

# Invasion! (Of the Species)

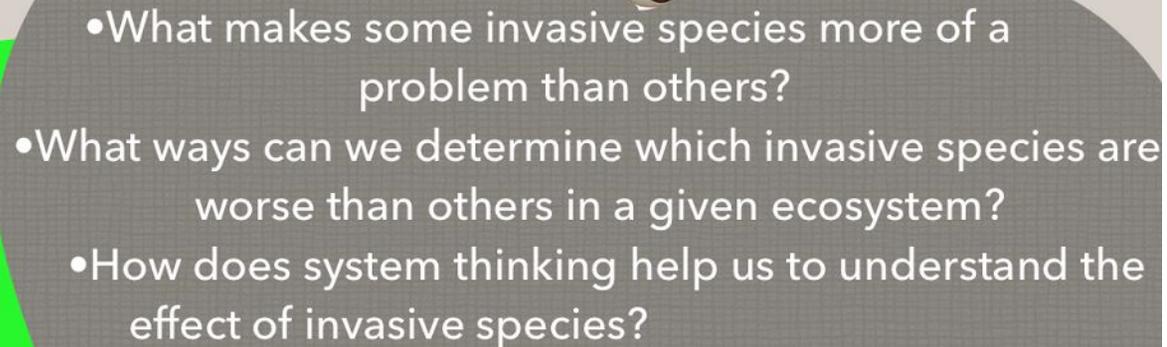
Who are these invaders?

How will we deal with them?

Who will you enlist to help!

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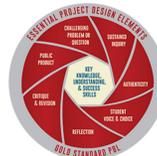
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- What makes some invasive species more of a problem than others?
  - What ways can we determine which invasive species are worse than others in a given ecosystem?
  - How does system thinking help us to understand the effect of invasive species?



Your Task: A call to action for citizens.  
**DEAL WITH THIS INVASIVE SPECIES!**

## Project Title: Invasion! (of the species)

<b>Grade</b>	<i>7th grade CA. Standards</i>
<b>Guiding Questions</b>	What makes some invasive species more of a problem than others? What ways can we determine which invasive species are worse than others in a given ecosystem? How does system thinking help us to understand the effect of invasive species?
<b>Public Product</b>	Create a presentation to highlight some troublesome invasive species in our area. Of those mentioned, describe one that is most troublesome, describe how you came to that conclusion and suggest a course of action to deal with it.
<b>Big Idea</b>	System thinking is important for understanding much of the natural world as well as the interpersonal world of humans. Exploring the issue of invasive species provides a great way for students to understand what it means for a system to be stable as well as how affecting one element of a system has an effect on other parts. <b>In this Project, students will</b> Learn about invasive species, the mathematics of predicting population growth and analysis of informational text as they build towards proposing some action to help mitigate the effects of a specific invasive species.
<b>Background</b>	Systems and systems thinking provide a nice opportunity for 7th grade students to begin to use more abstract and complex thinking. The cross-curricular connections in this PBL allow for leveraging context and content between classes. For example, comparing different proportional growth models in math is much more engaging when it is about comparing the population growth rate of two invasive species under investigation.
<b>Student Work</b>	Students will compare population growth of different species (math), write informational pieces about the topic of regulations that are meant to mitigate or minimize the effects of invasive species (ELA) and explore the effects on an ecosystem of invasive species (science). Students will also take part in a classic debate on topics related to invasive species and management of ecosystems.
<b>Time Frame</b>	<i>Predicted time frame: 2-3 weeks.</i>



### Essential Design Elements

<b>Sustained Inquiry</b>	Each new subject area asks a different question. ELA asks about more societal issues and policy. Math ask students, “what does it mean to be ‘more invasive?’” Science asks how one can measure or control the effects of invasive species on an ecosystem.
<b>Authenticity</b>	This project is more personal when students meet people who work with ecosystems and have the opportunity to ask about invasive species. This subject is part of a greater societal issue of weighing man’s needs or desires and the needs of the greater system in which we live. Although this is not about human impact, this sets the stage for that conversation later in a real context from their local ecosystem(s).

