Laaqudax̂: The Northern Fur Seal

ELEMENTARY CURRICULUM

September 2013

Artwork by Thomas Stream

NOAA Fisheries Alaska Fisheries Science Center Alaska Regional Office	Pribilof School District	Central Bering Sea Fishermen's Association	Aleut Community of St. Paul Island Tribal Government

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

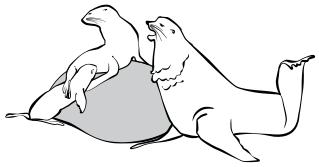
Laaqudax̂ the Northern Fur Seal for grades K-6 was developed by NOAA's National Marine Fisheries Service (NMFS)/ Alaska Fisheries Science Center and Thalassa Education, in partnership with the Pribilof School District, the Aleut Community of St. Paul Island – Tribal Government, the NMFS Alaska Regional Office, and the Central Bering Sea Fishermen's Association. The curriculum was developed by Lisa Hiruki-Raring (NMFS), Pam Goddard (Thalassa Education), Tonia Kushin (St. Paul School) , and Harriet Huber (NMFS). Graphic design and layout was provided by Rebecca White (NMFS).

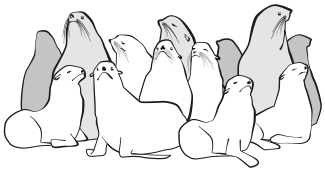
Pinniped images (Activity 1.6) were used with permission from "Marine Mammals of Alaska" by Kate Wynne. Material in Activities 2.1 and 2.2, adapted from the "Unangam-Based Environmental Education Primer for St. Paul Island, Alaska" (Mierzejek, B., A.D. Lestenkof, and P.A. Zavadil, 2007) are used with permission from the Aleut Community of St. Paul Island – Tribal Government. The map of traditional territories of Alaska Native Cultures (Activity 2.2) is used with permission of the Alaska Native Heritage Center. Readings from "Aleut Images" (Activity 2.4) are used with permission from the State of Alaska, Alaska Pacific University, Alaskool and Dana G. Anderson (Copyright 1980). The "Create a Rookery" activity was developed with Seattle artist Liz Haven. The "Blubber Mitt" activity (Lesson 5, Activity 5.1) is a lesson adapted with permission from the award-winning FOR SEA family of curriculum guides for grades 1-12, available from FOR SEA Institute of Marine Science, Indianola, Washington 98342 (www.forsea.org).

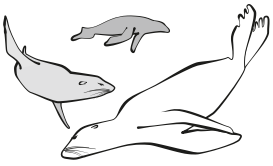
Funding was provided by NOAA's National Marine Fisheries Service (Headquarters office and Alaska Fisheries Science Center) and by the Central Bering Sea Fishermen's Association.

Please send any comments or inquiries to:
Lisa Hiruki-Raring
Alaska Fisheries Science Center
National Marine Fisheries Service, NOAA
7600 Sand Point Way NE
Seattle, WA 98115
Phone 206-526-4410
Fax 206-526-4004
Email: afsc.outreach@noaa.gov

Table of Contents

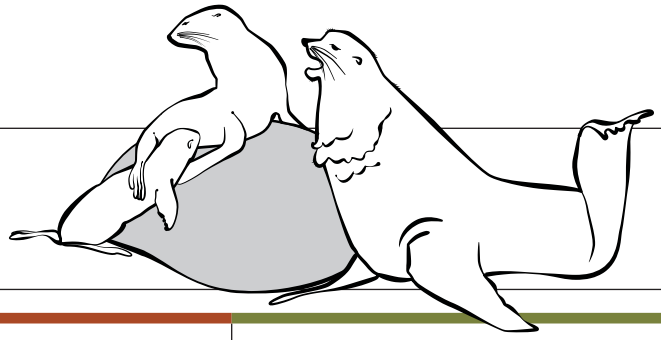






LESSON ONE

What is a fur seal?



