## Green Crab Science



## Grade Level Focus:

$5^{\text {th }}$ Grade

## NGS Science Standards:

5-ESS3-1 Earth and Human Activity - Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Photo by David Reed via flickr.com

## Math Common Core Standards:

- CCSS.MATH.CONTENT.5.NBT.B. 5

Fluently multiply multi-digit whole numbers using the standard algorithm.

- CCSS.MATH.CONTENT.5.NBT.B. 6

Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

- CCSS.MATH.CONTENT.5.NBT.B. 7

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

## Student Phrased Learning Goals:

- I can explain the effects green crabs are having on shellfish and other parts of the environment.
- I can explain what environmental specialists are doing to protect sensitive habitats from green crabs.
- I can solve multi-step word problems.
- I can multiply and divide multi-digit numbers.
- I can identify green crabs based on their features.


## Overview

The purpose of this lesson is to provide students with access to information about shellfish in the PNW and for students to have the chance to solve real-world problems. This lesson begins with a PowerPoint all about the European Green Crab. Then students have the chance to tackle a real-world math problem. Finally, they get the chance to look at different crabs and identify green crabs.

## Step By Step:

## 1. Materials

- Student packet for each student
- Technology to show PowerPoint.
- Math manipulatives as needed.
- Scratch Paper as needed.


## 2. Preparation

- Students will begin with filling out questions while watching a PowerPoint, then they will answer two math word problems and will end with identifying green crabs.
- A voice over was prepared for this PowerPoint but can be deleted if wanted (having students take turns reading the information aloud could be a great alternative).
- Make sure the PowerPoint is ready and the audio is working.
- Go through PowerPoint and preview any needed vocabulary for students.
- Decide which math worksheet you want to include in the student packet (Only one of pages 2-5 should be included in their packet depending on difficulty level).
- Print and hand out one student packet to each student.
- Make the PowerPoint accessible for students on their computers if available.
- Make sure each student is ready with a writing utensil.
- Students will be filling out a worksheet as the PowerPoint progresses. (You will want to pause at the end of slides that have information needed for their worksheet, so they have enough time to answer questions. The questions line up with the following slides: Slide 4- \#1-5; Slide 5-\#6-7; Slides 6 \& 7- \#8; Slide 8- \#9; Slide 10- \#10)
- Prepare access to math manipulatives and scratch paper as needed.
- Have a crayon available as a visual.
- The last resource on the PowerPoint is a free coloring book that can be printed for extra green crab fun!


## 3. Introduction

- Start the PowerPoint.
- Pause on slide 3. Allow students to turn and talk and discuss what they know and what they want to know more about green crabs, then fill in the chart on the PowerPoint.
- Continue to Slide 4. Have a crayon with you to show as a visual. Show the crayon when the third bulletin is discussed. You will want to pause to allow students time to answer questions 15. This can be done individually, with partners, or the whole class.
- Ask students what an estuary is. Explain an estuary is an area at the end of a river that is in between land and the ocean.
- Pause again on Slide 5 to allow students to answer questions 6 and 7 .
- Go through slides 6 and 7, then allow students to answer question 8. You may need to switch between the slides depending on which problems students want to include.
- Ask the class which problem they think is the worst. Have students think, pair, share, then write down on question 8.
- Continue to slide 8. Have students answer question 9.
- Continue to slide 9. Pause to look over the Trapping Summary of 2021.
- Pause on slide 10 to allow students to answer question 10.
- Finish the slide show with slides 11 and 12. Slide 12 has some great resources that can be viewed as a whole class or individually on student computers.


## 4. Partner Work

- Go over the directions for "The Crab Team Needs Your Help!"
- Have students pair up and begin working on the problems.
- Have scratch paper and any needed math manipulatives ready.
- Walk around the room to check for understanding, help when needed.


## 5. Individual Work

- Once students are finished with helping the crab team, have them begin the reflection page. This should be done individually.


## 6. Closing Activity

- Finally, students can spend a couple of minutes identifying European Green Crabs. This can be done individually or with a partner. This guide is a great guide to have available on the projector (or on individual computers) https://wdfw.wa.gov/sites/default/files/202206/WA\ Sea\ Grant\ Crab\ Team\ ID\ guide\ 2022\ version.pdf
- The free coloring book attached to the PowerPoint would be a great tool during this time when some students are not finished with the packet.


## Assessment

- Grading the packet can be used as a formative assessment to show student learning. Other pieces of evidence that could be used to show student achievement during this lesson are teacher observations, and student discourse.
- If students achieve 12 or more out of 15 points on the rubric, they will be considered proficient in this lesson.


