



Invasion of the Ecosystem Snatchers Classroom Activity



SYNOPSIS

Here, in sunny Southern California, wildfires are not an uncommon occurrence. However, small fires that were once beneficial to ecosystems are now destroying the same ecosystems. While there are many factors that contribute to the increasing intensity of wildfires here in California, scientists now place partial blame on the increased number of invasive plant species.

OBJECTIVES

In this lesson, students will:

- learn about the adaptations of native and invasive plant species
- learn about how the growth of invasive species changes the fire ecology in an area
- discuss how humans impact a natural area and spread invasive species
- research an invasive species and record information on that species
- create a public awareness poster or presentation to warn the public about invasive species

NGSS CONCEPTS

HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

MATERIALS

- Access to videos and additional readings
- Reading - Invasive Species and California's Natural History
- Student Worksheets
- Markers, pencils, paper, poster board, or electronic software to create campaign

INTRODUCTION

1. Have students watch at least one short video. The first and second are on California wildfires and how non-native, invasive grasses can intensify these fires. The third is a creative approach to combat these invasives here in Southern California.
 - [Invasive Plants Could Exacerbate Wildfire Danger](#)
 - [Non-native Grass and Increasing Wildfires](#)
 - [The Goat Brigade: Preventing Wildfires in Southern California](#) (feat. GoatPro)
2. Have the students read Invasive Species and California's Natural History.
3. Have the students discuss the following questions:
 - How might these plants have come to California in the first place?
 - What current human activities are complicating this situation?
4. These are some additional resources the student can use for more information:
 - [Invasive Plants and Wildfires in Southern California](#)
 - [Learning to Live with Fire](#)
 - [Invasive Species Definition Clarification and Guidance White Paper](#)
 - [Plants A to Z](#)
 - [Fire Effects Information System](#) - Searchable database for plants and fire regime

LESSON 1

1. Using the list of invasive plant species provided (or a predetermined list from teachers), students will research and collect information and data on an invasive species of their choice.
2. After students have gathered information, they will answer questions relating to invasive species and fire ecology found on the worksheet.
3. Students should focus on how human activity has introduced or increased the spread of invasive species and how those plants are impacting fire ecology.

LESSON 2

In this activity, students will come up with a way to present information and promote awareness to the public about their chosen invasive species. This public awareness “campaign” should be creative and, if possible, include a catchy slogan. Make infographics, posters, or videos to support your cause (see examples)!

Some things your students might want to include in their graphic:

- Name and picture
- Identifying features, such as seed germination
- Common places of growth
- Damages that the plant does
- What people can do to stop the spread

CHECK FOR UNDERSTANDING

- How might scientists limit the spread of invasive species?
- What can the public do to assist in this process?
- How will increasing fire risks change human activity?

EXTENSION

- This lesson can be expanded by having students peer review each other’s posters/presentations. One really great way to do this is by creating an online gallery walk using Google Slides, PowerPoint, etc. Teachers or students can upload images and plant information onto a slide and share it with the rest of the class. Students can then make constructive comments on their peers’ work.
- In addition, students can go to local parks and wild areas (if available) and see if they can spot some invasive species and fire evidence. Furthermore, students and teachers can deepen their discussion by using the questions in the Check for Understanding section.
- Compare different adaptations between the native and non-native plants in regards to fire protection and seed germination.

Invasive Species and California's Natural History

What is an invasive species?

Invasive species can be defined in a few different ways, but for the purposes of this lesson, we will use three distinguishing factors.

Invasive species:

- Are not native
- Compete with and displace native plants
- Can cause ecological and economic harm

So, what do these factors mean? A native species is a plant or animal that is indigenous to an area. These plants are naturally occurring and have usually been in their habitat for an extended period of time. By contrast, invasive species are not native to an area, but have been introduced. This could have been done purposefully, or by accident. Not all introduced plants, however, are destined to become invasive species. Invasive species compete with native plants for natural resources (such as sunlight, water, nutrients, and space). Over time, these invasive species can displace and outcompete native species, leading to a decline or even complete extinction of native species. (See table for common invasive and native species)

Invasive species not only impact single species, but can ultimately affect entire ecosystems. These changes can put stress on an ecosystem in a multitude of ways including: native animals who no longer have adequate sources of food or shelter, soil parameters such as pH and available nutrients, and an increase in the frequency of wildfires. It can also have substantial economic consequences. Bark beetles killing native pine trees and eucalyptus trees falling over during high winds and rain are just a few examples of how invasive species can cause financial impact to homeowners and governments. One ecological and economic stress that we will focus on in this lesson is how invasives change wildfire ecology.

