly? Have weather patterns changed in recent decades? Are new or exotic species of fish being caught in local fisheries? Have any stocks of salmon disappeared from local streams?</p> | <p>Students could use the world wide web to see if projected global climate trends relate to specifics of local observations or predictions for local changes.</p> |
| <p>4. Begin a long-term stream monitoring and habitat assessment project in a local watershed. Plan for it to be maintained annually by subsequent classes.</p> | <p>Resources are available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186.</p> |
| <p>Resources Especially for Teachers</p> | |
| <p>Tom Murdoch and Martha Cheo. 1999. <i>Streamkeeper's Field Guide</i>. Available from Adopt-a-Stream Foundation, Everett Washington, (206) 316-8592.</p> | <p>This is a complete “how-to” field guide for studying, monitoring, and taking action to preserve and restore streams. It contains detailed information on watersheds, physical characteristics of streams, water quality, underwater invertebrates, and ways to collect and present data.</p> |

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| <p><i>Alaska Volunteer Biological Monitoring and Assessment Procedures</i>. 2001. Environmental Natural Resources Institute (ENRI), University of Alaska Anchorage. Available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186.</p> | <p>These ENRI protocols are written to establish guidelines for the sampling of benthic macroinvertebrates by students. Their use allows teachers to create long-term water quality projects in schools.</p> |
| <p>J. Michael Migel. 1974. <i>The Stream Conservation Handbook</i>. General Publishing Company, Ltd.</p> | <p>A sourcebook for ideas on how to help and heal damaged waterways.</p> |
| <p>Fish Habitat in Alaska – Appendix B of this guide.</p> | |
| <p>Resources for Students and Teachers</p> | |
| <p><i>Alaska Stream Team, Water Quality Monitoring Field Guide, educational level</i>. 2000. ENRI. Available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186.</p> | <p>Student handbook to go with the ENRI protocols on stream monitoring described in the preceding section.</p> |
| <p>Alden Ford. <i>The Kenai Peninsula's Amazing Water Maze</i> (groundwater game on CD). Available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186.</p> | <p>An award-winning computer game that runs on both Mac and disc systems.</p> |
| <p>See <i>Alaska in Maps: A Thematic Atlas</i>, produced for Alaska schools, for maps of watersheds, and graphs showing salmon harvests by region.</p> | <p>Copies of this book are available in many classrooms and in most Alaska school libraries.</p> |
| <p>Community Database Online</p> | <p>The Alaska Dept. of Community and Economic Development Community Database Online describes economic and other information for every community in Alaska.</p> |
| <p>“It takes a healthy watershed to raise a fish” – brochure and poster</p> | <p>Available from Jon Lyman, Alaska Department of Fish and Game, (907) 465-6186</p> |
| <p>Looking Ahead</p> | |
| <p>Ask students to think about ways in which their use of water, and the ways their families and community use water, could affect the five habitat qualities salmon need. The five qualities are listed in the second paragraph on p. 14 of <i>Alaska's Wild Salmon</i> and in activities for Chapter 2.</p> | |

Chapter 4 Protecting Our Clean Water



Jon Lyman, ©ADF&G

Many citizen groups and school programs contribute to the understanding and health of Alaska's watersheds. These efforts are essential to safeguarding Alaska's clean waters.

Note: The laws affecting fish habitat that are outlined on pp. 30 and 31 of *Alaska's Wild Salmon* are still in effect. In 2003 the responsibility for enforcing these laws and for permitting activities in salmon bearing waters were moved from the Alaska Department of Fish and Game to the Alaska Department of Natural Resources in order to streamline the permitting process and provide for additional clarity in interpreting the laws. Enforcement of these regulations is now largely the responsibility of the Alaska Department of Natural Resources in consultation with Department of Fish and Game staff.

Key Concepts

Individuals and communities make choices that produce positive and negative impacts on salmon and their habitats. It is important that Alaskans understand the consequences of their actions on the health of watersheds and salmon resources.

The health and future of Alaska's wild salmon will depend, in part, upon our conservation efforts and responsible development with regard to:

- potential pollution & contaminants;
- non-point source pollution;
- invasive species; spread of Atlantic salmon in the Pacific Ocean, and

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| <ul style="list-style-type: none"> · fish farming. | |
| Chapter Objectives | |
| <p>Students will be able to explain how choices we make in land and water use can affect the survival of Alaska’s wild salmon. They will understand effects of pollution and contamination, changes in water volume or flow, invasive species, Atlantic salmon, and fish farming on wild salmon.</p> <p>Students will also understand:</p> <ul style="list-style-type: none"> · steps they can take to help decrease negative impacts on wild salmon, and · actions they can take to help protect and restore important salmon habitat. | |
| Terms Students Should Understand | |
| <p>pollution- the contamination of soil, water, or air with noxious substances</p> <p>non-point pollution- pollution from non-specific sources. This includes accidental and incidental pollution from our daily activities.</p> <p>invasive species- living organisms that thrive (and often compete with native species) when they are transported either intentionally or by natural processes to places where they are not normally found. In Alaska it is illegal to transport live fish without a permit because of the dangers of introducing exotic species.</p> <p>fish farming- the breeding, raising, and harvest of fish in enclosures. This is different from <i>ocean ranching</i>, which releases hatchery-bred fish to rear in the ocean and return.</p> <p>hydrological degradation – (See back cover of <i>Alaska’s Wild Salmon</i>)</p> | |
| Background for Teachers | |
| See “Note” at the start of this chapter. | |
| Do Alaskans need to worry about invasive species? | Invasive species have been called the greatest threat there is to America’s waters and watershed health. Although many troublesome species are now well established in parts of the Lower 48, few thus far appear to have become established in Alaska. Still, the problem |

remains, and Alaskans must be alert to the potential hazards of exotic organisms introduced through such sources as aquaculture, cargo shipped on boats and planes, imported nursery and mail-order plants, and other sources.

The Alaska Department of Fish and Game Division of Wildlife Conservation web site describes invasive species threats in Alaska and has developed an "Aquatic Nuisance Species Management Plan," as well as the following suggestions that anglers can follow to help prevent invasive species from entering as a result of sport fishing activity:

- clean all personal fishing gear and dry it thoroughly before using it in Alaska,
- wash lines and tackle in killing solutions of bleach or water hotter than 150 degrees F.,
- provide loaner tackle and gear to friends from Outside to use while they are in Alaska.



Culverts are inspected to ensure that natural flow and streambed conditions are met to allow safe passage for both adult and juvenile fish. Improperly installed culverts like the one above should be replaced to ensure salmon survival.

Questions For Discussion

1. Refer to the quote from the Alaska Constitution in the lefthand column on p. 30 of *Alaska's Wild Salmon*. Is it possible to "utilize, develop, and maintain" resources on the sustained yield principle all at the same time? What are "beneficial uses"? How can economic development and people's need for jobs be reconciled with the effects that resource extraction and community development activities may have on waters that provide habitat for salmon?

What kinds of choices must communities

There are no simple answers here. What is important is that students realize difficult choices must be made, and that we can all participate in processes for making community and statewide decisions about resource management.

