



Jacquelyn Fallon

Time Passes

Students draw a progressive map representing human land-use expansion and changes over time.

SECTION 3 Social Systems

Subjects:

geography, biology



Approximate lesson time:

1–2 hours



Materials:

*For each group of students:
one copy of the worksheet on
page 48,
colored pencils*

STUDENT OBJECTIVES:

At the end of this unit, the student should be able to:

1. Describe how habitat fragmentation influences wolf recolonization.
2. Explain the relationship between human development and the impact on wildlife.

VOCABULARY:

Habitat fragmentation • development

TEACHER BACKGROUND:

No threat to the wolf's long-term survival around the world is more serious than habitat loss. In the past two hundred years, much of what was uninterrupted wild land has become towns, neighborhoods and recreation areas so intensively changed by humans that they no longer support wildlife.

Today, the pace of development only accelerates. The twenty counties in the Greater Yellowstone Ecosystem are growing faster than any state in the country, faster even than Arizona and Florida. Private housing developments and commercial development of land for ski areas and oil and gas extraction continue to crowd wolves, elk and other wildlife.

Imagine being an elk spending your summer in Yellowstone National Park, then migrating to a nearby valley for the winter only to find that where last year's trees and grasses grew now stands a three-bedroom home on a fenced-in, 20-acre "ranchette"!

If 200 years ago we knew how fragmented and broken today's ecosystems would be, would we have developed our cities and towns differently? Would we have set aside more parks? Would we have used resources such as trees and water differently?

In this exercise, students make decisions about how to use land. Don't give away the ending, but really allow students to be stumped about what to do with the returning wolves, since that most closely replicates the situation many countries are in today.

ACTIVITIES:

1. Provide the worksheet and colored pencils to each group.
2. Read the students the following scenario, allowing time for students to draw on their worksheets at each step of the way. You may wish to recommend that students use different colors to indicate residences, cities, industrial areas etc.



Daniel Cox, naturexposures.com

**National
Science
Education
Standards**

**Unifying Concepts
and Processes**

*Systems, order, and
organization*

*Evidence, models,
and explanation*

*Change, constancy,
and measurement*

*Evolution and
equilibrium*

Form and Function

Science as Inquiry

*Abilities
necessary to do
scientific inquiry*

*Understanding about
scientific inquiry*

Life Science (5–8)

*Structure and
function in
living systems*

*Regulation and
behavior*

*Population and
ecosystems*

*Diversity and
adaptations
of organisms*

*For more
correlations, please
see Appendix IV.*

Time Passes Narrative

The landscape on the worksheet represents the land area in one imaginary county within the United States. It's a total of 1,496 square miles; each square on your worksheet represents one square mile. At the beginning of our story, the landscape consists of rolling hills with a few rivers and abundant wildlife. Native American people have lived in the region for generations, migrating from place to place following their seasonal traditions.

Draw onto your county two rivers. Both should begin and end beyond the borders of your map. Decide which direction the water is flowing. You may include one or two streams as tributaries to each of your rivers.

Time passes . . . Pablo and Miguel are two former gold prospectors who decide to settle down. They bring their families to the region and build ranches. They build fences to keep their cows contained and keep the wildlife out. On your map, build two ranches by filling in squares. Each ranch is 6 square miles in size. Position them wherever you like.

Time passes . . . Over the next decade, other settlers come to farm the land and graze their livestock. Soon, a city springs up. Build City 1 by filling in one square.

Time passes . . . The new settlers require water for their livestock and homes. Build a dam on one of your rivers. The water upstream fills in a lake, which takes up 14 squares. Draw this new reservoir on your map.

Time passes . . . The land prospers so much that soon a second community grows up in the region, and commerce joins agriculture as part of the economy of the region. City 1 expands. Fill in two additional squares adjacent to City 1. City 2 is founded; fill in two squares wherever you like. City 3 is founded; fill in two more squares in another location.

