Introduction to Invasive Species

A Mini-Curriculum for Middle School Students

DRAFT

KENAI PENINSULA COOPERATIVE INVASIVE SPECIES MANAGEMENT AREA

www.kenaiinvasives.org

Homer Soil & Water Conservation District

www.homerswcd.org

With this mini-curriculum, we aim to engage middle school students in issues related to invasive species and the increasing threat of invasive species in Alaska, and to provide teachers with resources to bring invasive species topics to their classroom.

The curriculum consists of four lessons, each one exploring a different essential question: 1. What is an invasive species?, 2. Why are invasive species a problem, 3. How do invasive species spread?, and 4. What can we do about invasive species? Each lesson consists of a hands-on activity, paired with a short video introduction (kind of like a virtual guest speaker). Our hope is that this format – video introduction/in-class activity – gives teachers flexibility and allows an invasive species expert to "visit" the classroom when an in-person program isn't an option.

If you use any of the lessons or videos in your classroom, let us know what you think! Your feedback will help us shape this curriculum to best meet the needs of teachers and their students.

Email Jen Chauvet at jen@homerswcd.org with feedback or to obtain a digital version of the curriculum and/or accompanying video files.

Introduction to Invasive Species

Lesson #1: What Is an Invasive Species?

Grade Level: Intended for grades 6-8, but adaptable to all grade levels

INTRODUCTION

This first lesson of the *Introduction to Invasive Species* series introduces students to basic invasive species concepts through a short video and creative in-class activity. After watching the "What Is an Invasive Species?" video, students apply their knowledge of invasive species to invent a unique, never-before-seen invasive species. Using a variety of props and other craft materials, students work in small groups to design and build their invasive species (i.e., dress up one or more team members) and present their invention to the class.

MATERIALS

- *Introduction to Invasive Species* Video #1, "What Is an Invasive Species?"
- Optional: "Let's Meet the Invented Invasives!" student handout (at the end of this lesson)
- Miscellaneous props. To make collection of the items easy, ask students to bring a few random things from home to share with the class. Here are a few ideas…
    - Household items (e.g., toilet plunger, broom, pillow, pots and pans, cooking utensils, etc.)
    - Gardening tools or supplies
    - Wigs and other costume items
    - Repurposable items (e.g., cardboard boxes, yogurt containers, egg cartons, etc.)
    - Sports equipment (e.g., bike helmet, ski poles, shoulder pads, tennis racket, golf club, etc.)
    - Colorful fabric or tapestries
    - Nets or other fishing gear
    - Construction supplies
    - Craft supplies (e.g., pipe cleaners, crepe paper, toothpicks, yarn, colored paper, etc.)

PROCEDURE

Part 1: What Is an Invasive Species? Video

Introduce students to basic invasive species concepts by showing Video #1, "What Is an Invasive Species?" from the *Introduction to Invasive Species* video series.

Part 2: Invent an Invasive Species Activity

Adapted from "Invent-an-Invasive" by Katie Spellman and "Invent the Ultimate Invader!" from Oregon Sea Grant's *Aquatic Invasions! Menace to the West* curriculum

1. Divide students into teams of about 3-4.
2. Explain that one of the reasons invasive species are so successful at taking over an ecosystem they have been introduced to is that they often have physical and/or behavioral traits and adaptations that enable them to reproduce quickly, spread aggressively, prey on, and/or outcompete native species for resources.
3. Guide teams to design an original, never-before-seen invasive species. Encourage students to be imaginative in applying what they know about real-life invasive species and ecological adaptations to turn one or more members of their team into their invented invasive species (i.e., they will dress one or more team members up as the invasive species). If students have trouble getting started, here are a few questions that might help spark some creativity:
    - What does the invasive species look like?
    - Where is it originally from, and what is its native habitat like?
    - What characteristics make it a successful invader in Alaska?
    - How does it outcompete native species in Alaska?
    - What is it called?
    - How does it survive the winter in Alaska?
    - How does it reproduce?
    - What and how does it eat (or, if it is a plant, get its energy)?
    - What are its predators, and how does it avoid being eaten by predators?
    - Has it already been introduced to Alaska? If so, how did it get here? If not, how can we prevent it from getting to Alaska?
4. Give each group a few minutes to present their invented invasive species to the class. Depending on the age-group and/or class dynamics, you might consider giving students a list of topics they're to cover in their presentation (e.g., name of invasive species, its native habitat, what it eats, etc.). Optional: During the presentations, students in the audience can record information about each team's invented invader on the "Let's Meet the Invented Invasives!" student handout.