How do invasive species impact California's Fire Ecology?

If you've lived in California for any number of years, you have probably been witness to, or know someone who has been affected by the destruction of wildfires. In California, it seems that in late summer and early fall, we have come to expect at least a few wildfires to spread across our state. Wildfires are a natural and regularly occurring phenomenon that many of Southern California's native plant species are adapted to survive. Many of these native plants in ecosystems such as Chaparral and Coastal Sage Scrub can tolerate low intensity fires and will, over time, return to the state the ecosystem was in before the fire. Fires remove debris and burn underbrush opening up the forest floor to sunlight and nutrients that were not previously available. Some native species even depend on these low intensity fires in order to spread their seeds and reproduce, such as pine cones which need fire to open and spread their seeds.

In California, as invasive species continue to spread, they begin to influence the ecology of wildfires. Most of these plants have a short life - growing, taking up resources, seeding, and then quickly dying. These now dead, dry, invasive species can increase the frequency of fire by providing a more continuous source of fuel that is much easier to ignite than native plants. By adding more fuel, fires not only burn more often, but burn a wider area at a higher intensity. These high intensity fires can spread to other ecosystems, like the riparian (river), where plants are less adapted to fire. Native species, such as oak trees, become permanently damaged by these intense fires happening more frequently

After these fires sweep through an area, invasive species are usually the first to re-grow. Invasives often have a rapid re-establishing period, allowing them to quickly seed and cover a majority of the land around them. This prevents native plants from growing and recovering in this newly altered land.

Invasive Species (Increase fire risk)

Brazilian Pepper Tree
(*Schinus terebinthifolia*)



Pampas Grass
(*Cortaderia selloana*)



Black Mustard
(*Brassica nigra*)



Arundo
(*Arundo donax*)



Blue Gum Eucalyptus
(*Eucalyptus globulus*)



Wild Oat
(*Avena fatua*)



Star Thistle
(*Centaurea solstitialis*)



Castor Bean
(*Ricinus communis*)



Sweet Fennel
(*Foeniculum vulgare*)



Native Species (Low-intensity fire adaptations)

Scrub Oak
(*Quercus berberidifolia*)



Coast Live Oak
(*Quercus agrifolia*)



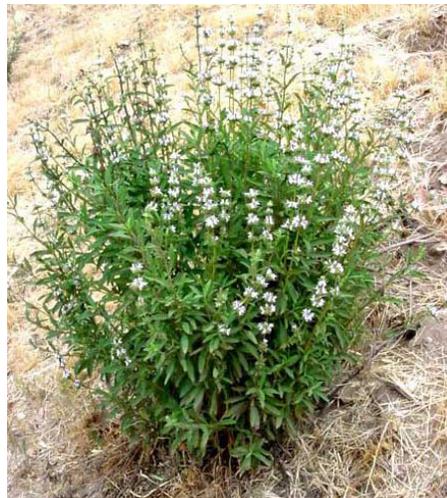
Bush Sunflower
(*Encelia californica*)



Chaparral Yucca
(*Hesperoyucca whipplei*)



Black Sage
(*Salvia mellifera*)



California Sagebrush
(*Artemisia californica*)



Toyon
(*Heteromeles arbutifolia*)



Laurel Sumac
(*Malosma laurina*)



Poison Oak
(*Toxicodendron diversilobum*)



What economic stress could this plant have on society?

How does this species complicate California's fire ecology? (at least a paragraph)

How does human activity contribute to the spread of this invasive species? (at least a paragraph)

Sample Campaign Ideas

PACIFIC SOUTHWEST REGION
Restoring, Enhancing, and Sustaining Forests in California, Hawaii & the Pacific Islands

INVASIVE SPECIES

Plant Invaders

What are Invasive Plants?

Invasive plants are defined as those that are nonnative to the ecosystem under consideration and that cause (or are likely to cause) economic or environmental harm or harm to human health.

