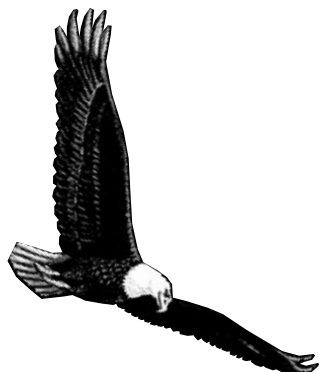




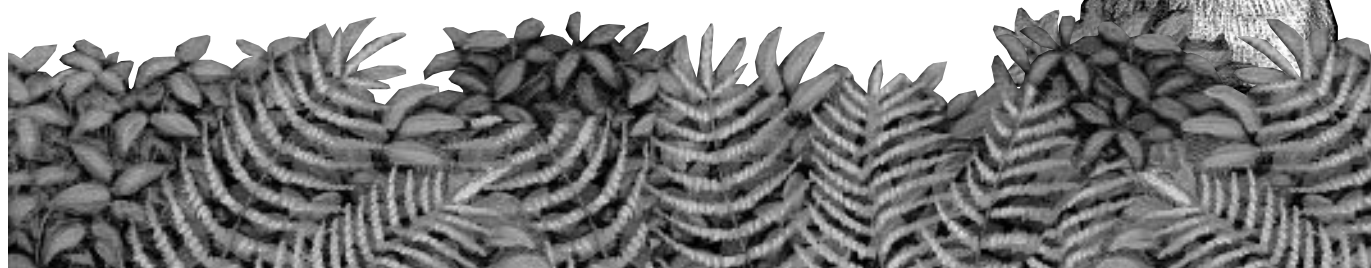
TEACHER'S GUIDE

**An Educational Companion
for SimPark**

For Grades 4 and Above



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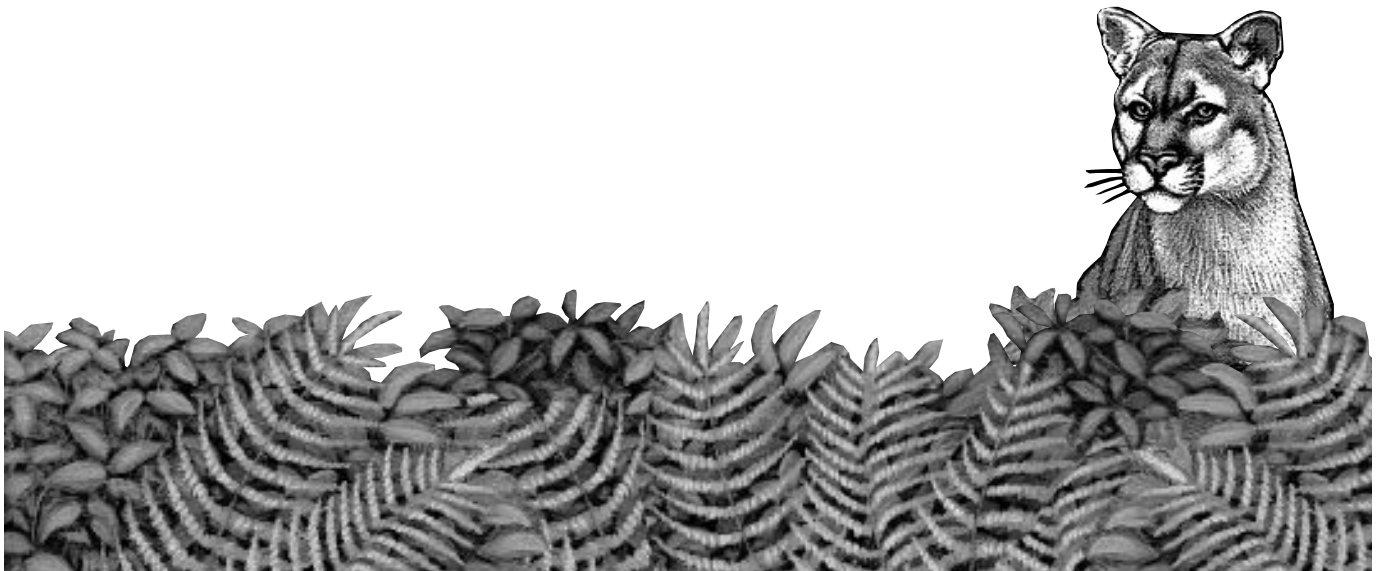
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PART 1:

Teaching With SimPark



INTRODUCTION

WHAT IS SIMPARK?

SimPark is a park simulator—a dynamic model of natural parks. Its graphic interface makes it easy enough for young children to use. Its flexibility and modeling accuracy make it suitable for adults. Presenting a park simulator in a game format, like SimPark, takes the tedium out of learning—and teaching.

SimPark is part of a series of educational products from Maxis called System Simulations. In a System Simulation, we provide a set of rules and tools that describe, create, and control a system. In SimPark, the system is a natural park—complete with simulated climate, plants, animals, droughts, fires, and every other important aspect of parks.

As an educational tool, SimPark allows students to learn by presenting old concepts in new ways. Students unearth new experiences as they

- Create and manage their own natural park.
- Identify different plant and animals species.
- Determine the interdependencies between plants and animals.
- Explore food chain and food web relationships.
- Compare and contrast the adaptability of organisms to a particular climate.
- Investigate how ecosystems are affected by natural changes and humans.

OUR GOALS

Our primary goal as producers of educational software is to help people develop an understanding of complex systems by providing the means for playing with those systems. To do this, we present complex information in a game format, which makes both teaching and learning more exciting.

Our ultimate goal in creating SimPark (and other simulations) is to inspire the player to look beyond the simulation, transferring the insight gained from playing SimPark to the real world. SimPark illustrates what is usually abstract for students: that many aspects of

the environment and living organisms are interrelated. For example, in SimPark, students can directly compare the adaptability of plants and animals to certain climates.

We hope that by capturing what has been, for the most part, thought of in the abstract and by giving students the opportunity to participate in typically unfamiliar activities, they will not only learn about natural parks and park management, but will also develop a sensitivity to and appreciation of the delicate balance inherent in the natural world.

SIMULATIONS IN THE REAL WORLD

Simulations are increasingly powerful tools that allow researchers in all fields from astronomy to particle physics to conduct inquiries into areas where traditional laboratory methods are not possible, practical, ethical, or legal.

Simulations, whether they are modeling real or hypothetical situations, allow the user to change individual variables to see how specific changes affect systems. Unlike the real world, simulations allow individual and precise manipulation of variables involving anything from climate to the laws of physics to time itself.

SIMULATIONS IN EDUCATION

Simulations involve action and behavior rather than just the acquisition of facts. Simulations allow students to study processes instead of events. In a simulation, students explore and test new ideas; they discover what happens when principles are *applied* to a situation, rather than merely learn about a set of facts and principles. Students become active and powerful participants in the learning process.

Using a computer simulation like SimPark is more than a single learning experience; it is an introduction to a new tool for research.

- Simulations encourage and require imaginative thinking rather than rote learning.
- Simulations give students experience in decision-making, and allow them to quickly see the consequences of their decisions.