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| <p>make, and how should “preferences among beneficial uses” be allocated? What are some examples of local choices that students consider successful or less successful?</p> | |
| <p>2. Students should be aware of the state and several federal laws that work together to protect salmon habitat and assure safe passage for Alaska’s fish. They will learn more about the role of the agencies that enforce these laws in Chapter 7 (pp. 58-61).</p> | <p>A class discussion would help students think about which laws they can see working in their community, and how the laws interface with the needs of the community and the desires of individual families and businesses.</p> |
| <p>3. Fish farming has been banned in Alaska. Some people have proposed lifting that ban to allow Alaskans to raise farm-reared fish. What are the arguments for and against this proposal?</p> | <p>Some arguments students might come up with are: Pro: Fish farming could provide new jobs in the world market. Farms make fresh fish available year around. Con: Farmed fish could introduce pollution and invasive organisms, and would compete with wild salmon, destroying genetic resilience just when environmental changes may require it more than ever. Many commercial fishermen feel fish farming would destroy the small operator salmon fisheries prevalent in Alaska.</p> |
| <p>4. Have students study the pie chart on p. 32 of <i>Alaska’s Wild Salmon</i>, then discuss potential sources of the various types of pollution in their community, particularly as they could affect salmon and their habitat at various stages of the life cycle. What is being done to curtail or control them? How effective is it? What could students do to help?</p> | |
| <p>5. What can all Alaskans do to help prevent the introduction or expansion of invasive plants and animals in their communities?</p> | <p>See Alaska Dept. of Fish and Game plan for dealing with invasive species. (See Resources later in this chapter.)</p> |
| <p>6. Refer to the top photo on p. 34 of <i>Alaska’s Wild Salmon</i>. Why would people introduce a species such as northern pike into waters in which they don’t occur naturally? How can we educate people about the dangers of such introductions?</p> | |
| <p>Ideas for Activities</p> | |

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| <p>1. Have students list for one day all the times they use clean water, and in what approximate quantities. Then have them investigate: Where does their water come from, and could their usage have any potential impact on salmon habitat? What would happen if their family and community population grew substantially? What precautions could be taken to meet community needs but also protect salmon?</p> | <p>Invite students to produce written material or a display to share what they have learned with members of the community.</p> |
| <p>2. Assign groups of students to look for potential sources of non-point source pollution that could affect salmon habitat in their homes and in various sites in the community. The idea is not to point fingers but to identify problems, see what is being done, and see if efforts to control pollution could be improved. Then, using the list on p. 33 under “What You Can Do,” have them propose three things they could do to help minimize pollution effects on salmon and their habitat.</p> | <p>Here are just a few examples: Besides looking around their homes for fertilizers, pesticides, etc. and how they are used and disposed of, students might:</p> <ul style="list-style-type: none"> · go to a parking lot and look for oil slicks – Where do they go when it rains? Are they adequately controlled? · visit the boat harbor – Are there provisions for pumping sewage tanks, disposing of waste oil, and cleaning up bilge water? How are people encouraged to use amenities that may be provided? · check out ATV trails – Do they cross salmon streams? Could anything be done to educate riders and/or reroute trails? |
| <p>3. Have students visit the Alaska Department of Fish and Game invasive species web site to learn more about invasive plants and animals in their area and in Alaska. What fish species in their region have come from other places? Have they had beneficial or harmful effects? What can the class do to help monitor or control these and other potential invaders? Ask them to share their information and ideas with the community.</p> | <p>Students might also survey local agency personnel, talk with their parents or elders about changes in local plants and animal species, or look at possible sources of invasive species in their community. Research on the internet can help them understand the problems other states and countries are facing from invasive species.</p> |
| <p>4. Have students role play questions and decisions that would emerge if a new business were proposed that would affect salmon habitat, especially water quality, volume, or flow, in the community. Assign students or groups to research and represent the interests and perspectives that would be represented by such players as the business owners, adjacent property owners, people and groups who harvest fish regulatory agencies and others. Hold</p> | <p>An “audience” of students, invited parents, or invited agency personnel could comment on how convincing student representatives were, what other issues might be relevant, and what they think the community decision might be as a result of the mock hearing.</p> |

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| <p>a mock hearing or town meeting in which students present their viewpoints.</p> | |
| <p>5. Societies usually protect the things they value the most. Ask students to think about how their community values clean water for human use, and to explore how clean fresh water is valued around the globe. Can they imagine any scenario in which people would be competing with salmon for a certain volume and flow of clean water in your community? (What if the community started a water bottling plant? What would be valued more, salmon or water? How would salmon habitats be affected?) Discuss how much we value clean water, and how people in other parts of the U.S. and the world value water. Some students may research concerns about global water shortages.</p> | <p>An interesting exercise is to have students visit local stores to determine the amount of shelf space devoted to bottled water and its price per gallon. Have the class compare the price per gallon of water and gasoline or diesel fuel. What is the economic value? In what other ways do we establish values for resources? How can values change over time? And how might salmon be affected by changing values?</p> |
| <p>6. Have students discuss the information on p. 35 about Atlantic salmon. Be sure they could identify and know where and how to report a catch of Atlantic salmon.</p> | |
| <p>Resources Especially for Teachers</p> | |
| <p>Village Water Resource Curriculum (grades K-8) . Contact Michele Hebert at the Alaska Cooperative Extension Service Cooperative Extension Service</p> | <p>This curriculum kit contains lesson plans and materials for 8 educational water quality activities especially relevant to interior Alaska villages. Activities address the natural water cycle, identification and sources of hazardous materials in the home, sources of drinking water in villages, sources of contamination, difficulty in cleaning up contamination, and how pollutants can affect fish.</p> |
| <p>Water for Kids</p> | <p>The Water for Kids section of EPA’s Water link has ideas for lessons and classroom activities about clean water.</p> |
| <p>Resources for Students and Teachers</p> | |
| <p>Invasive species</p> | <p>This web site describes the history and threat of invasive species in Alaska and the Alaska Department of Fish and Game “Alaska Aquatic Nuisance Species Management Plan” to monitor and control them. The first 14 pages are an excellent overview of the history and threats of invasive species and there is a link to the</p> |

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| | department's white paper on Atlantic salmon. |
| Farmed and Dangerous | This web site of the Coastal Alliance for Aquaculture Reform discusses problems of farmed salmon as exotic species. |
| Many of the references used in Chapter 3 regarding salmon habitat and watersheds can be revisited from the perspective of the need for volume and flow of clean water. | |
| See web sites of the agencies responsible for the four state and other federal laws protecting clean water. | |
| Global Water Shortage | This site posts an excellent article entitled "Global Water Shortage Looms in New Century" from the Arizona Water Resources Research Center at the University of Arizona. |
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| Looking Ahead | |
| How many benefits can you list that come to your community because of healthy salmon stocks? Do salmon have to be harvested to be beneficial? | |

Chapter 5 The Harvest of Salmon



Jim Magdanz, © ADI/EG

Replacing subsistence caught salmon with store bought dried or smoked salmon would cost roughly ten million dollars annually. The traditions, self-reliance, spiritual connection, and family ties reinforced by fishing together cannot be measured in dollars.