EXTENSION IDEAS & OTHER RESOURCES

- If time allows, have the teams redesign their invented invasive species - what changes would they make, and why?

- In addition to the "What is an Invasive Species" video, begin the lesson with the TedEd "The Threat of Invasive Species" Video, an animated, 5-minute-long introduction to the global problem of invasive species
- "Design the Ultimate Invader!" from Oregon Sea Grant's *Aquatic Invasions! Menace to the West* curriculum: Student groups design the ultimate invader and use large pieces of paper to draw and present their invented invasive species to the class. The lesson plan includes some excellent discussion questions.
- "Invent-an-Invasive" by Katie Spellman: A similar activity, but specific to invasive plants. Focuses on physical adaptations that allow some plants to be such successful invaders.
- Have students, individually or as a team, research an invasive species and create a "WANTED" poster. There are many templates available online. "Most Unwanted" provides a more in-depth lesson plan.

Name: _____

Let's Meet the Invented Invasives!

Directions: While watching your classmates' presentations, fill in the table below for each group's invented invader.

Name of Invented Invasive	Origin and Arrival Where is it originally from? How did it get to Alaska?	Invented Invasive's Advantages What makes it such a successful invader?

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Introduction to Invasive Species

Lesson #2: Why Are Invasive Species a Problem?

Grade Level: 6-8, but adaptable for most levels

INTRODUCTION

In this lesson, students learn why invasive species are a problem and how invasive species can be harmful to the environment, the economy, and to the health and safety of humans and wildlife. Students watch the "Why Are Invasive Species a Problem?" video, and then participate in a role-play activity designed to simulate the possible impacts an invasive species can have in an area it has been introduced to. Specifically, the activity focuses on the impact of northern pike - an invasive freshwater fish found on Alaska's Kenai Peninsula - on native fish populations and humans. While northern pike are used as the example in this activity, the activity can easily be adjusted to focus on a different invasive species - one that is a particular problem in your geographical area or one that is specifically interesting to your class. (Note: As of 2021 northern pike have been eradicated from the Kenai Peninsula! Biologist and invasive species managers now focus on monitoring and prevention to make sure no new pike are introduced.)

MATERIALS

- *Introduction to Invasive Species* Video #2, "Why Are Invasive Species a Problem?"
- Small objects (e.g., craft pom poms, Legos, poker chips, buttons, small rocks, puzzle pieces, etc.) to represent "food"
- Colored shirts or vests, colored armbands, or some way to indicate players' team affiliations
- Optional: small bags for students to use as "stomachs" to store their collected food pieces in while they play
- Optional: cones or flagging tape to mark off boundaries of playing area

PROCEDURE

Part 1: Why Are Invasive Species a Problem? Video

Introduce students to how invasive species can be harmful by showing Video #2, "Why Are Invasive Species a Problem?" from the *Introduction to Invasive Species* video series.

Part 2: Northern Pike Invasion Simulation Game

Adapted from "Blue Catfish - Go Fish" from *The Good the Bad and the Ugly: Aquatic Invasive Species of the Mid-Atlantic* and "Invasive Species Simulation" activity, a component of USFWS Alaska Region's invasive species teacher kit

Activity Preparation

1. Optional: Using cones or flagging tape, mark off the "playing field" (can be inside or outside)
2. Scatter small objects on the ground - these objects are the "food" the students will collect during the simulation. Depending on the age and/or dynamics of the group, you may want to put the objects in obvious places, in places that are harder to find, or a combination of both.
3. Divide students into two groups: northern pike (invasive species) and salmon (native species)
4. Explain that, like all living things, they (whether a northern pike or salmon) need food to survive. Their goal in this game is to collect as much "food" (the tiny objects) as possible. (Safety thought: depending on where you set up the game, you may want to encourage walking or fast walking, not running.)

Round 1 *- only the salmon team will play in this round*

1. Explain that the game space, or playing field, represents a freshwater ecosystem (e.g., a lake or stream) that is an important habitat for native salmon. In this ecosystem, there's lots of food for the salmon to eat.
2. Give the salmon team one minute to collect as much food as possible from their pike-free "ecosystem".
3. Ask the salmon team to count the total number of food pieces their group collected. Record the number.

Round 2 *- both the salmon and northern pike teams will play in this round*

1. Explain that an invasive species (northern pike) has been introduced into the ecosystem.
2. Both teams working at the same time, give them one minute to collect as much food as possible.
3. Ask each team to add up the total number of food pieces their team collected. Record the numbers.