- Students become explorers that create and follow their own hypotheses rather than mere observers reading what other people have done.
- Learning becomes student-centered rather than teacher-centered.
- Simulations are particularly appropriate when the inquiry process assumes that knowledge is cumulative and constantly expanding.
- Simulations like SimPark fit easily into interdisciplinary learning. In addition to its use in studying natural parks and ecosystems, SimPark can add excitement to math, statistics, biology, geography, and even creative writing.

Limitations of Simulations

It is important to keep in mind that while simulations offer many possibilities for creativity and inquiry, they also have limitations. Simulations, by definition, are not real. As complex as any simulation is, it is nevertheless a simplified, artificial system that can in no way come close to the real world in complexity and variety.

Students must always be alert for limitations of simulations and for differences between the way systems work in their computers and the way systems work in real life. In all observations and conclusions, students should consider how the simulation's limitations may have affected their experimental design, the data they were able to collect, and the outcome of the experiment.

In general, when dealing with simulations, specific results may be inaccurate, but general trends, even with simple simulations, tend to be highly accurate.

Simulation Games and “At-Risk” Students

Often when we show our products to teachers and parents, they see the complexity and depth of the simulations and immediately think of using them with Honor or Advanced Placement students. We agree that students who excel in school can put our software through its paces and learn more with it than without it, but please don't limit its use to “good” students.

Educational computer games are one of the best ways to engage the interest of at-risk students: those with learning difficulties or short attention spans as well as those who do poorly in school because of boredom. We hope to see our products enhancing the education of the kids who really need help as well as those bright children who already have a leg up on the world. A game may be just the thing to light that spark of curiosity and kindle the desire to learn in the student who previously had no interest in education.

OUR TEACHING METHODS

This SimPark Teacher's Guide is different from most other teacher's guides, but don't worry. It's based on tried and tested educational methods. These methods can be applied to the use of all Maxis Simulation products.

We are proponents of what are known as *Backward Learning* and *Non-Specific Transfer*. Both of these are explained in the following sections.

Backward Learning

Backward Learning is an approach to education that reverses the usual teaching process. It is best summarized by the phrase *Everyone is already an expert*.

In the usual approach, students first have to learn many facts and figures. Next, they try to connect the facts and figures to do higher-level thinking. Finally, at the end of the process, it is hoped that students will be able to do the highest-level of thinking: creativity and original thought. With this approach, it is difficult for students to understand why they are learning these isolated facts and figures and how to connect them.

In contrast, *Backward Learning* starts with the highest-level of thought, with creativity, with invention. Students are encouraged to trust their intuition. After students invent, they analyze their invention, asking themselves, “What worked? What didn't? Why or why not? Let's find out. *Then* they research related facts and figures. This order of discovery provides a familiar context for learning, connecting, and even anticipating the facts and figures.

Non-Specific Transfer

Non-Specific Transfer is similar to what is commonly called “lateral thinking.” It is learning to recognize relationships and to think by analogy. Non-Specific Transfer involves applying knowledge gained in one area to a completely different area, reusing, expanding, and compounding every bit of knowledge the students gain. Insight, therefore, comes into play when students are exercising Non-Specific Transfer.

ABOUT THE SIMPARK TEACHER’S GUIDE

This Teacher’s Guide is designed to help you to use SimPark in your classroom with minimal preparation. As you and your students explore and play with SimPark, you will develop your own curricular uses, connections, and applications to further the program’s educational possibilities. When you do, we would appreciate it if you would write or e-mail us (see Part 3 for the information) and tell us about it so we can help you share your ideas with other educators.

This guide is divided into three parts:

Part 1: Teaching with SimPark discusses simulations in education; using SimPark in your classroom, including the logistics of using SimPark with different numbers of computers; and getting started with your new program.

Part 2: Teacher Materials for Simulations and Activities has three units—each one covers a different subject area. Each unit gives the objectives, summaries, and background information for the simulations in the unit and explains any preparations that should be done before doing the simulations in class. Following each unit is a Related Off-Computer Activities section that expand on the information covered in the unit.

You’ll find the reproducible blackline masters for each lesson’s activities in Part 3 of this guide.

Part 3: Student Materials and Resources contains blackline masters (Student Pages) for the lessons in Part 2. You’ll also find reference sheets that might be helpful for learning the SimPark controls. This part also includes additional resources and information about the author.

The activities in this guide give a sample of the activities and subjects that can be addressed using SimPark. We hope that these activities will prepare students to formulate plans, take action, and resolve problems.

You can adapt the simulations and activities in this guide for use in grades 4-12 and beyond. Reorganize the activities to suit the subject you are teaching, using them sequentially to form a teaching unit or individually as single learning experiences. Because the guide is flexible across a few grades, you may need to adjust the lessons slightly, tailoring them to the specific needs of your grade and subject focus.

USING SIMPARK IN YOUR CLASSROOM

CONCEPTS THAT CAN BE TAUGHT

In the past, learning about our world has been divided into disciplines such as history, biology, mathematics, geology, and so on. Although this made it easy to develop courses and schedules, it may not have been the most natural or the best way to learn.

Now curricula stress the importance of *themes* in order to encourage global understanding instead of memorization of unrelated facts. With SimPark, many of these subjects are directly related so that you and your students can explore them as the unified system that they are! After playing SimPark, your students will know how life science, earth science, math, business, and even meteorology (to name a few) are important subjects for any park ranger to grasp.

Above and beyond standard areas of study, students will learn other important concepts in today's world, including the following:

General Knowledge

- Basic Computer Literacy
- Critical Thinking
- Problem Solving
- Decision Making

Art and Design

- Form and Function
- General Design

Simulation Concepts

- What is a Simulation?
- Types of Simulations
- Uses for Simulations
- Limitations of Simulations

CURRICULUM CHART

This chart shows how each simulation can fit into your curriculum.

	Life Science	Earth Science	Meteorology	Math/ Statistics	Geography	Business/ Economics
Creating a Community						
Building a Basic Park	X				X	
Who Goes There?	X				X	
Climbing the Food Chain	X			X	X	
Preying on Predators	X			X	X	
Ecosystems and the Environment						
Comparing Climates	X	X	X	X	X	
Home Sweet Home	X	X	X	X	X	
All Dried Up	X	X	X	X	X	
Park Management						
Going Public	X			X	X	X
A Team Effort	X			X	X	X

IMPLEMENTATION IN THE CLASSROOM

SimPark can be used to enhance just about any instructional unit. It can stand alone as an enrichment computer activity, or it can be used as a pivotal activity connected to other activities and projects done before, during, or after using the computer program. Use the lessons in this guide to integrate SimPark, or to create custom lessons to suit your needs. Some options for implementing SimPark in the classroom include:

1. Use SimPark demonstrations or experiments to introduce a unit. Show the students (or let them show each other) science (or whatever) in action with SimPark. Then set them loose to research the subject in other, more traditional sources such as textbooks, films, libraries, interviews, and personal experience. After the research, repeat the same experiment (or another one or two) and the students can view it from a position of knowledge.
2. Use a SimPark demonstration or experiment as the culminating activity for a unit, providing an opportunity for students to put theory into practice.
3. Use SimPark activities to duplicate traditional laboratory or field experiments conducted by your students. Compare and contrast the results of the two types of experiments.

SCHEDULING CLASS TIME

SimPark is flexible in its time requirements. It can take as little time or as much time as you want it to. If you use this Teacher's Guide to its fullest, each unit can take up to four (or more) class periods:

- ½-1 class period for the Jumping-In Discussion.
- 1-2 class periods for the SimPark simulations and questions.
- ½-1 class period for the Related Activities.