## Differentiated Instruction

- Providing access to unfamiliar vocabulary words prior to doing the project.
- Access to math manipulatives and strategies used in the classroom.
- Scratch paper is used for students to record their thinking.
- Different complexity of problems for the math portion. (Numbers could be changed to make a harder or easier problem).


## Grade 5 Math Task: Green Crab Science

## Things to Consider

- Students may need extra help determining operations depending on student level.
- Students could be split into groups based on skill level and given different levels of the math questions. Depending on level, students can be given the math sheets that tell them the operations and they just have to solve (if used, do not grade the second component of the rubric).
- This lesson could be split into multiple days, where students could use the resources to research more about green crabs.


## Strategies Used

- The KWL chart allows students to decide what they know and what they want to know more about. It gives students a chance to share their knowledge of the topic with their peers and allows them to begin to think about green crabs and what they might want to learn.
- Think-Pair-Share allows students to think about the question, then get with a partner and work on their sharing and listening skills.
- Using visuals allows visual learners to understand and grasp an idea further (using a crayon to show the size of a green crab).
- Having the PowerPoint available for students allows them to go back through it if needed at any time.
- Group work allows students to socially solve real-world problems and discuss problem-solving techniques.
- Providing real life data allows students to see the relevance of the problem they are facing in the classroom.


## Further Investigations

- Students could build a food chain showing where green crab fit in.
- Students could do a research project on ideas of how to decrease their populations.
- Students could make a map of where green crab are found in the PNW and figure out why they aren't found in some locations.
- Students could use the Trapping Summary on Slide 9 to calculate the average crab caught in each area.


## Samples of Student Work

Coming soon!

## Grading Rubric

| Rubric Components | Point Scale |  |  | Student Score/Comments |
| :---: | :---: | :---: | :---: | :---: |
|  | 3 | 2 | 1 |  |
| Student uses given information to answer questions. | Uses accurate information to fill in the information page. Fills in each section appropriately. | Uses information from the PowerPoint but doesn't fill in each section and/or gets some questions wrong. | Does not pull-out relative information from PowerPoint, and/or does not answer a majority of questions. |  |
| Student can identify operations needed in a math word problem. | Determines all needed operations for the word problems with a partner. | Determines one operation needed for the word problems with a partner. | Requires support to find appropriate operations. |  |
| Student can use multiplication and division efficiently. | Solves each word problem correctly. | Solves one word problem. Needs support for the other. | Requires support to solve multiplication and division problems. |  |
| Student can use given information to reflect. | Independently reflects on information and is able to come to conclusions about given questions. | Independently reflects on information and can answer some questions with additional support on others. | Requires support to reflect on information. Struggles to answer questions. |  |
| Student can identify green crabs based on features. | Independently identifies and circles 5 or more green crabs. | Independently identifies and circles 3 or more green crabs. | Identifies less than 3 green crabs, and/or needs support identifying green crab. |  |

## Presentation Materials - PowerPoint Slides



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## LEARNING GOALS:

- I can explain the effects green crabs are having on shellfish and other parts of the environment.
- I can explain what environmental specialists are doing to protect sensitive habitats from green crabs.
- I can solve multi-step word problems.
- I can multiply and divide multi-digit numbers.
- I can identify green crabs based on their features.

2


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## EUROPEAN GREEN CRAB

- Green crabs made their way to the united states from Europe in the 1800 s by ship transportation of young green crab.
- Green crabs were first discovered in the pacific northwest in 1998.
- An adult green crab measures only about II An adult green crab measures only about
$3-4$ inches across (about the size of a crayon).
- They range in color from dark green to brown They range in color from dark green to brown
with yellow or brown patches. They can be an orange-red color underneath.
They can be identified by the set of five triangular teeth, or spines, evenly spaced on each side of their shell between the eyes and the widest part of the shell.
- Female green crabs can reproduce twise in a season.

- They can produce 175,000-250,000 eggs each time!

Green crabs prefer estuary habitats that are protected from waves but can also survive on the open coastline.


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## GREEN CRAB DIET

- Green crabs can eat just about anything, but enjoy eating species such as: mussels, snails, algae, crabs, oysters, and clams.
- One green crab can consume $\mathbf{4 0}$ clams in a single day.


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## WHAT'S THE PROBLEM?

Green crabs are an invasive species.

- An invasive species is any new species that, when introduced to a new area outside of its native range, can cause great ecological harm to that ecosystem if it becomes widespread.
Since green crabs can reproduce extremely fast, they can cause serious damage to ecosystems.
- They can disperse over a large area and eat a large quantity of prey.
- They are direct competition for local crabs (such as Dungeness crab) to get the food they need.
- They slice through seagrass destroying many other creature's habitats.