	•Students do authentic work by being required to research and make decisions in the way concerned adults, professionals and activists do.
<b>Student Voice &amp; Choice</b>	Students choose which species to compare and during the debate put together their own arguments for both sides to be the most persuasive.
<b>Reflection Critique &amp; Revision</b>	Student work will regularly be subject to peer review in ELA. As they near the debate they use the knowledge from all three classes to evaluate and arguments.
<b>Kick off/ Launch Event?</b>	Show extreme cases of invasive species such as the pythons in Florida and zebra mussels in waterways to begin the discussion of invasive species and the role of humans in changes to the environment and in controlling for change caused by invasive species.
<b>How will support personnel be utilized:</b>	

## Project Design Rubric

### Science

[Link to Conceptual Flow](#)

<b>Summary of science concepts/topics explored in this project</b>	<p><b>Standards:</b></p> <p>MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p> <p>MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.</p> <p>MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p>MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</p> <p>MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.</p>
<b>Performance Expectations/Possible Artifacts for analysis of student understanding</b>	<ul style="list-style-type: none"> <li>•Students will use data and textual resources to develop a model that describes relationships and interactions within an ecosystem as well as the effects of changes to an input or resources of an ecosystem. They will also develop arguments based on evidence to compare different invasive species in terms of the effect on an ecosystem.</li> <li>•Students will connect work done in math class to explain or predict concepts related to population growth or decay.</li> <li>•Students will design solutions for mitigation or even eradication of invasive species. For the project this will take the form of a proposal that will be presented.</li> </ul>

Describe a sub-section of your content unit (also approximate time). You can merge or unmerge cells to show relative length to other content area sections (Highlight the cells then go to Table - unmerge cells)

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Lesson Resource Links: INvasive species online game: <https://educators.brainpop.com/lesson-plan/invasive-species-lesson-plan-the-invasion-game/>

## Math

Link to Conceptual Flow

<p><b>Summary of math concepts/topics explored in this project</b></p>	<p>Converting a proportional relationship into an equation or graph helps us to make predictions beyond available data. A constant of proportionality describes the rate of change (growth) in a relationship. When representing a real world situation, each point, <math>(x, y)</math> represents a specific part of that relationship. Given a proportional relationship, the graph will pass through the origin <math>(0, 0)</math> and the point <math>(1, r)</math> where <math>r</math> is the unit rate. Two proportional relationships can be compared at single data points or (if time is a variable) over time. A comparison of their unit rate is also useful in describing how <math>y</math> will change as <math>x</math> increases. <b>7.RP.1, 7.RP.2</b></p>
<p><b>Performance Expectations/Possible Artifacts for analysis of student understanding</b></p>	<p>A student may explore various methods and representations to describe population growth or compare the growth of two different species. As a PBL, students need to be working towards the <i>best</i> way to represent or describe part of this quest. This means they may choose to represent more than one way. Students may realize that population growth would almost never be proportional. They will learn to “assume proportional growth pattern” in order to compare. Students will need to have presentations of some sort that describes what they are investigating or explaining and also clear explanation of how their graphs, equations, tables relate to what they are discussing.</p>

### Sample Math Conceptual Development Sequence for this PBL

<p><b>What does it mean to be proportional?</b> Determining whether a relationship is proportional or</p>	<p><b>How does data on a table show a proportional relationship?</b> Recognizing and generating data</p>	<p><b>What is a rate?</b> Exploring rates as a specific type of relationship.</p>	<p><b>What are examples of rates in the real world?</b> Applying the concept of proportional</p>	<p><b>What are the ways we can describe a rate?</b> Unit rates.</p>	<p><b>What is scale factor?</b> Scale factor in drawings.</p>	<p><b>What is the relationship between unit rate and scale factor?</b></p>	<p><b>what are the best ways to compare two different relationships?</b> Apply unit rate, proportional</p>
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not	for proportional relationships		relationships				growth, graphing a proportional relationship, making predictions.
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Lesson Resource Links:

## ELA/Humanities

Link to Conceptual Flow

<b>Summary of ELA/Humanities concepts/topics explored in this project</b>	Informational Text. Students will read various informational text pieces to become familiar with societies struggle to balance our use of land and dealing with unintended side effects such as invasive species changing an ecosystem.
<b>Performance Expectations/Possible Artifacts for analysis of student understanding</b>	Students will produce writing that informs the audience about an issue related to invasive species. Students will also prepare for, take part in and judge a debate on invasive species issues.