WHOLE CLASS INSTRUCTION

If you have access to an LCD Display for your computer and an overhead projector, the whole class can participate together in SimPark activities.

- One person (student or teacher) facilitates the discussion.
- One person operates the program, using suggestions from individual students or from teams of students.
- Small groups of students take turns presenting experiments to the whole class.

GROUP WORK

Divide the class into groups of three to five students each, assigning each group to a specific day or time with the computer. There are several ways to involve the groups:

- Individual model: Each group performs the same activity to replicate, dispute, and verify results.
- Cooperative model: Each group works on a different activity and reports the results to the class. This covers more subject matter, and allows for more individual creativity.

INDIVIDUAL WORK

Have the students individually complete the SimPark activities. Later, they can share their findings in groups or as a class.

INDEPENDENT EXPLORATION

By making SimPark available for individual students to use during class, before or after school, or in free time, you can help students find their own area of interest, and allow them the time to explore and be creative. Don't worry—the SimPark environment is so rich and varied that no amount of independent play can ruin your planned lessons.

COOPERATIVE/COLLABORATIVE LEARNING

Because SimPark offers many complex interactions, you will find many opportunities to use cooperative and collaborative learning groups.

1. Students will learn from one another, both about how to use SimPark and about the activity in which they are cooperatively engaged.
2. Students can be assigned cooperative roles within a group. Roles can be expanded or combined depending on group size. The following are possible role assignments for a group:

Facilitator: Keeps track of time, reads the activity instructions aloud, and directs the mouser.

Mouser: Operates the computer.

Recorder: Ensures the group correctly records data from the simulations as the lessons instruct.

Checker (optional): Checks accuracy of the mouser and facilitator and helps keep the group within the lesson's time frame.

Researcher (optional): Collects other groups' findings and shares them with his or her group.

There are two ways to share these jobs. Either you can rotate jobs every 15 minutes or so, or you can keep the jobs for the whole work period, then rotate jobs the next time. The goal is for everyone to try each job.

3. Collaborative groups will foster discussion and even debate about the concepts being investigated, strengthening participation in the exploration and learning process.

JOURNAL WRITING

No matter how you decide to implement SimPark in your classroom, you will find that there are many opportunities to integrate journal writing into the lessons. For example, as students work through the activities, you might have them record their process of discovery—what they were trying to find out and why, what steps they took, what controls and variables they used, and so on. They can also print pictures of some of the data they generate to insert in their journals (and portfolios). You might also have students record their answers to the Jumping In questions in their journals, and then compare and contrast their answers with the new knowledge they gain after completing the activities.

GETTING STARTED

BEFORE YOU BEGIN

To use SimPark, you and your students will need the following basic computer skills:

- Starting an application
- Using a mouse
- Using menus and submenus
- Clicking and dragging
- Saving and loading files to a floppy or hard disk

If you don't know how to do all these things, please see the manual that came with your computer and/or consult the Quick-Start Guide that came with SimPark.

TEACHER AND STUDENT PREPARATION

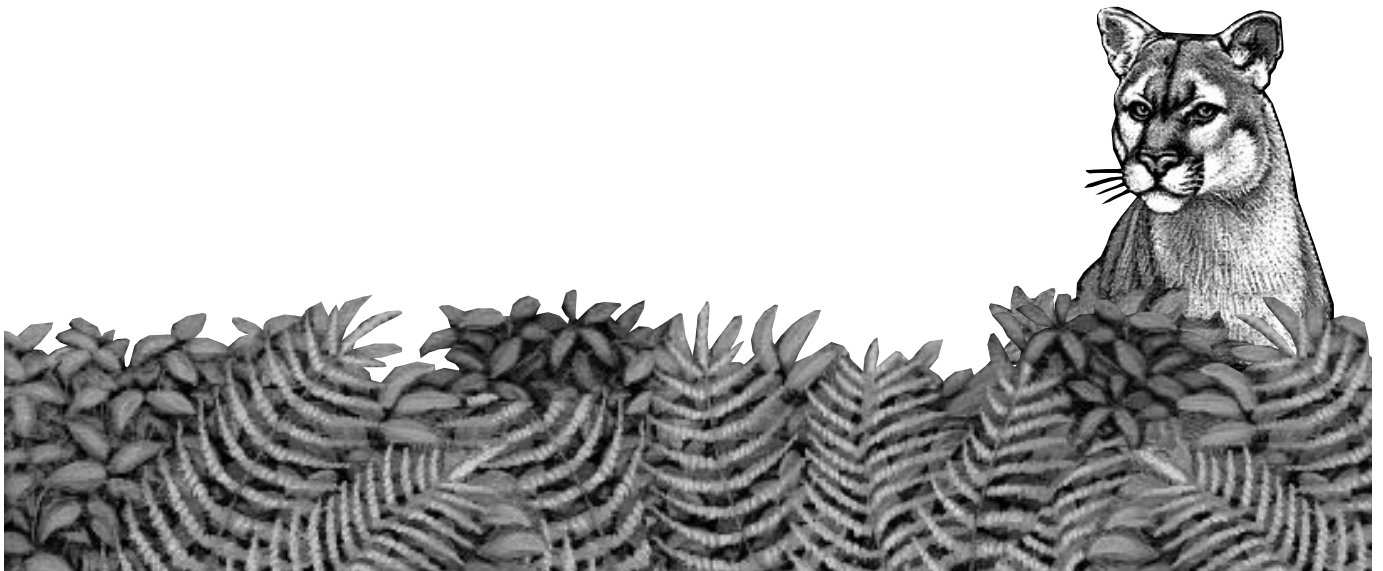
1. Follow the directions on the machine-specific addendum to install SimPark on your computer(s).
2. You and your students won't need to take a crash course in computer literacy in order to use SimPark. As a matter of fact, you'll probably find the SimPark interface very easy to understand and use. However, if you want a bit more experience using SimPark, Activity 1 (Building a Basic Park) in the Creating a Community Unit gives the basics about SimPark so that you and your students will get the most out of the subsequent lessons. You can also work through the Tutorial that comes with the program. You won't need to refer to the Quick-Start Guide or the Tutorial in order to use this guide, except for further clarification if you want it.
3. Copy the student pages of the lesson(s) to distribute to each student or group when you will be covering a particular lesson or unit. Students provide their answers and hypotheses on these sheets.

4. Before your students begin the activities, you might want to put a copy of the SimPark Controls reference sheets—see Part 3 for the blackline masters—on the wall for students to refer to. Or, you could simply make copies of the pages, laminate them, and place them by the computers.
5. Explain to your students that when following the instructions for any of the simulations, all instructions that require them to do something—either on or off the computer—are in bold type, **like this**. Clarification and explanation are in regular type, like this.
6. *Optional:* You might find the Jumping In discussion before each unit's activities more interesting if you have done the activities yourself ahead of time. But you don't need to do them before using SimPark in the classroom; the lessons fully explain the steps.
10. *Optional:* You might enjoy browsing through the Quick-Start Guide and Activity Guide that came in the SimPark box. The Activity Guide contains 12 activities that are intended to get students away from the computer and into the outdoors. The more you know about SimPark, the more you can expand on the lessons in this Teacher's Guide.