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| Key Concepts | |
| <p>The harvest of salmon has long been an important part of Alaska’s history. Salmon harvests will continue to play an important part in the economic and cultural lives of Alaskans.</p> | |
| Chapter Objectives | |
| <p>Students will be able to describe:</p> <ul style="list-style-type: none"> · the four categories of Alaska salmon harvesters and their gear: commercial, subsistence, sport, and personal use; · the history and importance of each, both culturally and economically, · the challenge of balancing these uses with changing economic conditions and salmon populations, and, · how they can identify and help their community respond to this challenge. | |
| Terms Students Should Understand | |
| <p>The harvest of salmon has long been an important part of Alaska’s history. Salmon harvests will continue to play an important part in the economic and</p> | |

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| cultural lives of Alaskans. | |
| <p>commercial fishing- the harvest of fish for sale.</p> <p>subsistence- the use of efficient harvest methods to collect wildlife for personal and family consumption, barter or trade by rural residents.</p> <p>sport fishing- fishing for recreation and/or harvest.</p> <p>personal use fishing- using efficient methods of harvest to take fish for personal and family use by all Alaska residents.</p> | |
| Background for Teachers | |
| <p>Are salmon that important to Alaskans today?</p> | <ul style="list-style-type: none"> · Alaska’s commercial fisheries regularly harvest more than 100 million salmon a year. · More than half of all Alaskans fish for sport or personal use, and many families make their living guiding, housing, and equipping visiting sport fishers. · More than 15,000 families in all regions of rural Alaska harvest salmon for subsistence. <p>Students should explore the importance of salmon to various cultures and lifestyles in Alaska.</p> |
| <p>What are Alaska’s leaders doing to help the commercial fishing industry in Alaska?</p> | <p>In 2003, as market prices of Alaska salmon declined, Governor Frank Murkowski’s administration initiated the Governor’s Fishery Revitalization Strategy using \$50 million from Federal Disaster funds and congressional funds from the Southeast Sustainable Salmon Fund. The Governor’s program provides direct aid to low- income fishermen, aid to municipalities, and Fisheries Economic Development Grants. The development grants are a competitive program open to municipalities, non-profit groups and private industry. Projects funded include processing equipment, freezing & chilling, and marine infrastructure. The program also funds:</p> <ul style="list-style-type: none"> · Marketing Matching Grants, a competitive grant program open to processors and exporters looking to find new ways to sell Alaska salmon products, |

- the Wild Salmon Campaign: a targeted media campaign teaching the benefits of consuming wild Alaska salmon, and
- funding for initiatives to improve quality and transportation of salmon, research and development into new technologies, small business assistance, a rural development investment fund, and a statewide fisheries business plan.

Questions For Discussion

1. How do the differences in life cycle, time of spawning, preferred habitat, etc. affect Alaskans' ability to harvest fish for subsistence, commercial, or recreational purposes?

It has been the summer-long bounty of salmon that has allowed Native peoples and cultures to survive and flourish in Alaska. Spreading their harvest and preservation of salmon over the entire season, indigenous people in the Northwest could take full advantage of this primary food and trade resource. The wealth of food provided by salmon allowed for the great Native cultures of the Northwest to develop and flourish. Today our harvest of subsistence salmon continues year round. Sport fishermen troll for winter kings in January. There are winter quotas on commercial salmon harvests, and it seems everyone harvests salmon the rest of the year.

2. Is there a special way of preparing salmon that you think would be a good marketing idea? One idea for increasing the market for Alaska salmon is to partner with a fast food chain and sell a salmon product nationally. Can you think of a way to preparing salmon that might be exciting to consumers? What makes certain fast foods successful in today's market—and how could a salmon product capitalize on those qualities?

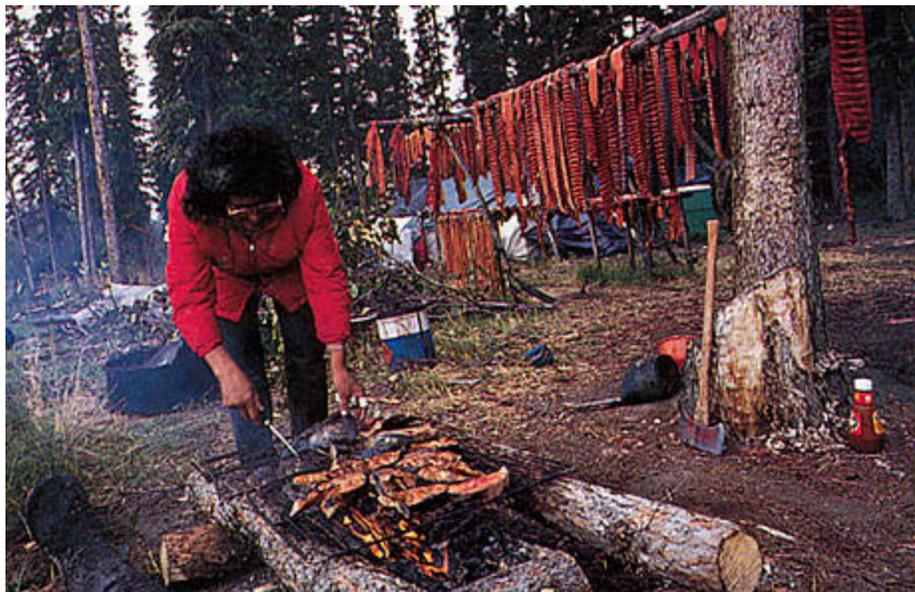
One way to prompt students' thinking would be to have them find all the salmon products in local stores—canned & frozen fish, dried bits and jerky, smoked salmon, salmon sausage, etc. How do their prices and packaging compare with substitutes? How might salmon be used in fast food restaurants or in the growing variety of "quick preparation" products found in grocery stores?

3. A major obstacle to increasing the value of Alaska salmon is maintaining quality and freshness. How can Alaska fishers maintain year-round quality in fish that are available for only part of the year? What obstacles do commercial fishers face in delivering high-quality salmon to market? How might they overcome some of these obstacles?

[Salmon Quality Guidelines](#)
This section of the Alaska Seafood Marketing Institute web site lists guidelines for maintaining salmon quality. It will be an eye-opener to the complexity of the problem.