Subject Area(s): Life science	**Grade Levels:** K-6	Presentation – 10 minutes Activities – variable

Lesson Topics:	Pre-Assessment and characteristics of mammals, pinnipeds, and northern fur seals.	**Focus Questions**	• What is a mammal? • What is a pinniped? • What is a fur seal?
Learning Objectives:	Students will: • identify four characteristics of a mammal; • identify the three groups of pinnipeds and list three characteristics of each group	**Key words:**	mammal, pinniped, true seal, eared seal, walrus, phocid, otariid, odobenid, northern fur seal, harbor seal, sea lion

ACTIVITIES		ALASKA STANDARDS						
		Math K–6	Science K–3	Science 4	Science 5	Science 6	Minutes	Grades
Activity 1.1	Know, Wonder, Learn (KWL)						10	K-6
Activity 1.2	Mammals, Marine Mammals, and Pinnipeds	K.CC.4–6 K.MD.3 1.MD.7 2.MD.9–10 3.MD.6 4.MD.6 5.MD.6	SA1.1–1.2 SA2.1 SA3.1 SC1.1–1.2 SC2.1–2.2	SA1.1–1.2 SA2.1 SA3.1 SC2.2	SA1.1 SA2.1 SC2.1–2.2	SA2.1 SC2.1	3x15	K-6
Activity 1.3	Describe a Pinniped		SC1.1–1.2 SC2.1–1.2	SC1.1 SC2.2	SC2.1	SA2.1 SC2.1	20	4-6
Activity 1.4	Walk and Swim Like a Pinniped		SC2.2				10	K-2
Activity 1.5	Venn Diagram of Pinnipeds		SC1.1–1.2 SC2.1–2.2	SC1.1 SC2.2	SC2.1	SA2.1 SC2.1	20	K-6
Activity 1.6	Label the Parts of a Pinniped		SC2.2	SC2.2	SC2.2	SA2.1 SC2.1	10	K-6
Activity 1.7	Fur		SA3.1	SA3.1	SA3.1	SA3.1	10	K-6

Targeted Alaska Grade Level Expectations (GLEs)

Math

CC Counting and Cardinality

MD Measurement and Data

Science

Science as Inquiry and Process

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.

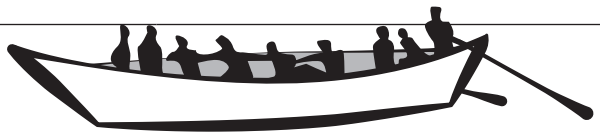
Concepts of Life Science

SC1 Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

LESSON TWO

Who are the Unangan?



Subject Area(s): Life science, history, cultural	**Grade Levels:** K-6	Presentation – 10 minutes Activities – variable

Lesson Topics:	Unangan historical overview and Unangan relationship to marine mammals	**Focus Questions**	• Who are the Unangan? • What is their relationship to marine mammals?
Learning Objectives:	Students will: • interpret the Unangan literature, describe the geography, and illustrate the differences between Unangan and non-Unanagan clothing.	**Key words:**	Unangan, Pribilof Islands, culture, history

ACTIVITIES		ALASKA STANDARDS			
		Science	History	Minutes	Grades
Activity 2.1	I Am Who I Am	SF1.1–1.3	PPE2,7 ICGP2	40	K–6
Activity 2.2	Where are the Aleutian Islands and the Pribilof Islands?	SF1.1–1.3	PPE1–3 ICGP2	20	K–6
Activity 2.3	Unangam Clothing and Environment	SF1.1–1.3	PPE1–3 ICGP2	20	K–6
Activity 2.4	Essays from "Aleut Images"	SF1.1–1.3	PPE1–3 ICGP2	20	K–3

Targeted Alaska Grade Level Expectations (GLEs)

Cultural, Social, Personal Perspectives, and Science

SF1 Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

SF2 Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.