PART 2:

Teacher Materials



UNIT 1: CREATING A COMMUNITY

UNIT SUMMARY

In this unit, your students will learn how to build their own natural park and identify different species. They will also examine some of the interdependencies between organisms. First students will use SimPark to build a simple park. Then students will discover some of the ways in which different organisms can be identified. Next students will create a controlled population, and then eliminate the lowest organism to see what happens to the rest of the food chain. Finally, students will investigate what happens when natural predators are eliminated from the park community.

BACKGROUND

In 1992, the heads of state from 150 countries met at the Earth Summit meeting in Rio de Janeiro. At the meeting they signed a promise that their countries would protect **biodiversity**—the total variety of different plants and animals living on the Earth.

The richness and diversity of life forms has been one of our least recognized natural resources. Biologists estimate that there are several hundred thousand **species**—distinct groups of organisms—living in the United States alone. A large percentage of these species live in our National Parks, and some occur nowhere else.

Biodiversity exists at many levels in a biological system. The easiest level to understand is **species diversity**. Organisms of the same species living together in a particular place make up a **population**. Every population is described by its location, time period, and kind of organism. For example, the deer currently living in California make up one population, while the deer living in California in 1953 were a different population. Different populations living together in an area make up a **community**. For example, a salt-water marsh community might include populations of mosquitoes, red-tailed hawks, pickleweed, and salt grass.

There is a strong interdependence between populations within a community. Every species needs energy for life, and this energy is transferred through a community from organism to organism via food energy. A **food chain** is a series of organisms linked together in the order in which they feed on each other. There are

many different food chains within a single community, and these chains connect together to form a **food web**.

The first link, or layer, of a food chain consists of **producers**—organisms, such as green plants, that produce their own food from sunlight. Organisms that eat the plants are called **primary consumers**. Organisms that eat primary consumers are called **secondary consumers**. **Tertiary consumers** eat primary and/or secondary consumers, and so forth. The organism at the top of the food chain is called the **top consumer**. Any consumer that eats another consumer is called a **predator**.

JUMPING IN

Below are some sample discussion questions to help you get your class talking and thinking about populations, communities, and food chains. Mix, match, tailor, or add questions as you see fit to customize the discussion to your class age and grade.

- What is a species? A population? A community?
- What are some populations you might find in a wooded area, such as a forest, and in a meadow? Do you think the same populations would be found in both areas? Why or why not?
- Why are green plants sometimes called “food factories”?
- Give three examples of producers. Give three examples of both primary and secondary consumers.
- What might happen if the number of producers in a community suddenly decreased?
- Rabbits reproduce very quickly. What do you think might happen to a rabbit population if the rabbits’ natural enemies were removed or destroyed? What affect would this have on the rest of the community?

SIMULATIONS

Simulation 1: Building A Basic Park

Objectives

- To create and build a small park.
- To familiarize students with the SimPark program and some of its controls.

Simulation Summary

Students will start the SimPark program. They will first choose an area in which to locate the park. Then they will set up the park, adding plants and animals to the location.

Preparation

Make copies of this lesson's Student Pages (pp. 20-23) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Simulation 2: Who Goes There?

Objectives

- To show that animals are attracted into a park by other plants and animals.
- To identify the plant and animal species in the park.
- To further familiarize students with the SimPark program and controls.

Simulation Summary

Students will create a simple park using only plant species. Then they will observe any organisms that are attracted into the park, and use the SimPark Identify-Species feature to identify all the species living in the park.

Preparation

Make copies of this lesson's Student Pages (pp. 24-29) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Simulation 3: Climbing the Food Chain

Objectives

- To discover what happens when producers are eliminated from the park community.
- To further familiarize students with the SimPark program and controls.

Simulation Summary

In this simulation, students will create a tree → squirrel → weasel → cougar → black bear food chain in a park, and graph the population growth of the organisms over a two-year period (in SimPark time). Then they will eliminate all the trees from the park to determine what happens to the rest of the food chain over time.

Preparation

Make copies of this lesson's Student Pages (pp. 30-34) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Simulation 4: Preying on Predators

Objectives

- To show what happens when natural predators are eliminated from a park community.

Simulation Summary

Students will create a simple park community consisting of plants, jackrabbits, and hawks. Then they will run two simulations using the same park. In the first, they will observe the normal population growth of the plants and jackrabbits over a three-year period (SimPark time). In the second, they will observe what happens to the population growth of the plants and jackrabbits when the hawks are eliminated from the park. Then they will compare and contrast the population growth of the lower organisms in both simulations.

Preparation

Make copies of this lesson's Student Pages (pp. 35-38) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

RELATED OFF-COMPUTER ACTIVITIES

1. Have students perform an inventory of the species they can collect or observe in an area of one square meter. Divide the class into teams of students, and assign each team to a different setting, such as an urban park, a nature reserve, the school grounds, a backyard, a pond or stream, and a city sidewalk. Remind students that they should look for both the obvious larger species, such as birds or squirrels, as well as the less obvious smaller species, such as ants, worms, and flies. If possible, supply students with local field guides to help them identify the species. Have the students prepare a display of their findings and compare results.
2. Have students play a "plant detective" game. Divide the class into small groups of three or four. Then take the class to an outdoor area. Have each student in the group find his or her own plant. Ask the students to write down descriptions of their plants that someone else could use to identify the plant. Remind students to make the descriptions as complete as possible. Once everyone in a group has found a plant and written a description, have students within the group exchange descriptions. Then ask the students to use the descriptions to see if they can correctly identify the plants.
3. The population density of an area is the number of organisms per unit of living space in that area. Have students calculate the population density of an area such as an apartment building, a backyard, or a school. They might survey a population of organisms such as cats, dogs, horses, men, women, or children under 10. Then have the students compare their results.
4. Have students create a food web for a local ecosystem. Ask students to write the names of the organisms living in that area on index cards, using one card per organism. Have the students arrange the cards to represent separate food chains. Then have them combine the chains into a food web. Finally have students identify each organism in the web as a producer, a primary consumer, or a higher-level consumer.

UNIT 2:—ECOSYSTEMS AND THE ENVIRONMENT

UNIT SUMMARY

In this unit, your students will investigate the effect of climate on the survival of plants and animals. First, students will compare and contrast the growth of plants in two different climates. Next, students will determine the climate of the region in which they live, and investigate what types of plants grow in that climate. Lastly, students will investigate the effects of drought on organisms in a park.

BACKGROUND

Communities depend on their environments. Nonliving things in the environment, such as water, air, soil, light, and weather, are necessary for a community's survival. An **ecosystem** is the combination of a community and its nonliving environment.

The general weather pattern, or **climate**, of an area determines the types of plants and animals that can live there. The amount of water in an area and the average temperature of the area are two of the most important factors affecting climate. In general, climates become colder as you move farther from the equator, and warmer as you move down in altitude from a mountain peak to sea level. The amount of water in an area is determined both by the amount of **precipitation**, and by the temperature. Higher temperatures increase evaporation and decrease the amount of available water. Lower temperatures have the opposite effect. Although the climates of the world vary considerably, they can be grouped into general **climatic zones**, each of which in turn can be divided into smaller zones.