Round 3 - b*oth the salmon and northern pike teams will play in this round*

1. Explain that, in addition to competing with salmon for food, northern pike <u>eat</u> salmon.
2. The salmon team will try to collect as much food as possible, while the northern pike team tries to "eat" the salmon. Like in a game of "tag", the northern pike will chase the salmon and try to tag them. If a northern pike succeeds in tagging a salmon, the salmon is considered "eaten" and must step out of the game.
3. The round ends when all the salmon have been "eaten".

4. Ask the salmon team to add up the total number of food pieces they collected and the northern pike to count the number of salmon they "caught". Record the numbers.

** Before moving on to Rounds 4 and 5, divide students into three new groups: salmon, northern pike, and anglers (depending on class size, select two to three anglers).

Round 4 *- the anglers and the salmon team will play in this round*

1. While the salmon try to collect as much food as possible, the anglers will try to "catch" the salmon. Like in a game of "tag", the anglers will chase the salmon and try to tag them. If they succeed, the salmon is considered "caught" and must step out of the game. The round ends when all the salmon have been caught.
2. Ask the salmon team to add up the number of food pieces they collected and the anglers to count how many salmon they caught. Record the numbers.

Round 5 *- all teams play in this round*

1. For this round, invasive northern pike have been introduced into the ecosystem again. This time, the anglers will try to "catch" the salmon AND the northern pike will try to "eat" the salmon, while the salmon try to collect as much food as possible.
2. The round ends when all the salmon have been "caught" or "eaten".
3. Ask the salmon team to add up the number of food pieces they collected and the northern pike and anglers to count the number of salmon each team caught. Record the numbers.

WRAP-UP & DISCUSSION

Here are a few ideas for questions to discuss as a class:

- How did the amount of food collected by the salmon change when northern pike were introduced? When the anglers were added? When northern pike AND anglers were both present?
- Did the number of salmon caught by the anglers change when northern pike were introduced? If so, why do you think that might be?
- Aside from reduced salmon populations, how else might invasive northern pike impact an ecosystem it has been introduced to? (e.g., how might their introduction impact other wildlife?)
- Could northern pike impact the Kenai Peninsula's economy? If so, in what ways?

EXTENSION IDEAS & OTHER RESOURCES

- **"**Reed Canarygrass Tag: Game and Population Simulation Activity" by Katie Spellman: Students play a game designed to simulate the impacts of an invasive plant, reed canarygrass, on Alaska's native ecosystems.
- "Food Web Invaders" activity from Oregon Sea Grant's *Menace to the West* curriculum: Students explore the impact of invasive species on the food web through a hands-on food web simulation activity.
- Northern Pike Teacher Kit: Contact the Kenai Watershed Forum for information, www.kenaiwatershed.org
- TED-Ed "Attack of the Killer Algae" video
- Alaska Department of Fish and Game Invasive northern pike fact sheet and interactive map

Introduction to Invasive Species

Lesson #3: How Do Invasive Species Spread?

Grade Level: 6-8, but adaptable for most levels

INTRODUCTION

In this activity students use geography and mapping skills to understand the distribution of various invasive species, including their native and introduced ranges. Students also explore possible pathways for the spread of invasive species to and within Alaska. Using a large wall map and colored yarn, students map the routes of invasive species from their native regions to Alaska and use critical thinking skills to analyze common characteristics between invasive species and their native/introduced places. Species cards provide students basic information about each species and how they spread.

MATERIALS

- *Introduction to Invasive Species* Video #3, "How Do Invasive Species Spread?"
- Large world map: wall-sized is ideal, and laminated is helpful. Alternatively, a digital map could be projected onto a wall.
- Invasive species cards (three per species) *[Alaska-specific cards are still being developed. In the interim, please use these cards (file: Lesson 3_Invasive Species Cards). Some of the species on these cards are found in Alaska, others are not, but it doesn't impact the purpose/outcome of the activity.]*
- Tape or colored thumb tacks
- Colored yarn (a different color for each species can be helpful but not necessary)

PROCEDURE

Part 1: How Do Invasive Species Spread? Video

Introduce students to pathways by which invasive species spread by showing Video #3, "How Do Invasive Species Spread?" from the *Introduction to Invasive Species* video series.