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| <p>4. There are many issues surrounding how catch limits of salmon are allocated among the many groups of people who want to harvest them. What are some issues that affect your community? Which ones affect your family's personal harvest of salmon? How does where you live affect your harvest of salmon? Do you have some thoughts on resolving these issues?</p> | <p>Students might discuss such issues as:</p> <ul style="list-style-type: none"> · competition between commercial and sport fishing boats in heavily populated areas; · differences in the value, say, a commercial troller and a charter fishing boat might receive for a single large king salmon; · impingement of recreational cabins or sport fishing activities on fish camps or traditional fishing grounds; · effects of closures and quotas on family incomes and community budgets. |
| <p>Ideas for Activities</p> | |
| <p>1. Have students read and discuss the descriptions of fishing by Jim Magdanz and Elizabeth Arnold on pp. 39-40 and 45-47 of <i>Alaska's Wild Salmon</i>. Using these as models, ask students to interview someone in their community or reflect on their own personal accounts of a specific experience with commercial, subsistence, sport, or personal use fishing, to produce a description. Have them find a way to recreate their experience for a larger audience using writing, visual arts, song, dance, video, or other media.</p> | <p>Students' work should include:</p> <ul style="list-style-type: none"> · careful descriptions or depictions of activities; · images of sights, sounds, smells; · feelings and attitudes of the people involved, and · a sense of why this activity is important to the people involved and to other community members and Alaskans. |
| <p>2. Have students discuss what they know about the types of salmon harvest described in pp. 36-49 of <i>Alaska's Wild Salmon</i>—commercial, subsistence, sport, and personal use. Ask them to outline topics they know little about, and list some individuals or agencies from whom they could learn more. (They can begin with agencies and organizations listed on pp. 58-61 of <i>Alaska's Wild Salmon</i>.) As individuals or groups have students find more information to present to the class.</p> | <p>Some examples might be:</p> <ul style="list-style-type: none"> · enlist an elder to talk about changes in subsistence fishing over the years; · enlist a commercial fisher to bring in and talk about gear, and to describe changes in the fishing business over the years; · research wild salmon marketing on the internet and report back; · have a state or federal fisheries manager visit class; · invite a sport fishing guide to talk about her or his work; · invite someone to teach students about catch and release. |
| <p>3. Have students read p. 49 in <i>Alaska's Wild Salmon</i>, which describes salmon stewardship programs on the Kenai River and lists some of the things that sport fishers can do to help protect stream</p> | |

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| <p>banks.</p> <p>In groups or as individuals, have students discuss what problems and solutions there might be related to sport fishing in their community. Have them prepare an information packet or proposal and present it to the appropriate governing body, or display it where community members can see it.</p> | |
| <p>4. Ask students to research jobs available now in the seafood industry in their community and other parts of Alaska. Or ask them to explore business opportunities based on salmon harvest in their community. What jobs or business opportunities might emerge from statewide trends in hosting anglers or people interested in cultural experiences, or in efforts to improve the commercial fishing industry? How would taking a particular job or starting a new business affect a student's family, or the community as a whole? Ask students to choose and focus on a job or business of their choice.</p> | <p>A good place to explore available seafood jobs is the Alaska Department of Labor Seafood Employment Unit web site.</p> <p>Starting a business—such as, opening a fishing lodge, or an outdoor salmon bake with Native dancing, or a plant to produce a new salmon product—could have both positive and negative effects on a community. What might they be?</p> |
| <p>5. Ask students as individuals or groups to research and report to the class on the challenges commercial fisheries in Alaska are facing today. Are they similar to challenges during other periods of Alaska history? (They can refer to pp. 42-44 or <i>Alaska's Wild Salmon</i>). What solutions are being proposed? What do they think could be done to help commercial fishers and the communities that depend on commercial fishing?</p> | |
| <p>6. Have students read a book on the life of commercial fishers, subsistence fishing, or sport fishing in Alaska, then write or present a book report to the class.</p> | <p>(See list of titles under Resources for Students and Teachers)</p> |



Most families preserve salmon in traditional ways, drying them on wooden poles or smoking them in sheds. Not only do dried and smoked salmon taste good, they keep without refrigeration. Electric freezers are available in most of rural Alaska, but they are expensive to buy and operate, and are not big enough to hold the hundreds of salmon that families harvest and need every year.

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| Resources Especially for Teachers | |
| See the Alaska Department of Fish and Game, Divisions of Commercial Fish, Sport Fish, and Subsistence for information on harvests, regulations, and other teachers resources | ADF&G Commercial Fisheries |
| Refer to the sites on how to do oral history under Teacher Resources in this guide's Introductory chapter. | |
| Resources for Students and Teachers | |
| www.alaskaseafood.org | The Alaska Seafood Marketing Institute offers seafood recipes, health information, and resources for commercial fishers and processors. Their "small fry" link offers lessons and a video on Alaska Salmon Harvests, and a Salmon Life Cycle Poster with activities. These are targeted for 4 th and 5 th grade students but could also work with middle school students. The Alaska Seafood Marketing Institute |
| Alaska Department of Labor | The Alaska Department of Labor Seafood Employment Unit web site describes seafood jobs in Alaska. |
| Alaska's Commercial Salmon Fishery | This 2-page brochure about "Alaska's Commercial Salmon Fishery" is downloadable using Adobe Acrobat Reader. It includes harvest figures and photos and descriptions of commercial salmon harvesting methods. |

Books about salmon fishing

Here are a few suggested books students might enjoy:

McMillan, Bruce.

Salmon Summer

Boston : Houghton Mifflin Company, 1998.

32 p. : col. ill. ; 29 cm.

A photo essay describing a young native Alaskan boy fishing for salmon on Kodiak Island as his ancestors have done for generations.

Page, Debra.

Orcas Around Me: My Alaskan Summer

Illustrated by Leslie Bowman

Morton Grove, Ill. : Albert Whitman & Co., 1997.

1 v. (unpaged) : col. ill. ; 23 x 29 cm.

A young boy describes his summers spent fishing for salmon with his parents and younger brother off the southeastern coast of Alaska.

Lord, Nancy

Fishcamp: Life on an Alaskan Shore

Washington, D.C. Counterpoint Press, 2000.

Thoughtful and intriguing description of a season running a set net operation in Kachemak Bay.

Hirschi, Ron.

People of Salmon and Cedar

New York : Cobblehill Books, c1996.

42 p. : ill. (some col.) ; 26 cm.

Taylor, C. Barr (Craig Barr).

Shadow of the Salmon

San Francisco, CA : HarperCollins West, 1994.

127, [1] p. : col. ill. ; 29 cm.

A fly fisherman's quest for the elusive wild salmon.

Iglauer, Edith.

Fishing with John

New York : Farrar, Straus, Giroux, 1988.

305 p., [1] leaf of plates : 1 map ; 24 cm.

Rustad, Dorothy Scott.

I Married a Fisherman

Sketches by Edward O. Ramstead Jr.
Edmonds, Wash. : Alaska Northwest Pub.
Co., c1986.
113 p. : ill. ; 22 cm.

Landale, Zoe,

**Harvest of Salmon : Adventures in
Fishing the B.C. Coast**

Saanichton, B.C. ; Seattle : Hancock
House Publishers, c1977.
222 p. : ill. ; 23 cm.

Forrer, Eric.

From the Nets of a Salmon Fisherman

Illustrated by Michael Flanagan
Garden City, N.Y., Doubleday, 1973.
viii, 158 p. illus. 22 cm.
Pacific salmon fishing--Yukon Territory

Smith, Sherri L.

Lucy the Giant

New York: Delacorte Press, 2002
217 p.
15-year-old Lucy, the largest girl in her
school, leaves her small Alaska town and
her alcoholic father and discovers
hardship and friendship posing as an adult
aboard a commercial crabber.

Thompson, Donnis.

Mystery at an Alaskan Fish Site

Illustrated by Jack Gaughan
New York, Criterion Books [1967, c1966]
143 p. illus. 22 cm.
A Chicago youth goes to Alaska to spend
the summer fishing for salmon with his
cousin, but unfriendly neighbors and
stolen fish lead the boys to the discovery
of a smuggling ring.

McKervill, Hugh W.

**The salmon people; the story of
Canada's West Coast salmon fishing
industry.**

Sidney, B.C., Gray's Pub. [1967]
198 p. illus., maps. 23 cm.

Griese, Arnold A.