Time passes . . . Over the next decade, city folk, who make their money in city businesses, want to build country homes outside of town. Now, add rural residents to your landscape by filling in two different quarter-mile sections no closer than one square to any city.

Time passes . . . With all of the growth in the area, you need roads to handle all the travelers through the region. Draw in major roads to connect the major cities.

Time passes . . . More pioneers are attracted by the rich grasslands in the area and build homes and barns, fence off large areas of pasture land and begin raising cattle. Add two more ranches by filling in 26 square miles total area. (You may choose to have two 13-square-mile ranches, or one 10-mile-square and one 16-mile-square, as long as the total is 26 square miles.)

Time passes . . . With the growth in commerce and agriculture, a small crossroads grows into an incorporated town. Build a small town near an intersection of your roads by filling in one square.

Time passes . . . As settlers buy up land and use it for farming and ranching, the government decides to protect some of the prettier

Time Passes Narrative*(continued)*

parts of the region for a park for everyone to enjoy. Establish a park by filling in 46 square miles.

Time passes . . . More city people wish to retire to the country to spend their golden years communing with nature. Add more rural residents by marking off four quarter-mile sections no closer than one square to a city.

Time passes . . . The region's convenient location right off a major highway makes it a regional center for commerce. A thriving city grows up. Add six squares to your existing City 1, add three squares to existing City 2, and add one square to your City 3.

Time passes . . . Increasing demand on the water supply in the region causes intense political and social controversy. To solve the problem, build another water reservoir by damming your other river. The backup of water occupies 46 square miles.

Time passes . . . Cattle prices go sky high as more Americans move to the "all beef" diet plan. Cattle ranchers in the area expand their operations. Mark off four more ranches—52 square miles total area (ranches may vary in size).

Time passes . . . With pressure from ranchers, bounty hunters extirpate wolves and other predators from the area.

Time passes . . . An entrepreneur decides that he can make lots of money taking visitors on horse trips through the countryside, so he

decides to open up a horse camp. Add a horse riding camp by filling in 12 square miles.

Time passes . . . Corporate leaders decide that your region is a great place to manufacture a new line of pots and pans. They construct factories in your area. Build an industrial area by filling in two squares adjacent to one of your cities.

Time passes . . . All the corporate business means that business people need to get to and from the region on a regular basis. Business leaders ask the city to establish an airport. Build an airport that takes up 12 squares.

Time passes . . . With growing businesses in the area, small towns spring up. Add two new towns, one square each.

Time passes . . . Seeing the growth in the region, state highway officials upgrade gravel roads into paved highways. Draw in secondary roads to connect small towns with major roads.

Time passes . . . Corporate leaders and their families seek rural areas to build their country homes so they can escape city life. Mark off eight new quarter-mile sections no closer than one square to a town or any other residence.

Time passes . . . Investors come to the area looking for the next hot tourist attraction. They decide that a nearby range of mountains would be a great place to build a ski resort and conference center. Build a ski resort by filling in nine squares.

Time passes . . . Industry expands when a new factory is built that

Time Passes Narrative*(continued)*

manufactures car parts. Add an industrial area by filling in three squares adjacent to a city that doesn't have the first industrial area.

Time passes . . . More industry means more jobs and more people moving to the area. As a result, cities grow. Add four squares to City 1, add one square to City 2, add three squares to City 3.

Time passes . . . More people means more congestion on the highways. The state highway department upgrades your main road. Your major road gets improved—it becomes an interstate highway (double lines).

Time passes . . . The BallMart Corporation decides that the region needs the largest selection of ball, nets and other sports equipment in the state. Their “anchor store” soon becomes the beginning of the region’s first outlet mall, complete with a food court and movie theater. Add an outlet mall by filling in four squares no closer than two squares to any city.

Time passes . . . Small towns continue to appear as businesses expand with the development of the mall, factories and ski resort. Add two small towns of one square each.

Time passes . . . The federal government decides that it can't let wolves disappear and initiates the “Species Survival Act” to protect wolves from trapping and hunting.