Part 2: Mapping the Spread of Invasive Species Activity

Adapted from "Where in the World?" activity from *A Menace of the West* curriculum by Oregon Sea Grant

Activity Preparation

1. Prepare invasive species cards.
2. Attach a large, laminated world map to a wall. Or project a map onto a wall.

3. Cut pieces of colored yarn in lengths that are long enough for students to connect, region to region, the movement of species on the map.

Mapping Activity

1. Ask students if they have ever traveled, or moved, from one place to another. From where? To where? How?
2. Have a couple of students describe the route they took on a recent trip. Encourage them to think creatively here – we "travel" more often than we might think. Perhaps it was an out-of-state or international trip: by car from their home to Anchorage, by plane from Anchorage to their grandma's house in California, by car around California, and by plane/car to return home. Or an in-state trip: by car from their home to Homer, by boat from Homer to Kachemak Bay State Park, by foot on a trail in the park, and back home by foot/boat/car. Or a trip from their home to the grocery store, on foot, by car, or on their bicycle. Or maybe their family moved from another state/country to Alaska.
3. Explain that, just like we move from one place to another, other organisms – plants, animals, fungi, microbes – move, too. Like us, they take a particular route and use a certain kind of "transportation" to get from one place to another. Whether on purpose or by accident, humans are usually responsible for moving species from their native ecosystem to a new place. That is, introducing a species to a place they're not native to.
4. Distribute the invasive species cards to students. Some of the cards describe an invasive species that has already been introduced to Alaska. Other cards describe invasive species that have not yet been seen in Alaska but could potentially end up here. One side of the card shows the name and a picture of the species, and the other side has a few sentences about the species.
5. Explain that there are three cards for each species. While the side with the species' picture and name are the same for all three cards, each card will contain different information about the species on the other side. One card in the set will name the species' native range (where it naturally lives), and the other two cards will name where and how the species was introduced.
6. Ask the students to get up and move around the room and find the two other people who have the same species cards. Once the trio have found each other, they should share with each other the information from their cards – the species will be the same, but the information will be different.
7. Using the colored yarn and thumbtacks (or tape), each group will attach their species' native range to its introduced location.
8. Once all groups have attached their yarn, the map will be covered in lengths of yarn that show how invasive species have traveled around the world, including to and within

Alaska. Have the groups create a list of common features their species' native and introduced regions share. (e.g., Latitude? Weather or climate? Access to water? Other?)

9. Have each group share with the class their invasive species, its native and introduced location(s), method of introduction (vector/pathway), and common native/introduced location features.

WRAP-UP & DISCUSSION

Maps tell stories. As a visual representation of information, maps can help us find patterns and make connections. Looking at the "story" they have created as a class, ask students to share their reactions: What patterns do they see? What are they curious about? There are infinite ways to facilitate a discussion, but here are a few suggested questions to help guide the conversation:

- Are there longitude or latitude similarities? Does that mean anything? (Invasive species will often invade places that have a similar latitude to their native region, because the climate is similar. They may move north as the climate changes.)
- How did these species travel from one place to another and over such great distances? (Invasive species can spread in a multitude of ways, including as unintentional hitchhikers on tires, a boat motor, or shoes, in the ballast water of a ship, as pets, as fishing bait, as animal feed, and many more. Answers will vary, depending on the species cards used.)
- Which species were transported by the same pathway(s)? Is there one pathway that is most common? (Answers will vary, depending on the species cards used.)
- What characteristics do the invasive species have in common? (e.g., ability to survive cold temperatures, humans value them for food or some other reason, have seeds that easily attach to clothing, tires, etc. Answers will vary depending on species cards used.)

EXTENSION IDEAS & OTHER RESOURCES

- "Where in the World?" from *Menace to the West* by Oregon Sea Grant
- TED-Ed "Attack of the Killer Algae" video
- US Fish and Wildlife Service invasive species teacher kit (contact Homer Soil and Water Conservation District to find out how you can bring this kit to your classroom)

** Insert Alaska-specific Invasive Species Cards at end of this activity **

Introduction to Invasive Species

Lesson #4 (Option A): What Can We Do About Invasive Species?

Grade Level: 6-8, but adaptable for most levels. To challenge older students (grades 8-12) critical thinking skills, consider using Lesson #4 (Option B) instead of, or in addition to, this lesson.