Anna's Athabaskan Summer

Illustrated by Charles Ragins

Honesdale, Pa. : Boyds Mills Press ; [New York] : Distributed by St. Martin's Press, 1995. 32] p. : col. ill. ; 21 x 27 cm.
A young Athabaskan girl and her family make the annual return to their summer fish camp where they prepare for the long winter ahead.

Luenn, Nancy.

Nessa's Fish

Illustrated by Neil Waldron
New York : Atheneum, 1990.

[32] p. : col. ill. ; 24 cm.
Nessa's ingenuity and bravery save from animal poachers the fish she and her grandmother caught to feed everyone in their Eskimo camp.

Remick, Dennis.

Anchorage : Materi

Summer fish camp / written and photographed by Dennis Remick and Tupou L. Pulu ; design and layout by Dennis Remick.als Development Center, Rural Education, University of Alaska, [198-?]
29 p. : ill. ; 28 cm.

George, Marilyn Jordan.

Following the Alaska Dream: My Salmon Trolling Adventures on the Last Frontier

Petersburg, AK : Marilyn Jordan George, c1999.
365 p. : ill. ; 23 cm.

Denton, Pedro.

Boats of Alaska: An Artist's Guide to Alaska's Commercial Fishing Boats

Anchorage: Publication Consultants, 1998.
80 p. ill.

Looking Ahead

In light of the history of salmon harvest since the 1850s, why might careful management be important for the survival of Alaska's wild salmon. In what way might the salmon life cycle contribute to a "boom and bust" mentality among

harvesters?

Chapter 6 Alaska's Salmon Management & Research

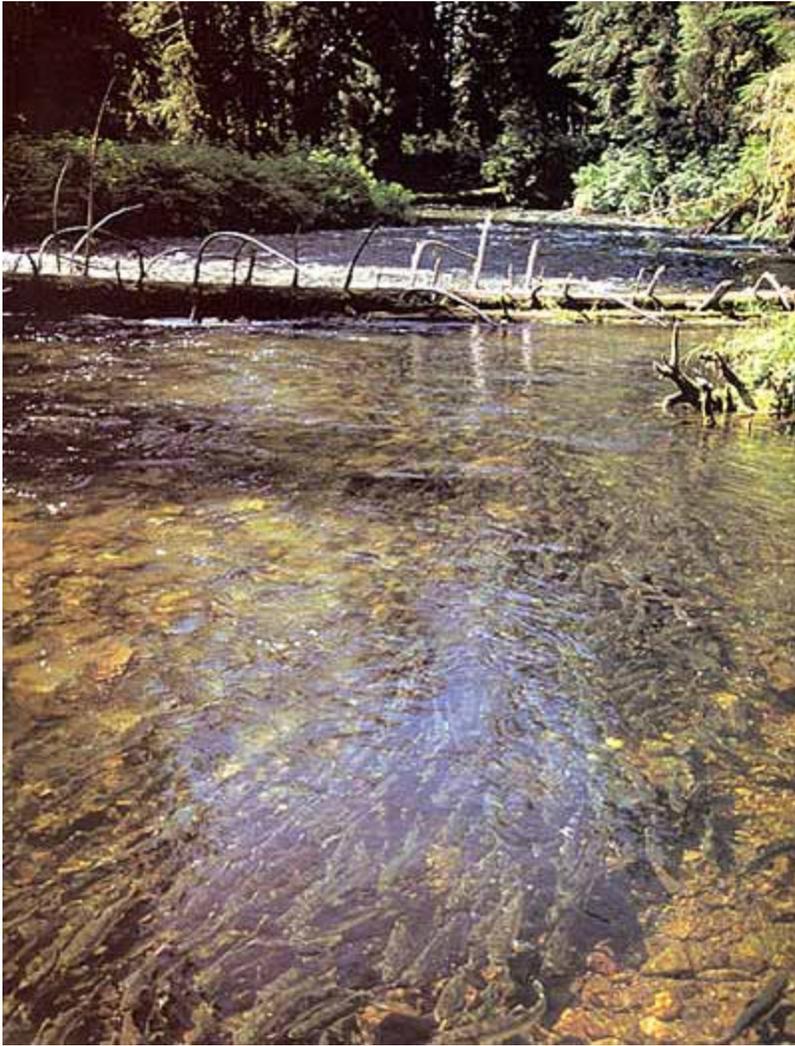


Randy Bachman, ©ADF&G

The Chilkoot River weir is used to monitor the strength of sockeye salmon runs in northern Lynn Canal. Comparing escapements from previous years on this indicator stream helps ADF&G staff manage local sport, commercial, and subsistence harvests.

| Key Concepts | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>The goal of salmon management in Alaska is to allow enough returning salmon to reach spawning grounds to sustain both salmon populations and related ecosystems, and to provide for the harvest of salmon that are surplus to those needs. Sound research provides the foundation for effective conservation, management, and harvest practices.</p> | |
| Chapter Objectives | |
| <p>Students will be able to:</p> <ul style="list-style-type: none">· explain how salmon in Alaska are managed on the basis of conservative management, sound science, and habitat protection;· explain the need and importance of in-season, abundance-based management;· describe or demonstrate some of the research techniques used to count, observe, and monitor salmon and to monitor environmental conditions necessary to salmon;· intelligently discuss the pros and cons, problems and advantages of hatcheries in Alaska. | |

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| Terms Students Should Understand | |
| escapement – The number of salmon that need to be allowed to spawn and regenerate the run. | (p. 54, col. 2) |
| sustainability [sustained yield] – to preserve for the future while allowing use. | (p. 54 col 1, p. 30 col. 1) |
| Background for Teachers | |
| [none at this time] | |
| Questions For Discussion | |
| 1. Review the Alaska Department of Fish and Game’s three principles of salmon management on p. 51 of <i>Alaska’s Wild Salmon</i> . See the description of conservative management on p. 54, explore what salmon science can teach us on p. 52 and on Alaska Department of Fish and Game web sites, and review what was learned in previous chapters about protecting salmon habitat. Why can adherence to these three principles be considered just as important as legal protections for salmon? | Discussion of this question should help students pull together some of what they learned in preceding chapters about salmon biology, habitats that salmon use, harvests, and economic value of salmon. |
| 2. How do questions about the viability of hatcheries relate to what we learned about the evolution of salmonids in Chapter 1? | |
| 3. What do we mean when we aim to make a natural resource such as salmon “sustainable”? | Refer back to “sustainable yield” in the quote from the Alaska Constitution on p. 30. |
| 4. Some people say that sound management for salmon becomes more important as more individuals and groups compete to use salmon and their habitat. To what extent do you think this is true or not? | |



| Ideas for Activities | |
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| <p>1. Plan a field trip, invite a fisheries biologist to the classroom, or have students conduct research to understand the variety of methods and new technologies used to study salmon biology, population numbers, habitats, and related environmental conditions. Individual students or groups might explain or demonstrate to the class techniques particularly important to their community. Ask some students to find research statistics about salmon and salmon habitats in your region.</p> | |
| <p>2. Alaska has the second largest salmon hatchery program in the world. Yet many people, including some fisheries managers and political leaders, disagree about the value of hatcheries. Beginning with the information on p. 53 of <i>Alaska's Wild</i></p> | |