SF3 Students develop an understanding of the importance of recording and validating cultural knowledge.

American History-People, Places, Environment (PPE)

The student demonstrates an understanding of the interaction between people and their physical environment by:

PPE 1 comparing and contrasting geographic regions of Alaska.

PPE 2 using texts/sources to analyze the similarities and differences in the cultural attributes (e.g., language, hunting and gathering practices, art, music/dance, beliefs, worldview), movement, interactions, and settlement of Alaska Native peoples.

PPE 3 using texts/sources to analyze the effect of the historical contributions and/or influences of significant individuals, groups and local, regional, statewide, and/or international organizations.

PPE 7 using texts/sources to explain the political, social, cultural, economic, geographic, and historic characteristics of the student's community or region.

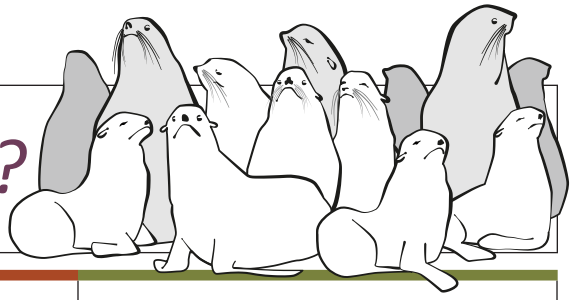
Individual, Citizenship, Governance, Power (ICGP)

The student demonstrates an understanding of the historical rights and responsibilities of Alaskans by:

ICGP 2 using texts/sources to analyze the impacts of the relationships between Alaska Natives and Russians (i.e., Russian Orthodox Church, early fur traders, Russian American Companies, enslavement, and Creoles).

LESSON THREE

What is a fur seal rookery?



Subject Area(s): Life science, genetics, reading	**Grade Levels:** K-6	Presentation – 10–15 minutes Activities – variable

Lesson Topics:	Fur seal rookery structure, location, and seasonal changes.	**Focus Questions**	• What is a fur seal rookery? • What do seals do at the rookery? • How does the rookery change over the season? • Why do we want to know?
Learning Objectives:	Students will: • describe the seasonal timeline of a northern fur seal rookery • describe what fur seals in different age groups do at the rookery	**Key words:**	rookery, haulout, vocalization

ACTIVITIES		ALASKA STANDARDS			
		Math	Science	Minutes	Grades
Activity 3.1	How Many Babies?	K.CC.4–6 K.MD.3 1.MD.7 2.MD.9–10 3.MD.6 4.MD.6 5.MD.6	SC 2	2x15	K–6
Activity 3.2	Rookery Timeline	4.MD.1 5.MD.1	SC2	25	3–6
Activity 3.3	Create a Rookery – Rubber Stamp Making		SC2	50	K–6
Activity 3.4	Find Your Fur Seal Family		SC2	10	K–6
Activity 3.5	Vocalizations in Northern Fur Seals		SC2	10	3–6

Targeted Alaska Grade Level Expectations (GLEs)

Math

CC Counting and Cardinality

MD Measurement and Data

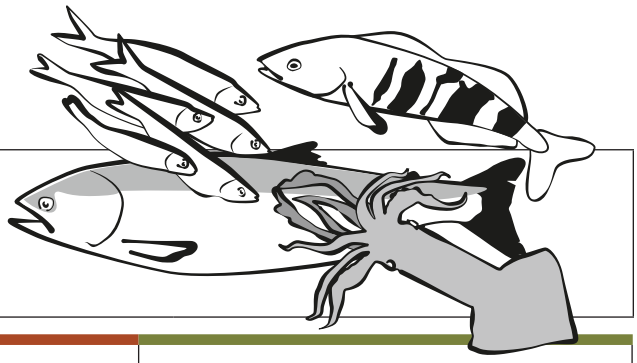
Science

Concepts of Life Science

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

LESSON FOUR

What do fur seals eat?