INTRODUCTION

In this culminating lesson of the *Introduction to Invasive Species* series, students explore the essential question, "What can we do about invasive species?". A short video introduces students to some of the many ways people can help stop the spread of invasive species in Alaska and beyond. A creative, in-class activity allows students to participate in the prevention process by researching an invasive species and creating an original poster to raise awareness about invasive species. Students' posters are displayed for their classmates to view at a "gallery walk". During the gallery walk, students use guiding questions to reflect on what they learn from their classmates' work. As an extension idea, the gallery walk could be set up in a larger common space and made available to other students in the school and/or community members. This activity could be carried out over multiple class periods or condensed into a single class period by giving at-home assignments.

MATERIALS

- *Introduction to Invasive Species* Video #4, "What Can We Do About Invasive Species?"
- Access to the internet, books, and/or other materials for research
- Poster-making supplies: this will vary based on how you choose to do the activity, but may include paper, poster board, markers, miscellaneous art supplies, computers with digital graphics software, etc.
- Classroom walls or common space for displaying students' posters and something to hang the posters with
- Optional: Copies of the "Gallery Walk Reflections" handout

PROCEDURE

Part 1: "What Can We Do About Invasive Species?" Video

Show Video #4, "What Can We Do About Invasive Species?" from the *Introduction to Invasive Species* series.

Part 2: Poster Creation

Adapted from an activity created by Kendra Nelson, teacher at Homer High School

1. Review project objectives and requirements with students. They will research an invasive species and create an engaging poster to raise awareness about the problem of invasive species and what humans can do to help keep Alaska free from invasive species. As for requirements, this is totally up to you. You may like the idea of a large poster, or you may prefer something flyer-sized (e.g., 8"x11"). Will posters be done entirely by-hand or digitally? Posters will be more interesting if they include a combination of text and images, but contents can really vary depending on your goals and the students' interests. Here are a few ideas: species name, identifying characteristics, native range and/or introduced range map(s), characteristics that make the species such a successful invader, damage the species causes, what we can do to control for or prevent the introduction/spread of the invasive species, drawings, or other images of the species. Encourage creativity!
2. Allow students to select an invasive species that interests them or that they are curious about. This can either be an invasive species that has already been introduced to Alaska or one we'd like to avoid being introduced to Alaska. If students have trouble selecting a species, you might consider offering them a list to choose from or assigning a species to each student.
3. Give students time (in class or at home) to research their species and create their posters.

Part 3: Gallery Walk

1. Hang students' posters in the classroom or another space conducive to an art walk-type event.
2. Optional: Copy and distribute the "Gallery Walk Reflections" handout to students.
3. Allow a class period for students to check out their classmates' work and reflect on what they've learned (you can use the optional "Gallery Walk Reflections" handout) from the posters and over the course of the four-day introduction to invasive species series.
4. Lead a follow-up discussion with the students. Again, you might choose to use the optional "Gallery Walk Reflections" handout as a guide.

EXTENSION IDEAS & OTHER RESOURCES

- Invite other students from the school and/or community members to the gallery walk or hold a second gallery walk for this purpose. Like a scientific poster session, students could be available to talk with attendees about their project.
- Get involved with a citizen science project like, the U.S. Forest Service's Coastal Alaska Spruce Aphid Monitoring Program or the iNaturalist Invasive Species Program.

- "Invasive Plant Management Dilemma: Mapping infestations and debating management priorities" by Katie Villano Spellman: Students use GPS units to survey a local site for invasive plants, collect data, and discuss management options.
- "Time to Act!" activity from Washington Pest Watch's invasive species curriculum: Design and implement a stewardship project with your class (e.g., write a letter, organize a weed pull, monitor for invasive species on your school grounds, teach younger students about invasive species, etc.)
- "How to Stop the Spread of Invasive Species" video by PlayCleanGo
- "Stop Arctic Aliens" video by Nordregio

Name: _____

Invasive Species Poster Project - Gallery Walk Reflections

Directions: Study the posters created by your classmates, and use the information you gather from their projects to answer the following questions:

1. Explain how invasive species can cause disturbance in an ecosystem to which it has been introduced.

2. Name two ways that an invasive species can out-compete native species.

3. Name one way that invasive species can be intentionally introduced to an area and one way that they can be accidentally introduced to an area.

4. List three different kinds of efforts made to control/eradicate invasive species.

5. List three ways humans can help prevent the spread of invasive species.

6. Why do you think species diversity is important in an ecosystem?

Introduction to Invasive Species

Lesson #4 (Option B): What Can We Do About Invasive Species?

Grade Level: 8th grade and up. For 6th-7th grades, consider Lesson #4 (Option A) as an alternative to this lesson. For 8th grade students, consider using this lesson in addition to Lesson #4 (Option A).