Plants and animals have **adaptations**—different body structures, physiology, or behaviors—that help them survive in a particular climate. For example, plants that live in desert areas tend to be able to retain water in their stems and leaves. Animals that live in cold areas tend to have heavier coats and more fat to help keep them warm. **Generalists** are species that have adaptations that allow them to live in many different regions. **Specialists** are species whose adaptations allow them to live in only one area.

JUMPING IN

Below are some sample discussion questions to help you get your class talking and thinking about ecosystems and the environment. Mix, match, tailor, or add questions as you see fit to customize the discussion to your class age and grade.

- What is an ecosystem? How is an ecosystem different from a community?
- What is climate? What are some factors that affect the climate of an area?
- What adaptations might plants and animals that live in hot, dry areas have? How do these adaptations help the organisms survive?
- Do you think that plants that live in hot, dry areas would grow as well in hot, wet areas? Why or why not?
- What adaptations might plants and animals that live in cold areas have? How do these adaptations help the organisms survive?
- Do you think that plants that live in hot, dry areas would grow as well in cold, dry areas? Why or why not?
- What is the difference between a generalist and a specialist? If both types of species are living in an area, which do you think might better survive a drastic climate change? Why?

SIMULATIONS

Simulation 1: Comparing Climates

Objectives

- To show that plants planted in regions suitable to those particular plants survive better than plants which are not suited to the region.
- To further familiarize students with the SimPark program and controls.

Simulation Summary

Half the class will run one simulation: Tropical Climate (Simulation 1a), and half will run another simulation: Arid Climate (Simulation 1b).

The Tropical climate groups will build a park in a tropical region and then grow plants that are adapted to different climates, including tropical and arid climates. The Arid climate group will do the same, but in an arid region. The groups will independently predict which plants they think will do well in their region, and then monitor the plant population growth for a two-year period (SimPark time). Then the groups will compare their results.

Preparation

Make copies of this lesson's Student Pages (pp. 39-48) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Divide the class into two main groups: Tropical and Arid. Supply the students in each group with the appropriate Student Pages.

Simulation 2: Home Sweet Home

Objectives

- To discover some plants that are adapted to the climate in which the students live.

Simulation Summary

In this simulation, students first determine the climate in which they live. Then they set up a park in that region using plants of their own choosing, and predict how well the plants will grow in their area. Next, students will monitor the population growth of the plants over a two-year period (SimPark time) to check their predictions.

Preparation

Make copies of this lesson's Student Pages (pp. 49-52) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Simulation 3: All Dried Up

Objectives

- To show what happens to the organisms living in a particular climate when a drought occurs.

Simulation Summary

Students will create a park community consisting of several different plant species. Then they will observe the normal population growth of the plants over a three-year period (SimPark time). Next, they will move their parks to a new area to simulate drought conditions and observe what happens to the plant populations.

Preparation

Make copies of this lesson's Student Pages (pp. 53-57) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

RELATED OFF-COMPUTER ACTIVITIES

1. A *climograph* is a graph that compares temperature and rainfall values for an area over a certain period of time (usually twelve months). Have students create a climograph for their area over a twelve-day period. The students should create two graphs, one below the other, using temperature and rainfall data from a local newspaper or weather service. The top graph should show the average daily temperature (in °F) along the vertical axis. The average daily temperature is found by averaging the high and low temperature for that day. The bottom graph should show the precipitation (in inches) along the vertical axis. After students have completed the activity, have them discuss how climographs might be helpful in defining the climate of the area.
2. Have students investigate the effects of water and temperature on plant growth. Divide the class into small groups. Ask the students to devise experiments to compare how well plants grow under the following conditions:
 - Low water and high temperature
 - Low water and low temperature

- High water and high temperature
- High water and low temperature

Have students write up the plant (or plants) they will test, the methods they will use in their experiments, and the controls and variables in each case. Then have them perform the experiments. Ask students to keep numerical data on the plant growth. Then have students compare their results.

3. Terrariums provide first-hand observations of land plants, animals, and their relationships within a controlled environment. Have students create a terrarium in a large glass aquarium for a particular ecosystem. Possibilities include a woodland ecosystem, a swamp ecosystem, or a desert ecosystem. Have students research the types of plants and animals that live in the ecosystem and the necessary soil, light, and water requirements. (Note: Students should consider small plants and animals (such as insects and reptiles) that can easily be kept in the container.)

After the terrarium is established, you might ask students to test the influence of changes in light or temperature on the environment. For example, they might set it under a light all night for several weeks to see what happens.

UNIT 3:—PARK MANAGEMENT

UNIT SUMMARY

In this unit, students will learn some of the managerial aspects of being a park ranger. First they will try to increase the profitability of the park by inducing humans to visit the park. In the process, they will also see the impact that humans can have on a natural area. Second, they will try to meet the needs of all the organisms in a biodiverse park.

BACKGROUND

Ecosystems exist in a delicate balance. When an ecosystem is modified or destroyed, the species inhabiting that area may become endangered or extinct, disappearing forever from our world. Although ecosystems change naturally over time, this natural process has been greatly speeded up by human activities. Because the quality of the environment and the continued existence of healthy life forms are interdependent, processes such as the development of land, pollution, and over consumption of natural resources can cause a great deal of harm to the environment. The process of protecting wildlife and natural areas from destruction is called **wildlife conservation**.

One strategy for protecting the environment involves setting aside and protecting natural areas. In the United States, approximately one-third of our total land is owned by the federal government and administered by agencies that are responsible for managing and/or using the resources contained on these lands. One of these agencies is the National Park Service, which attempts to more or less preserve entire ecosystems. However the Park Service, like other federal agencies, is a business, and therefore has to balance the desire for conservation and maintaining diversity with the demands for recreational development and other conflicting activities.

JUMPING IN

Below are some sample discussion questions to help you get your class talking and thinking about park management and our responsibilities to other living organisms. Mix, match, tailor, or add questions as you see fit to customize the discussion to your class age and grade.

- What are some reasons why you might want to visit a natural park or wilderness area?
- How do you think humans might affect the plants and animals living in a park area?
- What are some ways in which humans may have contributed to the extinction or near-extinction of wildlife species?
- What are some activities that people do that could harm the environment?
- What is conservation? Why is it important?
- What responsibilities do we have to other species?
- Are efforts to protect endangered plant and insect species as important as those to protect large-animal species such as elephants and pandas? Why or why not?
- What types of problems do you think a park ranger might have to deal with when running a park?

SIMULATIONS

Simulation 1: Going Public

Objectives

- To learn some of the effects of bringing humans into a park.

Simulation Summary

Students will set up a self-sustaining park. Then they will introduce PEOPLE STUFF into the park and investigate the effects of humans on the park ecosystem.

Preparation

Make copies of this lesson's Student Pages (pp. 58-62) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

Simulation 2: A Team Effort

Objectives

- To illustrate some of the tasks that a park ranger must perform.
- To create and maintain a biodiverse park.

Simulation Summary

Students will try to create a biodiverse park within a particular region. They will work with the park guide (a frog named Rizzo) to maintain a balanced community. They also will try to minimize the impact of humans on the park.

Preparation

Make copies of this lesson's Student Pages (pp. 63-68) to distribute to your students. You also may want to post or pass out copies of the SimPark Controls Reference Sheet from Part 3.