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| <p><i>Salmon</i>, ask students to research and present to the class some of the pros, cons, problems, and contributions of hatcheries in Alaska and the Pacific Northwest. What, if anything, do hatcheries contribute to your community? Do they pose any problems, and if so, what solutions can you suggest?</p> | |
| <p>3. Invite an elder from the community to describe traditional ways of knowing about salmon, salmon populations, and their habitat. Alternatively, students could interview elders to gather this information and present it in writing or visual form.</p> | |
| <p>4. Ask students to research information in order to answer the following question: Among Alaska’s five salmon species, kings are normally the most valuable per pound, followed by sockeyes and cohos. Why is it that most of the production from Alaska hatcheries is of pink and chum salmon?</p> | |
| <p>Resources Especially for Teachers</p> | |
| <p>[none at this time]</p> | |
| <p>Resources for Students and Teachers</p> | |
| <p>ADF&G Commercial Fisheries</p> | <p>For information about the economic value of commercial fishing in Alaska, visit the Alaska Department of Fish and Game, Division of Commercial Fisheries web page and do a search for “Blue Sheet”.</p> |
| <p>Economic Value of Sport Fishing in Alaska</p> | <p>For information about the economic value of sport fishing in Alaska follow link on the Alaska Department of Fish and Game Division of Sport Fish page.</p> |
| <p>Subsistence</p> | <p>For information about subsistence in Alaska, follow the Publications link to Community Profile Data Base, on the Alaska Department of Fish and Game, Division of Subsistence web site.</p> |
| <p>The Coast Range Association</p> | <p>A 2-page brochure on “Alaska’s Salmon Management” can be downloaded in Adobe Acrobat format.</p> |
| <p>ADF&G Research</p> | <p>The “Fishery Research Programs” link on the Alaska Department of Fish and Game</p> |

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| | Commercial Fisheries home page leads to descriptions of tagging, otolith marking, and other research techniques. |
| Hatchery Home Page | The Hatchery Home Page link on the Alaska Department of Fish and Game, Division of Sport Fish home page describes the statewide stocking program and research associated with it. |
| Farmed and Dangerous | This web site of the Coastal Alliance for Aquaculture Reform discusses nutritional and environmental dangers of farmed salmon and provides action plans for seeking industry reform. |
| The Coast Range Association | The primary purpose of this site primarily addresses the failure of hatcheries and the crisis of declining salmon stocks in the Pacific Northwest. |
| Do a web search for “salmon hatcheries in Alaska” | |
| Looking Ahead | |
| What is it about the Pacific salmon life cycle that makes it important to involve a variety of groups and agencies in assuring that Alaska salmon stocks will remain healthy? | Students should consider such factors as time spent in the ocean, variety of habitats needed, and the variety of governments and agencies that have control over the places where salmon live. |

Chapter 7 Partners for Salmon

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| Key Concepts | |
| Partnerships of many kinds are crucial to protecting and restoring Pacific wild salmon stocks and the habitats that support their various life stages. | |
| Chapter Objectives | |
| Students will be able to: <ul style="list-style-type: none"> · explain why partnerships among individuals, tribes, businesses, harvesters, and state, federal, international, and non-governmental organizations are essential to preserving the health of Alaska’s wild salmon; · describe the goals and activities of major agencies and organizations working to protect Alaska’s wild salmon, their habitats and their economic, social and | |

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| <p>spiritual role in the lives of Alaskans; and</p> <ul style="list-style-type: none"> · demonstrate how they can play a role in determining how Alaska salmon stocks will be managed. | |
| <p>Terms Students Should Know</p> | |
| <p>market niche – a small market segment developed for specialty products, such as the idea of “wild” salmon as opposed to farmed, or the use of “ecolabels” to promote sustainable salmon to people concerned about the environment.</p> | |
| <p>Background for Teachers</p> | |
| <p>Since partnerships change frequently, type “Alaska salmon partnerships” into a search engine. You should get references to a wide range of agencies—Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration, Sea Grant, and others.</p> | |
| <p>Questions For Discussion</p> | |
| <p>1. Why are partnerships important to the successful management of salmon in Alaska? How do individuals, harvesters, businesses, tribes, government agencies, and non-governmental organizations work to sustain salmon in your community?</p> | |
| <p>2. According to p. 58 in <i>Alaska’s Wild Salmon</i>, Alaska has at least three state agencies, plus the Alaska Department of Fish and Game, responsible for managing salmon and the habitats affecting them. Why not streamline state government and have one agency handle the whole job?</p> | <p>Refer to the missions of the various departments on p. 58 of <i>Alaska’s Wild Salmon</i> and ask students to think about how they might interact and/or conflict. Students can also search the web pages of the departments, under State of Alaska, to see their missions and activities.</p> |
| <p>3. How is the book's title <i>Alaska’s Wild Salmon</i> inaccurate in terms of what we’ve learned about Pacific salmon life cycle and management?</p> | <p>Salmon may start their life in Alaska but they feed in the open ocean, sometimes for years, before returning to spawn. Some of the fish caught by Alaskans were spawned in streams outside the state.</p> |
| <p>4. If Alaskan stocks of wild Pacific salmon are healthy, why should we bother making treaties and agreements with other states such as Washington and Oregon, and countries such as Canada, Japan, and Russia? What do we gain from such</p> | <p>Students might search the web for International Whaling Commission, Alaska Eskimo Whaling Commission, North American Waterfowl Treaty, Inuit Circumpolar Conference, and international organizations listed on pages</p> |

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| <p>treaties and international efforts? Some students might research treaties and agreements affecting other natural resources in Alaska, such as whales, migratory waterfowl, wetlands, and others.</p> | <p>60-61 of <i>Alaska's Wild Salmon</i>.</p> |
| <p>5. Are you aware of efforts to market farmed salmon in your community? Talk with local retailers, food stores, restaurants, discount chains, etc. about the sources of the salmon they sell.</p> | |
| <p>Ideas for Activities</p> | |
| <p>1. If a “concerned and involved public” (<i>Alaska's Wild Salmon</i>, p. 55) is crucial to maintaining healthy salmon stocks in Alaska, what agencies and procedures have been set up to foster that concern and involvement? Ask students as individuals or groups to research and report to the class on the roles of the five agencies described on pp. 58-59 of <i>Alaska's Wild Salmon</i>, and the Alaska Department of Fish and Game, plus any salmon-related programs relevant to your community (See pp. 60-61 of <i>Alaska's Wild Salmon</i>).</p> | |
| <p>2. Students should be familiar with all terms in the Glossary (p. 63 in <i>Alaska's Wild Salmon</i>). Individuals or groups of students could reinforce their understanding by creating crossword puzzles or Word Searches using these terms and others introduced in the Teacher's Guide.</p> | |
| <p>3. As individuals or groups, have students develop a simple basic plan for a business or activity in their community that will affect salmon habitat. Have them:</p> <ul style="list-style-type: none"> · identify effects their project would have on salmon habitat; · decide how they would find out about effects they might not be aware of; and · find out what regulations they would need to follow and which agencies they would need to deal with to achieve their goals. | <p>Students might plan:</p> <ul style="list-style-type: none"> · building on a waterfront lot; · expanding a ball field near a stream or wetlands; · building a fishing lodge; · building a golf course; or · starting a sawmill, etc. |
| <p>4. Is there a change in salmon fishing regulations that students or community</p> | |