INTRODUCTION

In this culminating lesson of the *Introduction to Invasive Species* series, students explore the essential question, "What can we do about invasive species?". A short video introduces students to some of the many ways people can help stop the spread of invasive species in Alaska and beyond. In an in-class activity, students take on the role of invasive species managers and work in teams to think critically about how to best manage various invasive plant infestations. A dichotomous key-inspired guide leads students through the process of making decisions about management priorities and strategies.

MATERIALS

- *Introduction to Invasive Species* Video #4, "What Can We Do About Invasive Species?"
- Copies of the "Invasive Species Management Simulation Activity" student handout (Students will work in teams of 2-3, and each team will need at least one copy of the handout.)

PROCEDURE

Part 1: "What Can We Do About Invasive Species?" Video

Show video #4, "What Can We Do About Invasive Species?" from the *Introduction to Invasive Species* video series.

Part 2: Invasive Species Management Simulation Activity

Adapted from "Callin' the Shots" from the *Invasive Plants: Taking Root in Alaska* curriculum by Homer Soil and Water Conservation District

1. Divide students into groups of two or three and provide each group with a copy of the "Invasive Species Management Simulation Activity" handout.
2. Propose the following (fictitious) scenario to the students (scenario is also included in the student handout for them to read):

Oh no! Despite best efforts to prevent the introduction of invasive species, a new invasive plant has found its way to Alaska, and it has already established itself in a few locations on the Kenai Peninsula. It has the potential to spread very quickly, and you know it could cause a lot of damage to sensitive salmon habitat. Luckily, your team of experts is ready to take on the case! As invasive species managers, it's your job to learn as much as you can about this new invasive plant and work with local landowners and other groups to decide on the best management practices – how to deal with the established infestations, and how to prevent the plant from spreading to new locations.

3. Have students select one member of their group to be the "accountant". The accountant will keep track of the team's budget.
4. Give students time to work through the scenario, using the "Get to Work!" guide to help them make management decisions. The accountant should record the team's budget on a scrap piece of paper.
5. Facilitate a class discussion about the students' experiences with the activity. Here are a few questions to consider for discussion:

    - How did your budget fare? How much money did you have in your budget at the end?
    - How did you select the first site to work on? What criteria did you use?
    - How did public involvement impact your choices? How did public involvement impact the success of your project? What benefits might come from involving local people in invasive species management?
    - What would you do differently next time?
    - What would you suggest as a plan to make sure the invasive plant doesn't come back?
    - There are many ways to solve a problem, and this activity presented only one. What other ways might be useful in controlling invasive species infestations? What are the benefits? What are the drawbacks?

EXTENSION IDEAS & OTHER RESOURCES

- Get involved with a citizen science project like, the U.S. Forest Service Coastal Alaska Spruce Aphid Monitoring Program or the iNaturalist Invasive Species Program.
- "Invasive Plant Management Dilemma: Mapping infestations and debating management priorities" by Katie Villano Spellman: Students use GPS units to survey a local site for invasive plants, collect data, and discuss management options.
- "Time to Act!" activity from Washington Pest Watch's invasive species curriculum: Design and implement a stewardship project with your class (e.g. write a letter, organize a weed

pull, monitor for invasive species on your school grounds, teach younger students about invasive species, etc.)

- "How to Stop the Spread of Invasive Species" video by PlayCleanGo
- "Stop Arctic Aliens" video by Nordregio

Invasive Species Management Simulation Activity

You've Got a Problem…

Oh no! Despite best efforts to prevent the introduction of invasive species, a new invasive plant has found its way to Alaska, and it has already established itself in a few locations in your community. The plant has the potential to spread very quickly and, if it's not dealt with, it could damage native forests, streams, and local agricultural land. It could also cost your community thousands of dollars in economic loss. Luckily, your team is on it!

It's Your Job!

As invasive species managers, it's your job to learn as much as you can about this new invasive plant and work with landowners, community members, the local government, and other groups to make decisions about management practices – that is, how to best deal with the established infestations and how to prevent new infestations.

As a first step, your team surveyed various sites in the community. You found the invasive plant growing in three different locations. Here's a description of each infestation:

- **Site #1, West Property:** This infestation is small, just 0.5 acre. The landowner, Gary West, originally saw the plants growing in the community park and liked them. He received permission from the park's maintenance manager to dig up a few of the plants to plant in his yard. He didn't know they were invasive. During your surveys, you found the plants on Mr. West's property and decided to give him a phone call. You informed Mr. West that the plants are an invasive species and talked with him about the benefits of removing the plants from his yard. He seems willing to get rid of the plants because they are ruining his lawn and beginning to creep into his vegetable garden.

