

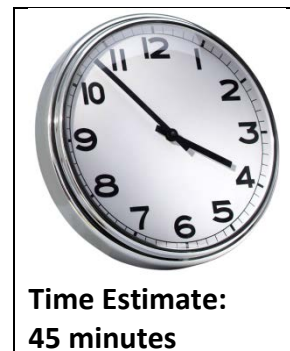
Weeds: Costs, Causes, and Prevention

This activity addresses the following essential understanding:

- Invasive weeds cause extensive damage, and people can arrest the spread of invasive weeds by learning more and changing habits.

Overview

Through this activity, students discover the extent of the invasive weed problem on public lands in the United States, and they identify actions people can take to arrest the spread of weeds. After they explore and discuss how weeds harm the landscape, students focus on the ways weeds spread and how to check the weed invasion.



Learning Objectives

Students will be able to (1) describe damage done by invasive weeds in the U.S., and (2) explain how people's behaviors can help slow the expansion of weeds.

Teacher Preparation

1. Make copies of the Learning Group student handouts. Group 1 will receive Handout 1; Group 2 will receive Handout 2; etc.
2. Secure the technology needed to show the brief video on invasive weeds.
3. Make copies of the Leave No Weeds handout.
4. Read the Background Information to become familiar with the types of damage weeds can do.

Curriculum Connections

The activity helps students understand the following Next Generation Science Standard:

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.

Background Information

The terms “weed” and “invasive plant” are similar but not identical. According to the BLM’s Weeds and Invasives Program (<https://www.blm.gov/weeds>):

The term “weed” ... in the broadest sense, is any plant growing where it is not wanted. Weeds can be native or non-native, invasive or non-invasive, and noxious or not noxious. Legally, a noxious weed is any plant designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property (Sheley, Petroff, and Borman, 1999). A noxious weed is also commonly defined as a plant that grows out of place and is “competitive, persistent, and pernicious” (James, et al, 1991)....

Invasive plants include not only noxious weeds, but also other plants that are not native to this country or to the area where they are growing. The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. As a result, the plants usually have no natural enemies to limit their reproduction and spread (Westbrooks, 1998). Some invasive plants can produce significant changes to vegetation, composition, structure, or ecosystem function. (Cronk and Fuller, 1995).

In this activity, “weed” is shorthand for “noxious weed.” As of 2018, 79 million of the 245 million acres of public land managed by the BLM were weed-infested. And 4,600 acres of federally-managed public lands are overtaken by weeds every day. Across the entire country, there are more than 3,000 non-native plant species.

In this activity, students work in small groups on the following four threats posed by weeds.

Weeds **threaten habitat** for fish, wildlife, and other plants.

All living things depend on healthy habitats for food, water, shelter, and space. Imperiled habitat—its loss, degradation, or fragmentation—is the main cause of decline among wildlife populations in the Western United States and across the globe. Weeds can imperil habitat by overwhelming native plant species, devastating shelter and forage, and reducing the diversity and quantity of native plants. When weeds do not hold and protect the soil the way native plants do, erosion and stream sedimentation increase, and fish habitats can become degraded.

Weeds **threaten public safety** by worsening wildfires.

Weeds are often less resistant to wildfire than are native plants. In a healthy ecosystem with native plant communities, occasional wildfires often help maintain ecosystem balance. Fires can increase nutrients in the soil, help some native plants reproduce, and prevent invasive plants from entering an area. However, recent hotter, longer-burning fires have begun to upset the balance. Such fires can change the soil that native plants depend on, making the soil retain less water. This can start a cycle in which invasive plants drive out native plants, shorten the time period between fires, and prevent the native plants from returning.

In sagebrush communities across the West, cheatgrass is an example of an invasive plant with specific characteristics that make an area susceptible to wildfire. Cheatgrass is an invasive annual plant that

quickly depletes soil moisture and reproduces faster than many native plants. It then establishes itself quickly on disturbed sites. Cheatgrass provides large amounts of connected fuel (“fuel continuity”) between and underneath the sagebrush shrubs, which causes the fires to burn at higher temperatures. These fires can be so hot that the sagebrush is injured or dies. Cheatgrass also promotes larger and more frequent wildland fires. Because there is less time between fires, native perennial vegetation is unable to recover completely before the next fire. All the while, cheatgrass continues to spread, promoting larger, hotter, and more frequent fires.

Weeds threaten economic activity.

According to Montana State University, weeds cost the economy \$34 billion each year. Ranching and farming operations can suffer badly as weeds reduce the population of productive forage and crops. American private ranchers alone spend \$5 billion per year to try to control weeds. One weed, leafy spurge, costs ranchers more than \$140 million a year just in Montana, Wyoming, and the Dakotas. Weeds can reduce the value of land, which damages the economy in affected areas. The recreation economy also suffers because hikers and bikers do not usually enjoy trails with dense patches of weeds.

Weeds threaten ecosystem diversity.

Native plants offer food, cover, and nesting areas needed by animals in a particular ecosystem. As a result, plants significantly influence overall biodiversity as well as the fates of individual animal species adapted to highly specific habitats. Native plant species have generally adapted and evolved with the competing species, prey, predators, and diseases of an area over many thousands of years. So native plants are usually in reasonable ecological balance with their associates and competitors, and they have particular pests, predators, and diseases that limit their abundance.

Weeds tend to occur in monocultures (when a single type of plant thrives over a large area). Successful invasives thrive in new habitats because natural competitors do not live there. Weeds often reproduce quickly, adapt rapidly to new situations, and may outcompete native plants for water or nutrients. With few or no natural checks on their growth, the invasive weeds are able to quickly occupy any disturbed or damaged lands.