Most Scotch broom species can be recognized by their bright yellow flowers. When full grown, Scotch broom can grow from 3 to 10 feet high (see figure below).

Scotch Broom
Scotch broom forms thick brush fields that can shade out and kill native grassland plants. This plant threatens habitat for grazing animals and hinders revegetation efforts.

Yellow Star Thistle
Due to a lack of natural predators, nonnative plants, like the yellow star thistle, have a competitive advantage and can spread quickly. This rapid rate of spread may devastate native ecosystems by: crowding out native plants, reducing biological diversity, altering water patterns, and disturbing wildlife food webs.

Yellow star thistle plants are gray-green to blue-green, and the flowers are bright yellow. Yellow star thistle can quickly form dense mats (see figure below).

Learn more online
Invasive.org: www.invasive.org/species/weeds.cfm
National Park Service: <http://www.nps.gov/plants/alien/nci/amat.htm>
California Invasive Plant Council: www.cipc.org/cipc/index.php
UC Riverside Center for Invasive Species Research: http://cicr.ucr.edu/plant_invasive_species.html
USDA National Invasive Species Center: <http://www.invasivespeciesinfo.gov/plants/main.shtml>
Forest Health Technology Enterprise Team: <http://www.fs.fed.us/foresthealth/technology/pdf/FHTRPweed.pdf>

Image Credits
Scotch Broom close-up flower: Barry Flynn, sarracenia.com, bugwood.org
Scotch Broom full view: Laif Stridvall, <http://212.3.3.183/ia/index.php>
Yellow Star Thistle close-up flower: Peggy Grab, USDA Agricultural Research Service, bugwood.org
Yellow Star Thistle full view: Laif Stridvall, <http://212.3.3.183/ia/index.php>
Giant Reed (background): James H. Miller, USDA Forest Service, bugwood.org

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THE LOW-DOWN ON INVASIVE SPECIES IN FLORIDA

CANE TOAD

WHAT IS AN INVASIVE SPECIES?
Invasive species are nonnative species that have harmed habitats environmentally or economically.

AIR POTATO

HOW DO THEY GET HERE?
Nonnative species can arrive in Florida from 28 ports of entry, or released by owners.

WHY ARE THEY A PROBLEM?
Effects of invasive nonnative species are amplified by their explosive population growth.

HOW CAN YOU HELP?
To help control invasive species, know your species, know the regulations, prevent escape.

WHAT ELSE IS BEING DONE?
The UF/IFAS Invasive Plant Working Group has adopted a tool for predicting the likelihood that a plant species will become invasive.

#FLINVASIVES

BURMESE PYTHON

http://www.ifas.ufl.edu/content/download/2607/27665/attachment/Invasive_Species.pdf - <http://ifas.ufl.edu/infobot/infobot/invasives/infobot/infobot/infobot/> - <http://ifas.ufl.edu/infobot/infobot/invasives/infobot/>

Downloaded from:
<http://blogs.ifas.ufl.edu/ifascomm/2019/06/04/invasive-species-awareness-visual-campaign/>

INVASIVE SPECIES: GOLDFISH

Originally native to Asia and introduced in late 1600s. Thought to be the first invasive fish to reach North American waters.

Size: up to 16"

Identification:
Not always "gold"! Coloring can vary from gold to olive green to white. Long dorsal fin with 15-21 rays and 25-32 scales along lateral line. Anal fin of male is concave, female is convex.

Native to:
Eastern Asia, China, Japan, Korea.

Impact:
Large populations compete with native fish for food/habitat. Infested areas have higher water turbidity and decrease in aquatic vegetation.

Invasive Area:
All lower 48 States plus Hawaii, Puerto Rico, and Virgin Islands.

If You Catch One:
Consult local regulations. Follow recommended procedures. Document catch and notify local fisheries agency.

Source: USGS.gov

Downloaded from:
<https://www.fix.com/blog/invasive-fish-species-guide/>

Downloaded from:
[https://commons.wikimedia.org/wiki/File:Invasive_Species_Plant_Invaders_\(6033823490\).png](https://commons.wikimedia.org/wiki/File:Invasive_Species_Plant_Invaders_(6033823490).png)