- **Site #2, Snowshoe Community Park:** At 2.5 acres, this infestation is the largest one you found. A couple of years ago, the park's maintenance manager, Pam, planted some ornamental trees along the parking lot to make the park entrance more inviting to visitors. Pam knows how damaging invasive species can be, so before purchasing the trees, she called your office and did some other research to make sure they weren't an invasive species. She found out that, although the trees aren't native to Alaska, they aren't invasive – it would be okay to plant the trees. What Pam didn't know, however, is that seeds of other plants, including the invasive plant that has now spread throughout your community, were mixed into the soil that the trees were potted in. Ugh. In planting the trees, Pam accidentally planted the hitchhiking seeds of the invasive plant. Pam feels terrible about accidentally introducing the invasive plant and called you to get some help

in getting rid of the now-established invasive plants. They've started spreading to the surrounding forest, and she's worried about how that might impact native wildlife habitat.

- **Site #3, Snowshoe Creek:** During your survey, you located the invasive plant growing on private property, in a remote location, along Snowshoe Creek. The infestation is very small (only three plants), but Snowshoe Creek is an important habitat for juvenile salmon. You worry about these plant growing near streams, because the seeds can spread great distances by flowing water. The landowners, Carol and Mark Sanders, think the plants are pretty and don't want to remove them.

Time to Get to Work!

Making decisions about how to manage invasive species isn't easy. There are environmental, economic, and human-interest factors to consider. Often, it's not so much about making the *right* choice as it is making the *best* choice, given the circumstances and the resources you have. Use this guide to help you through the decision-making process. Choose wisely, and your efforts will make a big difference in your community and beyond!

I. First, let's look at the budget - how much money do you have to spend? You've got $5,000. Unfortunately, that's only enough to work on controlling the invasive plant at one site. So, where do you want to start? Here are a few factors to consider: How big is the infestation? The bigger the infestation, the more time and money it takes to control it. How likely is the infestation to spread? Infestations near waterways, roads, and human development are more likely to spread than infestations in remote locations.

Start your budget tally with $5,000. And decide - which is the best site to start with?

A. Site #1..... **Go to VII**
B. Site #2..... **Go to X**
C. Site #3..... **Go to II**

II. If you selected Site #3 as the first one to work on, you chose wisely - nice work! It's the smallest infestation and will be the easiest and least expensive to control. Because the plants are growing near Snowshoe Creek, there's a high potential for the infestation to spread. Seeds that fall into the water can float downstream to infest sites far away. For your decision to work on this high-priority site first, you receive a $5,000 grand. *Add $5,000 to your budget!*

One problem…Carol and Mark Sanders, the landowners, insist that they want to keep the plants. What do you do?

A. Plan a meeting with the Sanders…… **Go to IV**
B. Wait until the Sanders aren't home and sneak into their yard to pull up the plants…… **Go to III**

III. Oops, not a good idea! A neighbor saw you pulling up the plants and called the Sanders to tell on you. Angry that you trespassed on their property and removed the plants without their permission, Carol called your boss. Now, you must take a class about how to work with the public, and the class costs $2,000. Subtract $2,000 from your budget and…… **Go back to II**

IV. The Sanders refuse to meet with you. They claim that they haven't had any problems with the plants spreading outside of their property and insist on keeping them. They ask you to stop contacting them and even mention getting in touch with a lawyer. Now what?

A. You write to the local newspaper to inform the community that the Sanders are knowingly spreading the invasive plant and are unwilling to remove it from their property…….. **Go to VI**
B. Send the Sanders a letter to help them understand the problems the invasive plant can cause if allowed to spread and what their options are for dealing with the problem…….. **Go to V**

V. Nice work! A few weeks after receiving your letter, Carol Sanders comes to your office to learn more about the invasive plant. Your letter helped her understand why the plant is a threat and why it's important to remove it. You tell her that, since it's only a few plants, she can simply pull or dig them out of the ground herself. She should make sure to get all the roots, though, and check back occasionally to see if more plants have popped up. Since Carol thinks the invasive plant is pretty and likes having flowers in her yard, you suggest some different, non-invasive plants she can plant instead. Carol appreciates your help and says she'll remove the invasive plants. Phew! You have avoided upsetting the landowner, successfully dealt with the infestation, and saved the hefty cost of legal fees. Your boss is so impressed with your decision, and you are given another $5,000 to work on the project! *Add $5,000 to your budget.*

If you haven't addressed the other sites yet, **go back to I**, and select another site to work on.