RELATED OFF-COMPUTER ACTIVITIES

1. Invite a park ranger or forest ranger to your classroom. Ask the ranger to discuss the various aspects of his or her job. You might also take a trip to a local national park or forest to observe some of the tasks and services that rangers perform.
2. Most forest fires are caused by careless smokers and people burning trash. The danger of fire in a natural area on any given day is determined by a number of factors, such as wind velocity, humidity, the flammability of plants in the area, and the amount of dry fuels in the area. Have

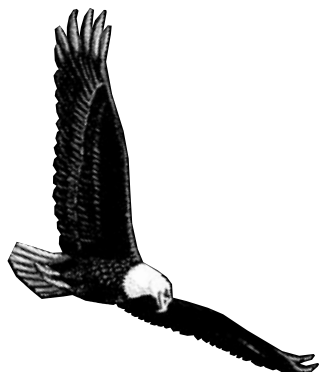
students estimate the fire danger in their area. First have students examine their surroundings each day and rate the danger from 1 to 5 for the following variables:

Wind Velocity:	1 for low wind to 5 for high wind
Relative Humidity:	1 for high humidity (moist air) to 5 for low humidity (dry air)
Ground Dampness:	1 for very wet ground to 5 for very dry ground
Plant Conditions:	1 for green, moist plants to 5 for dry, browning plants
Days Since Last Heavy Rain:	1 for 1 day, 2 for 2 days, 3 for 4 days, 4 for 6 days, 5 for more than 7 days

Next have students add the ratings for each category and divide by 5 to obtain the average fire danger for that day. A fire danger index of 1 is low danger, 2-3 is medium, and 4-5 is high. Ask students to record the daily rating over a period of two weeks and discuss any changes that they find.

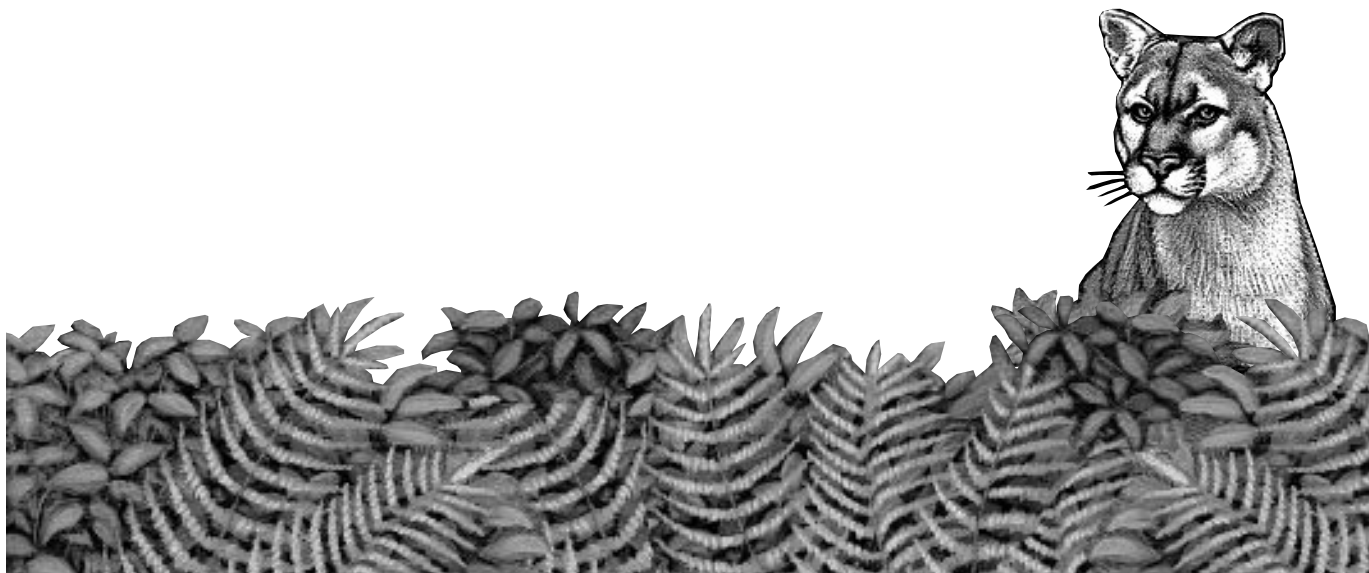
3. To help students understand the effect that their households have on the environment, have students make a table that lists the consumables (items the household takes in from the environment, such as water), waste products (items the household returns to the environment, such as garbage), and energy consumers (items that use energy). Then have the students use their lists to discuss ways in which they can reduce the waste of natural resources.

NOTES



PART 3:

Student Materials and Resources



CREATING A COMMUNITY

SIMULATION 1: BUILDING A BASIC PARK

BEGIN THE GAME

1. Start SimPark.

You can make the title screens go away faster by clicking on them.

2. Click on START A NEW PARK.

3. Type in your name.

4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. The Climate Selection screen lets you choose the climate of your park location. Each color on the map corresponds to a different climate region.



Click anywhere in the Semi-Arid region (the yellow band in the middle on the map). Then click on the NEXT arrow.

2. The Park Terrain Selection screen lets you pick the terrain for your park. The brown areas on the map are land, the green areas are marsh, and the blue areas are water. The NEW MAP option lets you choose a different terrain. One reason you might want to choose a new map is if you want different amounts of land or water in your park.



For now, click on NEW MAP until you find a map that has both land and water.

3. Click on **START GAME** !

PREPARE YOUR SCREEN

1. Go to the top of the screen and open the Options menu from the Menu bar. Then select **Rizzo Off** from the Options menu.

Rizzo is a frog who acts as your guide in the park. He gives you hints about the best way to manage your park. He also interviews plants and animals so you can find out how the organisms in your park are doing. Whenever you don't want Rizzo's help, you can either turn him off, or ignore him when he tries to get your attention. You won't need Rizzo's help in this simulation, so it's best just to turn him off at the beginning.

2. Open the **Disasters** menu and select **No Disasters**.

It's much easier to set up a park when you don't have to worry about things such as fires destroying your efforts.

3. Click on the **PARK MAP** button  on the right.

The Park Map lets you see your whole park, instead of just a part of it. The pink rectangle shows what part of the park you are seeing in the regular park screen.



4. Click and drag the pink rectangle until there's both land and water within the rectangle. Then click outside the Park Map to close it.

Note: You can also use the Compass  in the top right corner to move around your park. Just click and hold on one of the Direction Arrows to move in that direction. Let go when you want to stop moving.

SET UP YOUR PARK

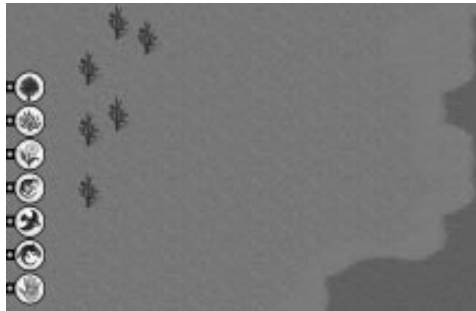
1. Your park is pretty barren right now, so let's start by adding some plants.

Click on the TREES button  on the left.

After you click the button, you'll see picture cards of different trees along the bottom of the screen. As you move the cursor over a card the name of that tree and its price appear. You can see more trees by clicking on the DOWN ARROW arrow on the left. You can hide the cards by clicking on the TREES button a second time.