Time passes . . . More residents get tired of city life and buy land in the country. Mark off 12 quarter-mile sections no closer than one square to a town or another residence.

Time passes . . . A good economy and good jobs keep bringing people to the area. Cities continue to grow. City 1: add three squares, City 2: add two squares, City 3: add two squares.

Time passes . . . With better roads and easier access to town, more residents move out to the country, but now they need more space to feel at home. Build a “ranchette” by marking off one two-mile section no closer than one square to a town.

Time passes . . . Factory orders continue to grow, and business leaders build even more production plants in the area to take advantage of a strong workforce. Expand an industrial area by marking off four squares adjacent to an existing industrial area.

Time passes . . . More residents seek “the good life” in the country. With land prices relatively low, they move out to the country. Add more rural residences by marking off four two-mile sections no closer than one square to a town or another rural residence.

Time passes . . . A political crisis in the Middle East forces oil prices through the roof. Now, it is economical to drill into natural gas reserves in your region. Set aside land for natural gas extraction by marking off 15 squares.

As part of the “Species Survival Act,” wolves were reintroduced into areas much farther north and south of you. There is a chance that wolves could wander back into your county. Where are the places wolves should and should not be allowed to live in your county? What makes these places suitable? What barriers are there to wolves traveling through your county? Start thinking about which areas you think would be suitable for wolves.

Time passes . . . Small towns expand to provide housing for workers at factories and other businesses. Expand two of your existing small towns by adding one square each.

Time passes . . . A pack of wolves wander in from the north. Where are they likely to establish a territory? What needs will the wolves have? Mark off a 60-square-mile wolf pack territory.

Time Passes Narrative*(continued)*

Time passes . . . As towns get crowded, more residents move out to the “fresh air” of the country. They quickly begin complaining about the smell from area farms and ranches. They also complain about the lights at the ski resort and conference center. Rural residents: mark off seven two-mile sections no closer than one square to a town, farm or other human-constructed feature.

Time passes . . . Towns continue to grow as small-business owners continue to grow the workforce. Add another small town by marking off two squares.

Time passes . . . The federal government gets worried that a natural disaster or sabotage attack on the natural gas field might endanger residents, so it sets up a buffer zone around the facility. Mark off all squares touching the natural gas field. No rural residences may be located within the gas field or buffer zone, so relocate rural residents as necessary.

Time passes . . . The highway department paves more roads to improve them and make it easier and safer to travel in the region. Make sure you have roads connecting small towns and other important landmarks to the major roads.

Time passes . . . The wolf population grows, and offspring begin to disperse and form new packs. Mark off another wolf territory: 75 square miles.

3. Discuss:

- Does your county have enough space for wolves? How many wolf pack territories do you have room for? How much human influence will your wolves have to tolerate?
- What challenges did you have as you incorporated the new developments?
- What do you wish you had done differently?

- Instruct students to adjoin their map edge to edge with another group’s map. The two groups should discuss what would happen if these two counties were adjacent to each other in real life. What works/doesn’t work about it?
- Make some predictions for the future. Based on past experience, what changes can you expect for the future? Consider human population growth, tourism and industrial development, increased demand on natural resources, increasing wolf population, and anything else you can think of. What problems do you foresee? What opportunities would you like to take advantage of?

ASSESSMENT:

Assign students to reflect on the following questions:

- What laws could you make to expedite and/or limit future development?
- What barriers to recolonization will wolves find in your county?
- How would you have drawn in your cities, towns, roads, ski hill etc. differently if you had known what the end result would be?

EXTENSIONS:

1. Tape all the counties together to form one large map. Discuss.
2. Instruct students to devise a wolf management plan for their county. Then, instruct students to devise a wolf management plan for another group’s county. Which is easier? Why?
3. Get out a map of your state. Discuss how this activity mirrors development there. Where could wolves live in your state?

COUNTY LAND MAP
for Time Passes Activity