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| members would like to see put in place? Have students prepare a proposal for the Alaska Board of Fisheries and plan how they would present their proposal. | |
| 5. If students did not propose new salmon products or marketing plans in an earlier chapter, now might be a good time for them to do it. | |
| Resources Especially for Teachers | |
| Pacific Salmon Fisheries: Climate, Information and Adaptation in a Conflict-Ridden Context | This web site contains the text of “Pacific Salmon Fisheries: Climate, Information and Adaptation in a Conflict-Ridden Context” by Kathleen Miller of the Environmental and Societal Impacts Group at the National Center for Atmospheric Research. See especially <i>Section 4. The Case of the Pacific Salmon Treaty</i> . |
| Resources for Students and Teachers | |
| Pacific Salmon Fisheries: Climate, Information and Adaptation in a Conflict-Ridden Context | This web site, listed above for teacher reference, gives an excellent description of the Pacific Salmon Treaty and reasons for its development. See especially section 1. Introduction, 3. Marine Fisheries, Ownership, and Adaptation, and 4. The Case of the Pacific Salmon Treaty. |
| Alaska Eskimo Whaling | This web site of Norway’s High North Alliance describes the Alaska Eskimo Whaling Commission and its connection with international agreements on whaling. |
| U.S. Fish and Wildlife Service | This site of the U.S. Fish and Wildlife Service summarizes the North American Waterfowl Management Plan and its achievements. |
| U.S. Fish and Wildlife Service | This site of the U.S. Fish and Wildlife Service posts A Guide to the Laws and Treaties of the United States for Protecting Migratory Birds |
| Looking Ahead | |
| Many classes end their study of salmon with a celebration that involves the community. This can be a good way to reinforce what students have learned. and | |

to share their work with their parents and others.



Alaska Native Knowledge Network

PROCESS OF INTERVIEWING by Rachel Craig

To begin the work of interviewing resource people for gathering information to put together into actual teaching materials and resources.

OPENING EXERCISES

1. Cordial greeting of the elders. Inquire if they had a good sleep. Inquire if they have anything of importance to communicate right then.

REASONS FOR INTERVIEWING

2. Give reason(s) for meeting. This is what we would like to do with you (give subject of discussion). We need this information for our students so they could -----(reasons)----- in school and in life. We can't put this information on paper without your help. We will work closely with you. We will listen to you. We will taperecord the session so we don't miss anything. But we want to be sure we understand what you are trying to tell us.

PROCESSES

3. We want you to be thinking of signing a **Release Form** while you are here so we could use the information in the classrooms. (Be upfront with the elders on the purposes of your work; they usually are willing to assist in any way possible. Just don't surprise them with additional details and obligations afterwards. Spell them all out at the beginning before you begin to work with them. Remember that this is a partnership; you are willing to work and open doors, and they have the information and knowledge that you need to make your work effective.)

4. As you interview, keep working toward getting the deeper, more meaningful stuff. Students need to know the whys of what they are studying. Try to approach the subject from all angles. Remember that most of our students don't know much about Native stuff, but they love it when they hear it. It doesn't hurt to get the detailed stuff. Our students are trained to read. They can read a lot better than they can write; but they can also learn to write.

5. Take breaks at appropriate times. Concentrating on a subject that you are wanting takes a lot of energy out of your partner. As the elders get older, their strength is used up more quickly. Be considerate of them. Have some juices (apple, grape, cranberry - something with not too much acid), water, tea, coffee or whatever the elders need for their breaks. Make them feel good. They love to feel that they are making

a contribution to someone else's well-being, especially their grandchildren or great-grandchildren.

6. Some things to consider when contemplating getting **Releases** from the elders:

Are the materials mainly for educational purposes? We have had no problem getting releases for educational purposes.

Are the materials gathered for commercial purposes? If money is expected to be made, a realistic percentage should be earmarked for the information source. In that case, it might also be wise to identify one of the heirs.

The elders should hear your proposal and your consideration of them; you should also ask them if they have any questions or counter-proposals. Keep the discussion friendly. What are you getting out of the whole deal? What do you envision are some of the outcomes of the interviews? Elders are entitled to know what's going on.

7. Enjoy your work with the elders. Your attitude helps them to feel that they have been involved in a worthwhile project.



[Return to ANKN Home Page](#)

Comments or questions? Contact the [Alaska Native Knowledge Network](#).



Oral History Unit Overview

Focus

Oral history serves as an exciting process designed to increase student involvement and improve student insight into historical experiences.

It involves students directly in a method of historical inquiry, which includes the organization and presentation of data directly from another person.

Oral history is an effective tool that requires students to become active participants in their own learning process.

It invites inquiry, stimulates discussion, and transforms abstract concepts into concrete reality.

Rationale

Oral history is a process that aids in the reconstruction of the past and in preserving and documenting culture. It is an extension of the art of storytelling. In this sense, each of us has an oral history - an account of where we come from and how we got to be who we are. Communities, likewise, each have an oral history. So, too, do nations, families, and human organizations of every sort.

Oral history serves us in many ways. It can inspire us with stories of exemplary lives or caution us with tales of human weakness and wickedness. Oral history can inform and educate us by providing the context and perspective that allows us to make thoughtful decisions about the future. Moreover, oral history has the power to delight and enrich us, enlarging and intensifying the experience of being alive!

Purpose

- Serves as a link from the immediate present to the

[Oral History Unit Overview](#)

[Information for the Development of an Oral History Project](#)

[Oral History Project: Guidelines For Recording an Interview](#)

[Fish Bowls and Bloopers: Oral History in the Classroom](#)

[One Minute Guide to Oral Histories](#)

[Oral History Questions](#)

[Specific Oral History Questions](#)

[Oral History Lesson Plans](#)

[Oral History Websites](#)

[Oral History Activities](#)

[Teacher's Guide to the Teen Reporter Handbook](#)

immediate past in a very understandable and human way.

- Fills an information gap when less and less information and reflections are recorded in written form.
- Provides a natural opportunity to obtain information related to ordinary people.
- Provides an opportunity to "experience" history firsthand
- Places local history within the overall context of Canadian history
- Helps students understand all phases of designing, implementing, and completing an activity.
- Increases understanding of a specific historical event
- Chronicles the traditional skills and values of many different groups
- Affirms community and common purpose, employs evaluation/reflection
- Nurtures mutual appreciation of schools and communities
- Produces a source of pride and identity and develops a sense of relativism
- Creates understanding that bridges generations
- Tries to capture in sufficient detail meaningful characteristics of a past that might otherwise be lost

[Oral History Topics, Skills and Methods](#)

[Download Oral History Unit Overview in Word Document format.](#)

The word "Heritage" is written in a stylized, cursive font with a green-to-yellow gradient.