They can also cause coastal erosion.
Coastal erosion happens when sediment or rocks get removed from the shoreline by waves, storms, and wind.
Green crabs burrow in the sediment to look for food, which causes more sediment to be swept away.
Seagrass does a good job at protecting the coast because it can trap rocks and sediment. When green crabs destroy the seagrass, they destroy that natural barrier, and more rock and sediment can escape the shoreline.

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## Grade 5 Math Task: Green Crab Science



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- There are 10,000 clams along your local beach's shoreline. There are also 50 European green crabs.
- The crab team needs your help figuring out how long it would take for the green crabs to eat all the clams on your shoreline.
- Then they need your help figuring out how many traps to put out to get rid of all the green crabs in the area
- Finally, they will need your help identifying some of the crabs they caught to figure out which are green crabs and need to be disposed of and which are not green crabs and are safe to return to the water.

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## WHAT CAN YOU DO?

- If you see a green crab, report it as soon as possible.
- It is illegal to possess a green crab in Washington state, so if you find one, report it and leave it there.


If you find a suspected European green crab or their shell, please photograph it, note the location, and report to the Washington Department of Fish and Wildlife:

## wdfw.wa.gov/greencrab

Or contact us at:
Phone: 1-888-WDFW-AIS
Email: ais@dfw.wa.gov


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Name: $\qquad$ Date: $\qquad$

## The Green Crab Project

INFORMATION PAGE

1. About how many inches across is an adult European green crab? $\qquad$ inches
2. How can a green crab be identified?
$\qquad$
$\qquad$
$\qquad$
3. How many times can a female green crab breed in a year? $\qquad$ times
4. How many eggs can a green crab produce every time it breeds? $\qquad$ eggs
5. Where do green crab live?
$\qquad$
6. Give TWO examples of what a green crab eats:
7. How many clams can a green crab eat in a day? $\qquad$ clams
8. What is one problem that happens due to green crab?
$\qquad$
9. What is one thing our environmental specialists are doing about green crab?
10. What could you do to help?
$\qquad$
$\qquad$

## Scenario A

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

1. If there are $\mathbf{1 0 , 0 0 0}$ clams on your local beach's shoreline and $\mathbf{5 0}$ green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)

Answer: $\qquad$
2. If one trap can catch 2.5 green crabs in one day, exactly how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

Answer: $\qquad$

## Scenario B

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

## 1. If there are $\mathbf{1 0 , 0 0 0}$ clams on your local beach's shoreline and 50 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)
Break it down:
How many clams can 50 green crabs eat in a day?
(Number of green crabs) $x \quad$ (Clams eaten in a day) $=($ Total clams eaten in $a$ day $)$

How many days would it take for the 50 green crabs to eat 10,000 clams?

|  | $\div$ |  |
| :--- | :--- | :--- |
| (Total clams) | $\div$ (Total clams eaten in a day) | $=\quad$ |
| (Days taken) |  |  |

Answer: $\qquad$
2. If one trap can catch 2.5 green crabs in one day, exactly how many traps would the
Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?
Break it down:
How many traps are needed to capture 50 green crabs in a day?
(Total amount of green crabs) $\quad \div($ Amount of crabs caught per trap) $=\quad=\quad$ (Amount of traps needed)
Answer: $\qquad$

## Scenario C

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

1. If there are 1,000 clams on your local beach's shoreline and 5 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)

Answer: $\qquad$
2. If one trap can catch 2 green crabs in one day, how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

Answer: $\qquad$

## Scenario D

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

## 1. If there are 1,000 clams on your local beach's shoreline and 5 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)
Break it down:
How many clams can 5 green crabs eat in a day?
(Number of green crabs) $\times$ (Clams eaten in a day) $==($ Total clams eaten in a day)
How many days would it take for the 5 green crabs to eat 1,000 clams?


Answer: $\qquad$

## 2. If one trap can catch $\mathbf{2}$ green crabs in one day, exactly how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?
Break it down:
How many traps are needed to capture 5 green crabs in a day?
(Total amount of green crabs) $\quad \div$ (Amount of crabs caught per trap) $=\quad$ (Amount of traps needed)

Remember, if you have a remainder, you will need to add an additional trap to capture all the green crab!
Answer: $\qquad$

Name: $\qquad$ Date: $\qquad$

## Reflection Time

1. Now that you know how quickly green crabs can consume a large number of clams, think about how this could be affecting our environment. How do you think it is affecting our clam population and other shellfish populations?
2. Think about if one of those green crabs reproduced and had 185,000 babies? 185,000 green crabs could eat over 7 million $(7,400,000)$ clams in one day. Why do you think green crabs need to be eliminated?
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
3. Based on what you have learned, what do you think is the best way to stop the spread of the green crab? How are environmental specialists trying to protect Earth from European green crabs?