Subject Area(s): Life science	**Grade Levels:** K-6	Presentation – 10 minutes Activities – variable

Lesson Topics:	Marine mammal and northern fur seal diets, scat and stomach analysis.
Learning Objectives:	Students will: • learn what fur seals eat • identify fur seal scat contents • learn two ways scientists determine what fur seals eat • summarize lunch contents • explain why it is so hard to study what marine mammals eat

Focus Questions	• How do scientists study what fur seals eat if they eat at sea? • Why do we want to know what fur seals eat?
Key words:	diet, prey, ecosystem, scat, food habits

ACTIVITIES		ALASKA STANDARDS			
		Math	Science	Minutes	Grades
Activity 4.1	Make a Food Chain		SC3.2	15	K–2
Activity 4.2	Lunch Box Detective	K.CC.4–6; K.MD.3 1.MD.7 2.MD.9–10 5.MD.4	SA1.1–1.2 SA2.1	15	K–2
Activity 4.3	Scat Detective	K.CC.4–6; K.MD.3 1.MD.7 2.MD.9–10 3.MD.4 3.MD.6 4.MD.6 5.MD.4	(3–6) SA1.1–1.2 SC2.1 SG2.1	30	3–6
Activity 4.4	Microworlds: What do Marine Mammals Eat?			15	K–6

Targeted Alaska Grade Level Expectations (GLEs)

Science as Inquiry and Process

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

Concepts of Life Science

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

Science and Technology

SE1 Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

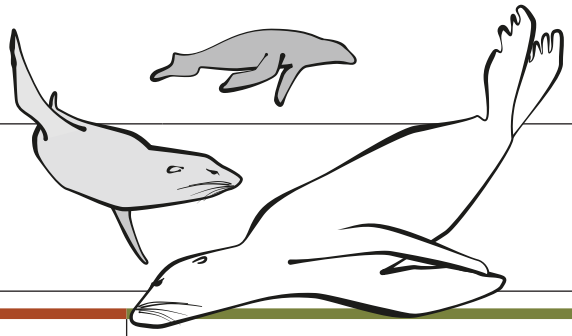
SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

History and Nature of Science

SG2 Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.

LESSON FIVE

How do fur seals dive?



Subject Area(s): Life science	**Grade Levels:** K-6	Presentation – 10 minutes Activities – variable

Lesson Topics:	Fur seal diving
Learning Objectives:	Students will: • investigate adaptations of seals to water • compare insulating qualities of air and blubber

Focus Questions	• How are pinnipeds adapted to the water? • How do they dive? • Why do we want to know how deep fur seals dive?
Key words:	blubber, body shape, forage, adaptation

ACTIVITIES		ALASKA STANDARDS				
		Math K–3	Math 4–6	Science 3–6	Minutes	Grades
Activity 5.1	Blubber Mitt	1.MD.7 2.MD.9 3.MD.4, 3.MD.6	4.MD.6 5.MD.4 6.SP.1-5	SA1.1–1.2 SA2.1 SC2.2 SG2.1	10	K–6
Activity 5.2	Waiting to Inhale	3.MD.4 3.MD.6	4.MD.6 5.MD.4 6.SP.1-5	SA1.1–1.2 SA2.1 SC2.2 SG2.1	10	3–6
Activity 5.3	Exhale and Dive	3.MD.4 3.MD.6	4.MD.6 5.MD.4 6.SP.1-5	SA1.1–1.2 SA2.1 SC2.2 SG2.1	10	K–6

NOTE: It works well to set each activity up as a station; divide the class into three groups and have the groups rotate through the stations. Afterwards, the class can discuss their results.