2. Move the cursor over the cards until you locate the Bitternut Hickory card. Click on the card. Then click on the ground to plant the tree. Click 5 more times in different areas on the ground to plant 5 more Bitternut Hickory trees as shown.



You should be a little bit careful when you place plants, because it costs you money every time you add a new plant. Notice that the Budget Indicator in the top left of the screen now reads \$14,700, instead of \$15,000. You can use this indicator to keep track of how much you're spending on your park.

You also can't move plants once you've planted them—the only way to get rid of them is to bulldoze them, using the Bulldoze tool. Then you have to re-buy whatever you bulldozed.

3. Click on the SHRUBS button  on the left. Then click on the Dogwood card. Plant 5 or 6 Dogwoods.

Note: If you run out of open space in the area where you're planting, just use the Compass Arrows or the PARK MAP to move to an open area of the park.

4. Click on the GRASSES AND FLOWERS button  on the left. Then click on the Daffodils card and plant 5 or 6 Daffodils.

You may have noticed by now that your park is changing with the seasons—the trees may be growing; leaves may be appearing, turning red, and then dying; flowers may be blooming. The Date Indicator near the top left tells you how many years have passed in your park since you first started the game. The Date Indicator also lets you know the current month and season in the park.

5. Animals may start entering your park as soon as you've added plants. But let's add some anyway.

Click on the MAMMALS button on the left. If you need to, click on the DOWN ARROW arrow until you locate the Deer card. Click on the Deer card, then click in the park to add a deer or two to your park.

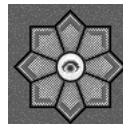


6. Click on the **BIRDS** button. Add a couple of **Blue Jays**.

TAKE A LOOK AROUND

1. You've done it! Your park is populated and going strong. Now you can move around the park to view the plants and animals.

Click and hold on the Compass Arrows to move in different directions.



2. To see your park without all the various buttons and tools blocking parts of the screen, click on the **EYE** button at the center of the Compass. This will hide the buttons and tools. Click again on the **EYE** button to show the buttons and tools.
3. When you've finished looking around, you can save your park on a personal or group disk for later use. Open the **File** menu from the menu bar and select the **Save**. When asked to name the game, type in **PARK1** then click on **Save**.

CREATING A COMMUNITY

SIMULATION 2: WHO GOES THERE?

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION



1. Click anywhere in the Subtropical region (the bright green area to the right on the map). Then click on the NEXT arrow.
2. Click on NEW MAP until you find a map that has roughly equal amounts of land and water.
3. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Rizzo Off.

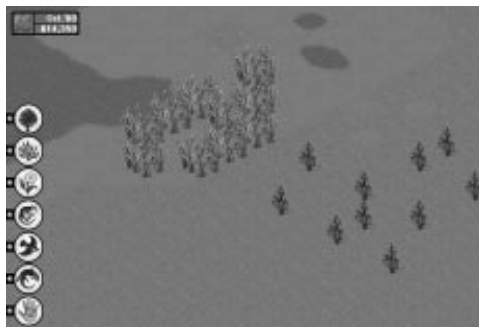
Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. Open the Disasters menu and select No Disasters.
3. Click on the PARK MAP button  on the right.
4. Click and drag the pink rectangle until there's both land and water within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.
2. Click on the Magnolia card and plant 10 magnolias by clicking on areas on the ground.

3. Click on the GRASSES AND FLOWERS button  on the left.
4. Click on the Cattail card. Cattails only grow in marsh areas, so make sure you're in an area of your park that has marsh. Plant 10 cattails by clicking on areas in the marsh.



5. Click on the Fireweed card. Plant 10 fireweeds by clicking on areas in the ground.

OBSERVE THE ANIMALS

1. Planting any type of plant will attract animals to your park. And those animals will attract other animals to your park. Let's see what animals you've attracted.

Click on the PARK MAP button .

2. On the park map you'll notice little green and pink dots inside the pink rectangle. These are the plants you've planted.



You may also notice some moving purple dots. These are animals.

Drag the pink rectangle until it's over one of the purple dots. Then click outside the Park Map to close it.

What type of animal do you see? _____

3. Click on the PARK MAP button  again. Drag the pink rectangle over any other moving colored dots on the map.

How many different types of animals can you find? _____

Don't be surprised if the number of dots change while you're moving around—animals may enter and leave your park over time. If you're having trouble keeping up with the animals, just open the Options menu and select Pause Simulation to pause the simulation. Then when you're ready to start the simulation again, select Pause Simulation once more.

IDENTIFY THE SPECIES IN YOUR PARK

1. Although you can see the different plants and animals in your park by moving around your park, it's sometimes hard to tell how many different species are in your park and exactly what species a particular plant or animal is. Luckily the SimPark Computer has some tools to help you out.

Click on the **COMPUTER** tool  on the right side of the screen.

2. The Park Computer has several different features you can use. The one we're interested in right now is the **Identa-Species** tool. To use this tool, click on the **IDENTA-SPECIES** button  at the top left of the Park Computer screen.

The Identa-Species tool helps you identify the different types of plants and animals that are currently living in your park. The buttons on the bottom show the different groups of plants and animals—trees, shrubs, grasses and flowers, mammals, birds, and reptiles. If a button is lit, there are organisms belonging to that group within your park.

The TREES button, GRASSES AND FLOWERS button, the MAMMALS button, and the BIRDS button should all be lit, as shown. Let's start with trees. (If a tree is not already shown on the screen then click on the TREES button to select that choice.)



3. In the top left of the Identa-Species screen is a picture of a plant (or animal) that you need to identify. To do this, you need to choose the correct species name from the Possible Species list in the top right of the screen.

If you think you know the species name, you can just click on that name in the Possible Species list. But if you need help identifying a species, you can answer a series of questions that will appear in the question area in the middle of the screen. Each question has two possible answers. You can see the possible answers by moving the mouse cursor over the pictures on either side of the question. Then you can click on the answer that best fits the plant or animal shown in the picture at the top left. Each time you answer a question, the list of Possible Species gets shorter. Once you've answered all the questions, there will be only one name left on the list. Let's give this method a try.

The first question is “Does it have needles or leaves?” The two possible answers are “Needles” on the left, and “Leaves” on the right. The plant shown in the picture has leaves, so click on the “Leaves” answer.

Don't worry if you make a mistake and choose the wrong answer. You can go back to a question using the species description at the bottom of the screen. Just click on the part of the description that you want to change to get back to that question.

4. **The second question is “Are the leaves simple or compound?” The plant shown has simple leaves—there is only one leaf on the leaf stem—so click on the “Simple” answer on the right.**

- Continue answering the questions until there is only one species name left on the Possible Species list. **CLICK ON THAT NAME.** You will get a message telling you whether your answer is correct or incorrect.
- If you get the “Incorrect” message, click on the TRY AGAIN button , and repeat steps 4 to 6.



If you get the “Correct” message, click on the NEXT SPECIES button .



Note: After you’ve identified all the species in a particular group, you’ll get a message telling you that there are no more members of that group to identify. You can either click on one of the other group buttons to identify other groups of plants or animals, or you can click outside the Park Computer screen to close the computer.

- Click on the GRASSES AND FLOWERS button . Use the Identia-Species to identify all the mammals in your park.

List the grasses and flowers you identified.

- Click on the MAMMALS button . Use the Identia-Species to identify all the mammals in your park.

