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#### Common Core Math:

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.

#### NGSS:

3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

#### MLR: Career & Educational Development 3-5

A3 Students identify and demonstrate behaviors that reflect positive interpersonal skills and lead to success in school or community.

- Getting along with others
- Working as a member of a team
- Managing conflict
- Accepting/giving/using constructive feedback.

## Investigating Salmon & Trout

### Grade 3

**Lesson Description:** After reading *Aquaculture for ME*, students will work in small groups and research either salmon or trout with regard to their natural habitat and their life cycle. Groups will analyze the differences and similarities between the two species and create a model of the life cycle of either salmon or trout. Students will discuss the differences between the natural and aquaculture environments and how “finfish farmers” cope with problems of a changing environment. Students will also present information in picture and bar graphs and solve word problems.

#### Learning Objectives

The student will:

- Identify successful group behaviors and work together in groups
- Research either trout or salmon, collecting necessary information
- Present findings to class
- Analyze similarities and differences between the two species of fish
- Analyze similarities and differences between natural and aquaculture environments
- Create a model of either salmon or trout life cycles.
- Graph information and solve word problems.

#### Materials:

1. Salmon or Trout Fact Sheets
2. Salmon/Trout Comparison Sheets
3. Life-cycle Sheet
4. Art materials for life-cycle models



## Procedure:

Students work in small groups and will:

1. Discuss and identify what is needed for their group to be successful.
2. List 5 guidelines for group work on a piece of chart paper.
3. Refer to their guidelines as they complete this lesson.
4. At the end of the lesson, students will score their group on success of following the established guidelines.
5. Use resources in the classroom and on-line to find information needed and fill in the fish fact sheet
6. Share information with the class
7. Take notes on Salmon/Trout Comparison sheet and analyze similarities and differences
8. Discuss and analyze the differences and similarities between the natural environment and the aquaculture environment. Brainstorm things that “finfish farmers” need to consider about the aquaculture environment.
9. Discuss what “finfish farmers” might need to do to cope with a changing environment (e.g. changing water temperature)
10. Create a model of either trout or salmon life-cycles. (Model could be a 3-D diagram, diorama, mobile, etc.)
11. Complete the Fishy Math problems.



## Salmon Fact Sheet



**Write information below**

What is the average size of an adult salmon?

What are the color patterns of an adult salmon?

How and when does the snout change in a salmon?

On what do newly hatched salmon feed?

On what do adult salmon feed?

How long do salmon usually live?

**In the Wild**

**At the Hatchery**

**In the Wild**

**At the Fish Farm**

**In the Wild**

**At the Fish Farm**



## Salmon Life-Cycle

<b>In Natural Environment</b>	<b>Describe each of the life cycle stages and where they occur.</b>	<b>In Aquaculture Environment</b>
	<b>Spawning (egg laying)</b>	
	<b>Hatching</b>	
	<b>Alevins</b>	
	<b>Fry</b>	
	<b>Smolt</b>	
	<b>Adult</b>	

## Trout Fact Sheet



**Write information below in sentences.**

What is the average size of an adult trout?

What are the color patterns on an adult trout?

How long does it take for a trout to grow from egg to adult?

**In the Wild**

**At the Hatchery**

On what do newly hatched trout feed?

On what do adult trout feed?

How long do trout usually live?





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## Trout Life-Cycle

<b>In Natural Environment</b>	<b>Describe each of the life cycle stages and where they occur.</b>	<b>In Aquaculture Environment</b>
	<b>Spawning (egg laying)</b>	
	<b>Hatching</b>	
	<b>Fry</b>	
	<b>Adult</b>	

## Salmon Trout Comparison

	<b>SALMON</b>	<b>Type of Water</b>	<b>Describe the term in this column for each of the fish.</b>	<b>Type of Water</b>		<b>TROUT</b>
			<b>Size of adult</b>			
			<b>Color patterns</b>			
			<b>Food they eat from newly hatched fish to adults.</b>			
			<b>Environment in which they were hatched in the wild.</b>			
			<b>Environment in which they live as an adult in the wild.</b>			
			<b>Water temperature best for growth and survival</b>			



## Fishy Math



Farm-raised Atlantic salmon have been part of Maine aquaculture since 1978. Harvest records have been kept since 1991. Let's take a look at how much salmon has been landed (harvested) over the years. The numbers have been rounded off.

1991	10 million pounds	2003	13 million pounds
1995	22 million pounds	2007	9 million pounds
1999	26 million pounds	2010	25 million pounds

1. On another piece of paper, draw a picture graph in scale to illustrate the pounds of salmon produced over the years. You may use the double digit numbers without the zeros to show *millions*, just be sure to label your graph with the word.

2. A. How many more pounds of salmon were produced in 1999 than in 2003?

B. In 2007 how many fewer salmon were harvested than in 2010? Show your work.



Let's take a look at salmon production and value information.

Year	Pounds Produced	Value
1991	10 million	\$27 million
1995	22 million	\$56 million
1999	26 million	\$58 million
2003	13 million	\$28 million
2007	9 million	\$21 million
2010	25 million	\$74 million

3. Show this information on a scale bar graph, use one color for salmon pounds produced and a different color for the value. Be sure to label the categories on your graph.

A. What conclusions can you make when looking at the bar graph?

B. Which year was the best year for producing salmon?

C. Which year was the worst year?

D. If you were raising salmon, what things might you want to find out about the worst year to see if another year like that one could be prevented?