Targeted Alaska Grade Level Expectations (GLEs)

Math

MD Measurement and Data

SP Statistics and Probability

Science

Science as Inquiry and Process

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

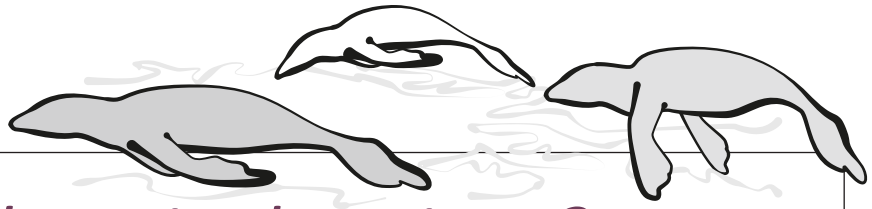
Concepts of Life Science

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

History and Nature of Science

SG2 Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.

LESSON SIX



Where do fur seals go in the winter?

Subject Area(s): Life science, geography, reading	**Grade Levels:** K-6	Presentation – 15 minutes Activities – variable

Lesson Topics:	Fur seal migration, traditional knowledge of migration, and current research.	**Focus Questions**	• Why do fur seals leave the rookery? • Where do they go? • How do we know? • Why do we want to know where they go?
Learning Objectives:	Students will: • describe where northern fur seals go in the winter • plot fur seal migration tracks on a map • describe three methods scientists use to track fur seal migration routes	**Key words:**	migrate, satellite tags, tracking instruments, latitude, longitude

ACTIVITY		ALASKA STANDARDS		
		Science 3–6	Minutes	Grades
Activity 6.1	Where are Fur Seal Rookeries?		20	3–6
Activity 6.2	Fur Seal Migrations (video)	SF1.1–1.3	15	K–6
Activity 6.3	Mapping and Fur Seal Migration Track		20–30	3–6

Targeted Alaska Grade Level Expectations (GLEs)

Cultural, Social, Personal Perspectives, and Science

SF1 Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

History and Nature of Science

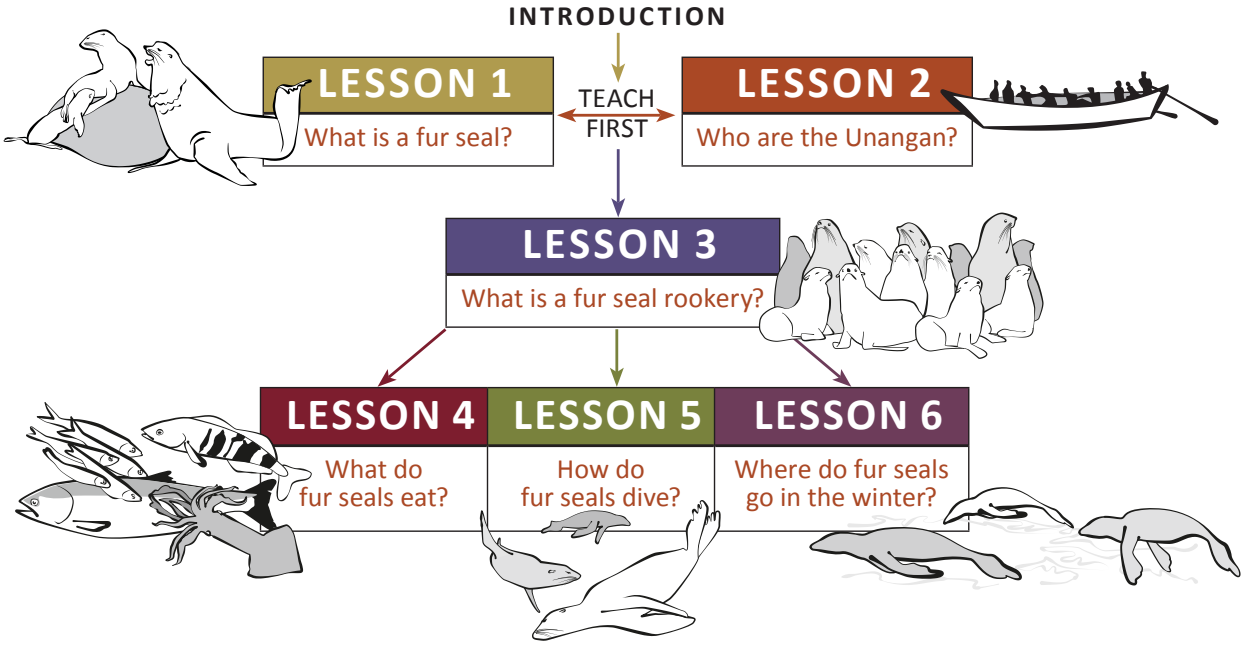
SG1 Students develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge.