Learning Objectives

Students will:

- Demonstrate the techniques of recording oral history
- Discern how point of view influences and effects historical understanding
- Learn about the experiences of some modern immigrants
- Evaluate selected experiences of modern and early immigrant experiences
- Demonstrate the literacy skills required to identify and analyze visual, oral, and written primary sources
- Develop language abilities, critical thinking skills and comprehension, and the understanding of community and self

Language Arts

Students will:

- Identify the central idea, purpose, or theme of a work and connect it to the theme of an oral history
- Gather and organize information from primary and secondary sources.
- Incorporate different genres of writing throughout the project
- Use standard conventions of writing to revise and edit their work
- Demonstrate appropriate speaking and listening skills

Social Studies

Students will:

- Use historical thinking, especially how it relates to chronology and cause and effect
- Engage in historical study through research and other forms of investigation
- Be able to compare their primary source information with literature and additional research information
- Study concepts related to Canadian ideals and how diversity has added to that perspective
- Demonstrate an understanding of the rights of citizens and civic involvement
- Study the role of geographic and cultural perspectives on the lives of individuals

Technology

Students will:

- Recognize technology as a means of creativity and problem solving
- Become active participants in our technological world
- Identify the purposes of communication
- Create a product based on their oral history investigation

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Teachers' Resources



The Alaska Department of Fish and Game has a wide variety of resources available to educators throughout our website. This page has been developed to provide a central location for links to educational resources on our site. (You will find that many of these resource web pages are also cross-linked from other pages within our website.)

[Program Participation Survey](#)

(Edit previous survey submission or enter a new one)



- [Alaska Correlations](#)
Our hands-on activities are rated to the Alaska State Content Standards. Use this resource guide in lesson planning to address the standards.
- [ADF&G Videos](#)
Describes the content and availability of most of the videos produced by Wildlife and Subsistence Divisions
- [Alaska Wildlife Notebook Series](#)
Species Descriptions
- [ARLIS](#)
AK Resource Library & Information Services
- [Conservation Education Kits](#)
Kits with resources available to educators at ARLIS and Anchorage ADF&G office ([Click here for a list of kits available](#))
- [Endangered Species in Alaska](#)
- [Project WILD](#)
- [Student Information Guide to Alaska](#)
- [Wildlife Viewing in Alaska](#)
- [Wildlife Furs, Skulls, and Bird Mounts](#)



- [Alaska Wildlife Notebook Series](#)
Species Descriptions
- [Alaska Wildlife Curriculum](#)
Alaska's Tundra and Wildlife
Alaska's Forests and Wildlife
Alaska's Ecology
Wildlife for the Future
Alaska Ecology Cards
- [Bear Facts](#)
The Essentials for Traveling in Bear Country
- [Funtastic Facts](#)
Facts About Alaska's Mammals
- [Kodiak Bear Fact Sheet](#)
- [Living in Harmony with Bears](#)
- [Teacher Training](#)
- [The Wolf in Alaska](#)
- [What to do About Aggressive Moose](#)

are available to educators at ARLIS

FISH RESOURCES



- [Additional Aquatic Education Resources](#)
- [Alaska Fly Fishing Mentorship program](#)
- [Alaska Water Watch](#)
Stream surveys and forms
- [Alaska Wildlife Notebook Series](#)
Species Descriptions
- [Angler Ethics](#)
- [Catch and Release](#)
- [Children's Activity Handouts](#)
- [Classroom Salmon Dissection](#)
- [Classroom Salmon Incubation Program](#)
- [Commercial Fisheries Features Page](#)
- [Commercial Fisheries Frequently Asked Questions](#)
- [Federal Aid in Alaska](#)
- [Fishing Vessels in Alaska](#) — PDF file* (110K)
- [Kid's Genetics Page](#)
- [Life Histories of Alaska Salmonids](#)
- [Pacific Salmon - Alaska's Story](#)
- [Regional Shellfish Research](#)
- [Salmon Egg IncubationCam](#)
- [Salmonids in the Classroom Curriculum](#)
- [Selective Harvest/Catch and Release](#)
- [Sport Fishing Brochures](#)
- [Sport Fish Student Handbook](#) — PDF file* (769K)
- [Tidepooling Etiquette](#) — PDF file* (372K)

SUBSISTENCE RESOURCES



- [Subsistence articles and presentations](#)
- [Frequently asked questions about subsistence](#)

BIRD RESOURCES



- [Alaska's Birds of Prey](#)
Historical and Contemporary Perspectives
- [Alaska Wildlife Notebook Series](#)
Species Descriptions
- [Birdhouses for Alaska](#)
- [Breeding Birds of Southeast Alaska](#)
- [For the Birds](#)
Links to many more bird related sites
- [Homeowners' Guide to Goose Solutions](#)
- [Landscaping for Wildlife in Alaska](#)
- [Raven: Northern Bird of Paradox](#)
- [Sandhill Crane Satellite Telemetry](#)
- [Scoter Satellite Telemetry](#)
Follow seasonal movements of Scoters in Alaska.
- [What am I?](#)
Find out how well you know your Alaskan birds.
- [Winter Bird-Feeding in Alaska](#)

HUNTER EDUCATION



- [Hunter Clinic Calendar](#)
- [Alaska Hunting Bulletin](#)
- [Becoming an Outdoors-Woman](#)
- [HIT](#)
Hunter Information and Training Program
- [Hunt Alaska](#)
An extensive hunter education series for planning your hunt
- [Hunter Education For Alaskans](#)
- [Waterfowl Hunters' Quiz](#)
- [Wildlife Diseases and Parasites](#)
A Field Guide to Common Wildlife Diseases and Parasites in Alaska
- [Muskox Hunting Tips](#) **NEW**
Identify muskoxen by sex and age and learn their physical and behavioral characteristics

OTHER AGENCY EDUCATIONAL RESOURCE LINKS

- [NEW NOAA's Bering Climate website](#) A rich and comprehensive resource web site focused on the Bering Sea Climate and Ecosystem
- [Adopt-A-Stream Foundation](#)
- [Alaska Watershed Stewardship page](#)
- [ANROE](#): Alaska Natural Resource and Outdoor Education Association
- [ASMI](#) Alaska Seafood Marketing Institute educational resources
- [A Short History of Fly Fishing](#)
- [Boating Safety](#)
- [Columbia Education Center](#), Teacher's Resource Index
- [EETAP](#): The Environmental Education and Training Partnership
- [ENRI](#): UAA's, Environment and Natural Resources Institute - Biological Monitoring and Assessment Program for Alaska
- [EPA's Biological Indicators of Watershed Health](#)
- [National Audubon Society](#)
- [National Project WILD](#)
- [Project Learning Tree](#)
- [Rapid bioassessment protocols for flowing waters](#)
- [University of Alaska, Fairbanks](#): Mammals checklist and information
- [USFWS](#): US Fish and Wildlife Service
- [USFWS](#): US Fish and Wildlife Education Page
- [USFWS](#): Cyber Salmon
- [USFWS](#): Shorebird Sister Schools Program
- [Watersheds: A Decision Support System for Non-Point Pollution](#)
- [Wildlife Forever](#)
- [World Wildlife Fund Education Page](#)

Send suggestions and comments to: [Robin Dublin](#) - Wildlife Education or
[Andy Hoffmann](#) - Fish/Aquatic Education



* Adobe Acrobat PDF files require a free viewer available directly from [Adobe](#) (various platform versions available) or [from us](#) (Windows 95/98/NT version only). Need a hard copy of a publication? Contact [ADF&G Public Communications Section](#).



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