Name: $\qquad$ Date: $\qquad$

## European Green Crab Identification

Welcome scientists! We need your help finding which of these crabs are the invasive species, European green crabs! Circle all the crabs that you think are green crabs. Remember to look for the 5 triangular teeth or spines in between its eyes and widest part of its shell. Also remember, they are not always green. HINT: There are 6 green crabs.


## The Green Crab Project

INFORMATION PAGE

1. About how many inches across is an adult European green crab? 3-4 inches
2. How can a green crab be identified?

They can be identified by the set of five triangular teeth, or spines, evenly spaced on each side of their shell between the eyes and the widest part of the shell.
3. How many times can a female green crab breed in a year? two times
4. How many eggs can a green crab produce every time it breeds? 175,000-250,000 eggs
5. Where do green crab live?

They prefer to live in estuary habitats.
6. Give TWO examples of what a green crab eats:
(Mussels, Snails, Algae, Crabs, Oysters, Clams...)
7. How many clams can a green crab eat in a day? 40 clams
8. What is one problem that happens due to green crab?

Answers will vary. For example, they can cause coastal erosion/ they are an economical issue.
9. What is one thing our environmental specialists are doing about green crab?

Environmental specialists are tracing DNA. ...or...
Environmental specialists are trapping green crab.
10. What could you do to help?

If I see a green crab, I could report it as soon as possible.

## Scenario A

Name:
Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.
3. If there are $\mathbf{1 0 , 0 0 0}$ clams on your local beach's shoreline and 50 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)

Answer: 5 days
4. If one trap can catch 2.5 green crabs in one day, exactly how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

## Scenario B

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

## 3. If there are $\mathbf{1 0 , 0 0 0}$ clams on your local beach's shoreline and $\mathbf{5 0}$ green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)
Break it down:
How many clams can 50 green crabs eat in a day?

| (Number of ${ }^{50}$ |  |
| :---: | :---: |
|  |  |

How many days would it take for the 50 green crabs to eat 10,000 clams?


Answer: 5 days
4. If one trap can catch 2.5 green crabs in one day, exactly how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

Break it down:
How many traps are needed to capture 50 green crabs in a day?


Answer: 20 traps

Scenario C

Name:
Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.
3. If there were 1,000 clams on your local beach's shoreline and 5 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)

Answer: 5 days
4. If one trap can catch 2 green crabs in one day, how many traps would the Crab Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

## Scenario D

Name: $\qquad$ Date: $\qquad$

## The Crab Team Needs Your Help!

Directions: Your mission is to help the Washington SeaGrant Crab Team to figure out how long it would take the green crab in your area to wipe out all the clams. Then you will figure out how many traps it would take to get rid of the green crab in your area. Answer the following questions and remember to show your work.

## 3. If there were 1,000 clams on your local beach's shoreline and 5 green crabs, how long would it take the green crab to eat all of the clams?

THINK: How many clams can one green crab eat in a day? (Look back at question 7.)
Break it down:
How many clams can 5 green crabs eat in a day?
$\qquad$ 5 _x $\qquad$ 40 $\qquad$ $=$ $\qquad$ 200 $\qquad$
(Number of green crabs) $x$ (Clams eaten in a day) $\quad=\quad$ (Total clams eaten in a day)

How many days would it take for the 5 green crabs to eat 1,000 clams?


Answer: 5 days
4. If one trap can catch 2 green crabs in one day, exactly how many traps would the Crab
Team need to put out to get rid of all the green crab in a single day?

THINK: How many green crabs are there in total?

Break it down:
How many traps are needed to capture 5 green crabs in a day?


Remember, if you have a remainder, you will need to add an additional trap to capture all the green crab!

Answer: 3 traps

Name: $\qquad$ Date: $\qquad$

## Reflection Time

1. Now that you know how quickly green crabs can consume a large number of clams, think about how this could be affecting our environment. How do you think it is affecting our clam population and other shellfish populations?

Answers will vary
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
2. Think about if one of those green crabs reproduced and had 185,000 babies? 185,000 green crabs could eat over 7 million $(7,400,000)$ clams in one day. Why do you think green crabs need to be eliminated?

Answers will vary
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
3. Based on what you have learned, what do you think is the best way to stop the spread of the green crab? How are environmental specialists trying to protect Earth from European green crabs?

Answers will vary
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

PEI
$\qquad$ Date: $\qquad$

## European Green Crab Identification

Welcome scientists! We need your help finding which of these crabs are the invasive species, European green crabs! Circle all the crabs that you think are green crabs. Remember to look for the 5 triangular teeth or spines in between its eyes and widest part of its shell. Also remember, they are not always green. HINT: There are 6 green crabs.