SG3 Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).

SG4 Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

Introduction

Northern fur seals have played an important economic and biological role in the history of Alaska and the United States that is often overlooked. Historically, Alaska was home to over 90% of the world's population of northern fur seals with the majority found on the Pribilof Islands in the Bering Sea. The Unangan (Aleut people) have inhabited Alaska's Aleutian Islands for thousands of years, and their history is intertwined with that of the commercial fur harvest, as forced labor first for Russians and later for Americans. It is a little-known fact that in the twenty years following the United States' 1867 acquisition of the Alaska territory, revenues to the United States Government from the Pribilof Island fur seal harvest paid off the $7.2 million purchase price.



The goal of this integrated curriculum is to increase knowledge of northern fur seals and the Unangan through lessons and activities designed for varying grade levels and teachers with little or no background knowledge. Science, math, language arts, culture, and art have been integrated into lessons that can be adjusted for grades K-6. Teachers with multi-grade classes have the choice to teach the same material at many levels and provide opportunities for older students to work with younger students, encouraging community teaching. The curriculum is designed as a spiral curriculum, where the same content can be revisited over several grades, each time at a higher level of difficulty and in greater depth.

This curriculum accomplishes the following objectives:

- Tell the story of the annual cycle of northern fur seals
- Teach core concepts in fur seal biology
- Increase understanding of the relationship between northern fur seals and Unangam culture
- Develop awareness of the science and research techniques used to study northern fur seals

The term **Aleut** is the Russian word used historically for the people of the Aleutian Islands. Today, people of this region use the words **Unangan** (Eastern dialect) and **Unangas** (Western dialect) to refer to the Aleut people. In this curriculum, we use the terms **Unangan** (noun) **and Unangam** (adjective) for simplicity.

Curriculum Framework

The curriculum consists of six lessons, each with a PowerPoint presentation and accompanying activities for different grade levels. A complementary curriculum is available for grades 7-12. The activities are designed to reinforce and expand the lesson themes, and provide hands-on opportunities for students to investigate and integrate the information they learned.

Lessons

1 What is a fur seal?

2 Who are the Unangan?

3 What is a fur seal rookery?

4 What do fur seals eat?

5 How do fur seals dive?

6 Where do fur seals go in the winter?

Lessons 1, 2, and 3 provide the foundation for the curriculum. It is strongly suggested that teachers at least start with lessons 1 and 2 before proceeding to lessons 3-6. Lesson 3 provides the groundwork for lessons 4, 5, and 6 but does not have to be taught first.

The curriculum is designed to be flexible enough that teachers can pick and choose the order of lessons and activities within a lesson based on their students' grade level and prior knowledge.

How does this material fit the Alaska State Educational Standards?

This curriculum has been specifically designed to meet Alaska State Standards for science, math, reading, writing, history, and cultural standards.

What are assessment methods?

Assessment methods vary with each lesson and activity; any of these methods can be given a point value and entered into a grade book. Methods include:

- Pre and Post test
- Visual representations
- Data analysis
- Geographical display (maps)
- Summary of observations using technical writing
- Verbal presentations
- Creative writing
- Visual arts
- KWL chart (Know, want to know, and learned)

How much time do I need?