Describe a sub-section of your content unit (also approximate time). You can merge or unmerge cells to show relative length to other content area sections (Highlight the cells then go to Table - unmerge cells)

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Lesson Resource Links:

## Electives

Link to Conceptual Flow

<b>Summary of electives concepts/topics explored in this project</b>	
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<b>Performance Expectations/Possible Artifacts for analysis of student understanding</b>	
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Describe a sub-section of your content unit (also approximate time). You can merge or unmerge cells to show relative length to other content area sections (Highlight the cells then go to Table - unmerge cells)

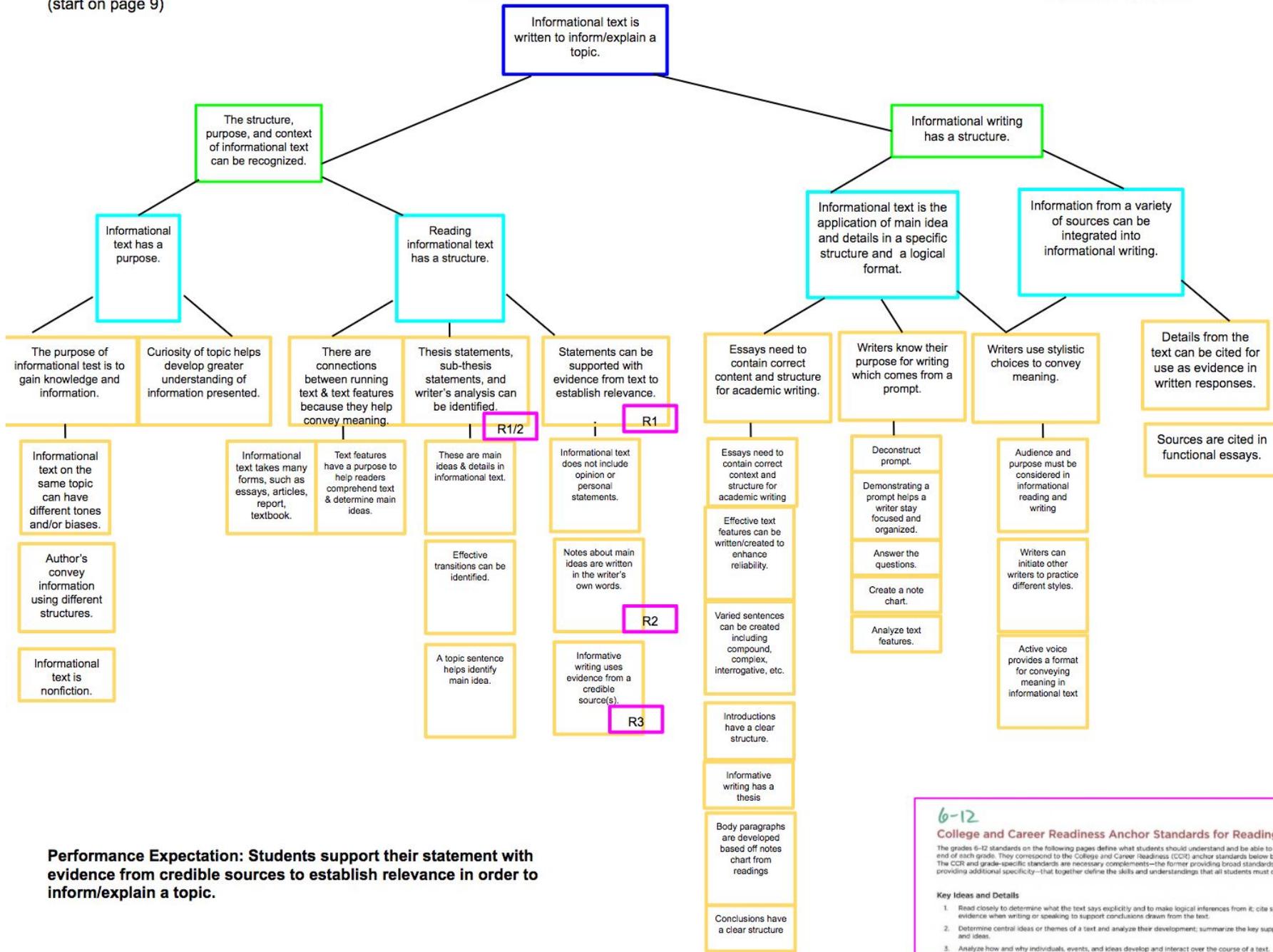
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Lesson Resource Links:

Sample ELA Content Map put together by a teacher team for this project:

What should an exiting 7th grader know about Informational Text?

All things have structures & observable patterns.



**Performance Expectation: Students support their statement with evidence from credible sources to establish relevance in order to inform/explain a topic.**

6-12

College and Career Readiness Anchor Standards for Reading

The grades 6-12 standards on the following pages define what students should understand and be able to do by the end of each grade. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.