Preventing the spread of weeds is everyone’s job. The BLM Weeds and Invasives program promotes practices and everyday habits that help arrest weed invasions. The program’s website notes:

Perhaps the leading cause of weed movement is directly related to the activities we engage in. Practicing the following preventative measures will help ensure weeds are not spread.

- Learn to identify invasive plants in your area
- Avoid traveling through weed infested areas
- Report weed sightings to the local county weed control supervisor or land management agency
- Clean vehicles, pack animals, and pets before entering the backcountry
- Clean all recreational clothing and equipment before leaving an area
- For 96 hours prior to entering public land, feed pack animals only certified weed-free feed
- Support local, state, and federal efforts to control invasive and noxious weeds

Procedure

1. **Hook:** Ask students to brainstorm about these questions for 60 seconds each: 1) what does it mean to say a plant is a weed? 2) where do they think weeds grow? 3) what problems can weeds cause? Let students know they will be investigating the damage weeds can do and how people can help stop the spread of weeds.
2. **Introduction:** Explain that healthy ecosystems depend on native plants to survive and thrive. Healthy means all parts exist in balance: soil, water, plants, and animals. Invasive weeds can make ecosystems unhealthy. Note that 79 million of the 245 million acres of public land managed by the BLM are weed-infested, and infestation grows there by 4,600 acres every day. Much of the problem is due to human activity, so part of the solution is to change people's behavior and habits.
3. **Video Presentation:** Show the 14-minute video "Meet the Menace: Wildland Weeds on Public Lands," accessible from <https://vimeo.com/342822874/ce546ad615>
4. **Describe Learning and Teaching Groups:** Explain to students that they will be working in two different groups: a learning group and a teaching group. In the learning group, they will read and talk about one type of damage done by weeds. This will prepare them to become an "expert" teacher about that problem later, in the teaching group.
5. **Learning Group:** There are four learning groups, one for each type of damage done by weeds. Depending on how large the class is, there might be seven or eight students per learning group. Divide the class into learning groups and distribute the appropriate handout to the students in each group. Once they are in a learning group, students should read their group's handout and talk about how to explain it to other students. Once each learning group has finished discussing its problem, have students within each group count off 1 through 7 or 8 (depending on how many are in the group). Then assign students to a teaching group by asking all the "1s" to form a group, all the "2s" to form a group, all the "3s" to form a group, etc.
6. **Teaching Group:** Every teaching group should have four students, one "expert" for each problem. Each "expert" has two minutes to teach the other three members of the group about his or her problem. First, the habitat "expert" explains how weeds threaten wildlife and fish habitat. Then the wildfire "expert" explains how weeds threaten public safety by intensifying wildfires. Then the economic activity "expert" describes how weeds harm tourism and ranching. Finally, the ecosystem diversity "expert" describes how weeds can create monocultures. By the end of the teaching group, all the students will know about four types of damage done by weeds.
7. **Discussion:** Ask students to call out the human activities that contribute to the spread of weeds, and record each in front of the class. For each human activity, ask students to describe the best ways to try to change those behaviors and habits. Distribute the Leave No

Weeds handout and ask students to comment on how their ideas compare to the best practices listed there.

Assessment

Circulate among groups during group work to ensure students are understanding and accurately relating the information on their handouts.

Learning Group 1 Handout

Weeds **threaten habitat** for fish and wildlife.

All living things depend on healthy habitats for food, water, shelter, and space. Imperiled habitat—when it is lost, degraded, or fragmented (divided into unconnected sections)—is the main cause of decline among wildlife populations in the United States and across the globe. Weeds can imperil habitat by overwhelming native species, devastating shelter and forage while reducing the diversity and quantity of native plants. When weeds do not hold and protect the soil the way native plants do, erosion and stream sedimentation increase, and fish habitats can become degraded.

How humans contribute to the spread of weeds: Hikers and backpackers can accidentally spread weeds by walking through weeds and picking up weed seeds on clothes, shoes, tents, and other gear. Car tires can also pick up and distribute weed seeds.



Learning Group 2 Handout

Weeds **threaten public safety** by worsening wildfires.

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Learning Group 3 Handout

Weeds **threaten economic activity.**

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Learning Group 4 Handout

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Weeds tend to occur in monocultures (when a single type of plant thrives over a large area). Successful invasives thrive in their new habitats because their natural competitors do not live there. Weeds often reproduce quickly, adapt rapidly to new situations, and may outcompete native plants for water or nutrients. With few or no natural checks on their growth, weeds are able to quickly occupy any disturbed or damaged lands.

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LEAVE NO WEEDS

Noxious weeds are invasive, exotic species that spread rapidly and choke out native species. They negatively impact the environment by decreasing diversity, reducing wildlife habitat, degrading water quality, increasing soil erosion, damaging agricultural lands, and decreasing recreational opportunities.

BE AWARE AND PREPARE

- Learn to identify common local weeds and weeds found in adjacent counties and states.
- Brush animals and clean watercraft before and after backcountry trips to remove weed seeds and plant propagules.
- Check your clothing and equipment for weed seeds.

TRAVEL AND RECREATE IN WEED FREE AREAS

- Avoid traveling through or recreating in weed infested areas.
- Clean vehicles and equipment before and after each trip.
- Stay on established roads and trails.

STOP, PULL, AND PACK OUT WEEDS

- Dispose of plants and seeds in a sanitary landfill or burn them.
- Pull only species you can identify.
- Be careful not to spread seeds on the way home!

REPORT IT!

- Report small or new infestations of weeds to the responsible local land management agency or landowner in your country.



www.blm.gov



www.doi.gov



Center for
Invasive Plant
Management

www.weedcenter.org

FICMNEW: Federal Interagency Committee for the
Management of Noxious and Exotic Weeds
www.fs.fed.us/ficmnew