Each lesson can be completed in 40-60 minutes if at least one activity is selected. Activities range from 10 to 50 minutes, with most being 15-30 minutes.

Culminating project ideas:

Consider choosing a culminating project that summarizes the knowledge gained from the unit and making it a project that the class works on each week, individually or as a whole. Examples of culminating projects include:

- make your own northern fur seal book incorporating writing and art from each lesson
- make a picture timeline of a rookery
- make an ABC book (Unangan and English) with vocabulary from this unit
- teach what you have learned to someone else (family, another class)
- write a skit or a play about a northern fur seal rookery or migration and act it out for students at your school or make a video
- make a bulletin board display of what you have learned

Northern fur seal Curriculum Overview

Lesson	Topic	Components	Length of Time	Grade Level
		Activities vary by grade level allowing educators to select age-appropriate activities for their class		
1	***What is a fur seal?*** Fur seal classification and physical characteristics	PowerPoint Overview (7 slides) Activity 1.1: Know, Wonder, Learn (chart) Activity 1.2: Mammals, Marine Mammals, and Pinnipeds (worksheets) Activity 1.3: Describe a Pinniped (worksheet) Activity 1.4: Walk and Swim Like a Pinniped (hands on) Activity 1.5: Venn Diagram of Pinnipeds (worksheet) Activity 1.6: Label the Parts of a Pinniped (worksheet) Activity 1.7: Fur (hands on)	 10 min 3x15 min 20 min 10 min 20 min 10 min 10 min	 K-6 K-6 4-6 K-2 K-6 K-6 K-6
2	***Who are the Unangan?*** Basic overview of Unangam history and relationship to fur seals	PowerPoint Overview (10 slides) Activity 2.1: I Am Who I Am (worksheet) Activity 2.2: Where are the Aleutian and the Pribilof Islands? (worksheet) Activity 2.3: Unangam Clothing and Environment (worksheet) Activity 2.4: Essays from "Aleut Images" (read and discuss)	 40 min 20 min 20 min 20 min	 K-6 K-6 K-6 K-3
3	***What is a fur seal rookery?*** Definition of rookery and haulout, where rookeries are, what seals do there, what we can learn	PowerPoint Overview (13 slides) Activity 3.1: How Many Babies? (worksheets) Activity 3.2: Rookery Timeline (hands on) Activity 3.3: Create a Rookery – Rubber Stamp Making (hands on) Activity 3.4: Find Your Fur Seal Family (game) Activity 3.5: Vocalizations in Northern Fur Seals (video clip, discuss)	 2x15 min 25 min 50 min 10 min 10 min	 K-6 3-6 K-6 K-6 3-6
4	***What do fur seals eat?*** Type of food, how do we find out, what can we learn	PowerPoint Overview (8 slides) Activity 4.1: Make a Food Chain (hands on, worksheet) Activity 4.2: Lunch Box Detective (hands on) Activity 4.3: Scat Detectives (hands on) Activity 4.4: Microworlds: What do Marine Mammals Eat? (video)	 15 min 15 min 30 min 15 min	 K-2 K-2 3-6 K-6
5	***How do fur seals dive?*** Adaptation to water, how deep they dive, how do we find out, what can we learn	PowerPoint Overview (10 slides) Activity 5.1: Blubber Mitt (hands on) Activity 5.2: Waiting to Inhale! (investigation) Activity 5.3: Exhale and Dive! (hands on)	 10 min 10 min 10 min	 K-6 3-6 K-6
6	***Where do fur seals go in the winter?*** Why do fur seals leave rookery, where do fur seals of different ages go, how do we know	PowerPoint Overview (10 slides) Activity 6.1: Where are Fur Seal Rookeries? (mapping) Activity 6.2: Fur Seal Migrations (video) Activity 6.3: Mapping and Fur Seal Migration Track (mapping)	 20 min 15 min 20-30 min	 3-6 K-6 3-6