VI. Uh oh. The landowners are angry that you wrote to the newspaper and gave them such a bad name in the community. They call your office and tell you that they have contacted a lawyer and intend to sue you. You must pay them $2,000 in damages *Deduct $2,000 from your budget*, and…… **Go back to IV**

VII. Although Site #1 is important because it's near a road and Mr. West wants to remove the invasive plant from his yard, it's not the highest priority. You've delayed work on the highest-priority site, that infestation has had time to spread, and it will now take more time and cost more money to control those plants. Bummer. If you selected Site #1 as the first site to work on, *deduct $2,000 from your budget*. But you've committed to working on Mr. West's infestation, so what do you want to do next?

A. Use a chemical herbicide to kill the invasive plants in Mr. West's yard and then, replant his lawn…….. …… **Go to VIII**

B. Recruit volunteers to help you with Mr. West's property……. **Go to IX**

VIII. The herbicide seems to be working, but members of the community are concerned about what you're doing. Rumors have spread that you are using a poisonous spray to kill a mysterious weed at Mr. West's place. Oops...you probably should have let people know about the project before you got started. You'll need to host a public meeting to educate the community about what you're doing and why it's important. It costs you $1,000 to host the meeting. *Deduct $1,000 from your budget,* and…….. **Go back to VII**

IX. Great news, the volunteers' efforts at Mr. West's place is a total success! The volunteers are enthusiastic about helping to control the spread of this invasive plant in their community, and they're spreading awareness about the dangers of invasive plants by telling their friends and family about the project. The town's mayor is so impressed by the work you're doing and awards you a grant of $5,000 to keep it up! *Add $5,000 to your budget*.

If you haven't addressed the other sites yet, **go back to I** and select another site to work on. Otherwise, **go to XI**.

X. Although it's tempting to treat the largest infestation first, Site #2 isn't the highest priority. Because the infestation is large, somewhat isolated, and will be the most difficult and most expensive to treat, it should be dealt with last. Smaller infestations and those that are most likely to spread (close to streams, trails, roads, etc.) are your top priority. If you selected Site #2 to work on first <u>or</u> second, *subtract $5,000 from your budget*

because the plants at the other two sites have spread and will now take more time and more money to deal with.

If you still need to complete work on Site #1 and Site #3, **return to I** and select another site. Otherwise, **go to XI**.

XI. Nice work, Site #1 and Site #3 are taken care of! You're ready to work on Site #2, Snowshoe Community Park. Pam, the park's maintenance manager wants your expertise in dealing with the infestation - how do you want to proceed?

A. Recruit community volunteers to help remove the plants……**Go to XIV**
B. Recruit community volunteers to help Pam remove the invasive plants at the park, and follow up by planting native plants…….. **Go to XIII**
C. Use a combination of control treatments: recruit volunteers to help mow the plants and follow up by having certified pesticide applicators use a chemical herbicide on what's left of the plants. Then, plant native plants in their place…….. **Go to XII**

XII. This is a great decision! By not relying on one control method, you are more likely to be successful in getting rid of the invasive plant. And planting native plants reduces the chance that the site will become reinfested in the future. Involving community volunteers in this big project saved you a lot of money in staff time and raised awareness of the problems associated with invasive plants. You have managed this project well - *add $5,000 to you budget* and **Go to XV**

XIII. It's great to use volunteer help, and re-vegetating the site will help prevent the invasive plants from coming back. But, because the infestation at the park is so big, you're unlikely to be successful in getting rid of the invasive plants this way. The plants will likely grow back and smother the native plants you planted. And pulling weeds by hand is exhausting – your volunteers will get worn out and discouraged. *Subtract $1,000 from your budget* and try again. **Go back to XI**

XIV. Ugh, removing all those plants one-by-one is hard work! Your volunteers are tired and frustrated. And, because you left the soil bare after the plants were removed, they came right back. It definitely costs less money to pull the plants by hand, with volunteer help, but in the long run this strategy is not worth it. *Subtract $2,000 from your budget,* and try again…….. **Go back to XI**

XV. Nice work, you've successfully eradicated the invasive plants from all three sites! How did your budget work out in the end? If you have time, try doing the exercise again, and see how your decisions differ from the first time around and how that impacts your budget.