List the mammals you identified:

9. Click on the BIRDS button . Use the Identify-Species to identify all the birds in your park.

List the birds you identified:

10. You can check to see if you've identified all the species in your park, using the Species Checklist tool.

Click on the SPECIES CHECKLIST button  at the top of the Park Computer Screen.

The Species Checklist shows you all the species currently living in your park. If there's a check mark next to a species, then you've correctly identified that organism.

11. Return to the park by clicking outside the Park Computer screen.

That's it—your job as a park ranger is finished for the day. You'll find your identification skills will come in handy later on.

You do not need to save this park.

THINK IT OVER

1. Planting the magnolias attracted pigeons into your park. What are some possible reasons that pigeons entered your park after the magnolias were planted?

2. The pigeons attracted falcons into your park. What are some possible reasons that falcons entered your park after the pigeons arrived?

3. Hypothesize as to why certain animals are attracted into your park by other types of plants and animals.

4. Suppose you saw a tree by the side of a road. What types of characteristics might you look at to help you identify the tree?

5. What types of characteristics might help you identify a flower?

6. What types of characteristics might help you identify a mammal?

7. What types of characteristics might help you identify a bird?

CREATING A COMMUNITY

SIMULATION 3: CLIMBING THE FOOD CHAIN

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Click anywhere in the Continental Cool region (the red area on the map). Then click on the NEXT arrow.
2. Click on NEW MAP until you find a map that has both land and water.
3. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Pause Simulation.

Sometimes it's useful to set up your park when the clock's not ticking away. Whenever you want more time, just pause the simulation by selecting Pause Simulation from the Options menu, even if the instructions don't tell you to.

2. Open the Options menu again and select Rizzo Off.
3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's only land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left. Then click on the American Elm card at the bottom of the screen. Plant 30 elm trees by clicking on areas on the ground. You should space out the trees a bit so they have room to grow.
2. Click on the MAMMALS button  on the left.

Click on the Black Bear card. Place 1 bear in your park.

Click on the Cougar card. Place 1 cougar in your park.

If you need to, click on the DOWN ARROW arrow until you locate the Tree Squirrel card. Click on the Tree Squirrel card and place 15 squirrels in the park.

Click on the Weasel card and place 2 weasels in your park.

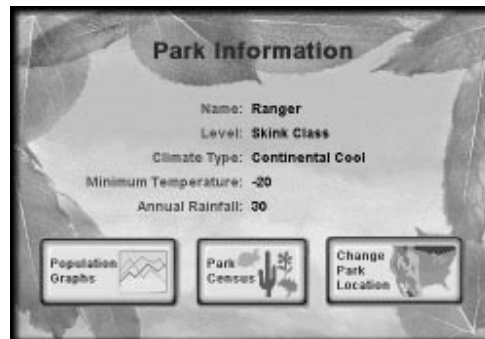
3. Select **Pause Simulation** from the **Options** menu to restart the simulation.

GRAPH THE POPULATION GROWTH

1. In this simulation you're going to track your animal populations for several years using the Park Computer. Then you're going to eliminate one of the species in your park to see if removing that species has an effect on the other species.

Click on the **COMPUTER** tool  on the right side of the screen.

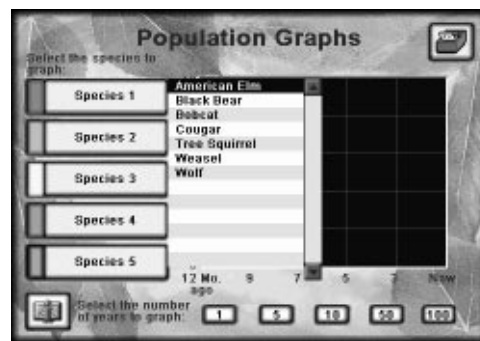
2. Click on the **PARK INFO** button  at the top of the Park Computer screen. (It's the second button from the right.)



3. Click on the **POPULATION GRAPHS** button .

4. The Population Graphs feature lets you graph the population of different species in the park over time. To use the graph, you need to select the species whose populations you want to graph.

Click on the **SPECIES 1** button, and then click on **American Elm** in the list of species that appears.



Click on the **SPECIES 2** button and select **Tree Squirrel** from the species list.

Click on the **SPECIES 3** button and select **Weasel** from the species list.

Click on the **SPECIES 4** button and select **Cougar** from the species list.

Click on the **SPECIES 5** button and select **Black Bear** from the species list.

5. Now that the graph is set up, you can return to the main park screen by clicking outside the Park Computer screen.

6. Watch the Date Indicator . When the date reads "JAN '02," open the Options menu and select **Pause Simulation**.

While you're waiting for time to pass, you can look around your park and watch the animals. Or you can use the Field Guide to read up about the animals inhabiting the park. To use the Field Guide, click on the COMPUTER tool. Then click on the FIELD GUIDE button  at the top of the Park Computer screen (it's the third button from the left). Choose an animal (or plant) category by clicking on the appropriate button at the bottom of the screen. Then click on an animal (or plant) name from the species list that appears. If you do this, don't forget to return to your park occasionally to make sure you don't miss the January '02 date.

ELIMINATE A SPECIES

1. Now it's time to do an evil deed—you're going to get rid of all the elm trees in the park!

Click on the BULLDOZE tool  on the right side of the screen. Then remove all the trees by clicking (or clicking and dragging) on them.

Don't worry if you accidentally click on an animal—the Bulldoze tool only removes plants and various non-living items from your park. Also, if you find that the animals are getting in your way, click on the HIDE MAMMALS button (the little green button next to the MAMMALS button) to hide the animals. To make the animals visible, just click again on the button.

Make sure you remove all the elm trees in the park. You might want to use the Park Map to locate any stray elms—they'll appear as green dots on the map.

2. Select Pause Simulation from the Options Menu to restart the simulation.
3. Use the Park Map or the Compass to move around your park and observe what happens to the animal populations after you remove the trees.
4. Watch the Date Indicator . When the date reads "JAN '03," open the Options menu and select Pause Simulation.

ANALYZE THE POPULATION-GROWTH GRAPHS

1. Click on the COMPUTER tool  on the right side of the screen.

If you looked at the field guide earlier, click on the PARK INFO button and then on the POPULATION GRAPHS button to return to the Populations Graphs screen. Otherwise, you should be back at the Population Graphs screen already.

As you can see, the Park Computer has been keeping track of your populations while you were wandering around the park. The graphs on the screen show the populations over the previous 12 months in your park's history. You can change the amount of time the graph shows by selecting on the NUMBER OF YEARS buttons at the bottom of the screen.

2. Select the 5 Year button  at the bottom of the screen. Use the graph to answer the following questions:

Look at the population lines for the first two years of the simulation.

- a. Which animal species had the greatest increase in population over the first two years?

- b. Which animal species had the least increase in population over the first two years?

3. Select the 1 Year button  at the bottom of the screen. Use the graph to answer the following questions:

Look at the population lines for the last year of the simulation.

a. Did the animal populations increase, stay the same, or decrease once the trees were removed?

b. If any of the animal populations completely died off, list the order in which the species died from most recent to least recent.

You do not need to save this park.

THINK IT OVER

1. What happened to the animal populations once the trees were removed? Why do you think this might have happened?

2. Look at your response to Question 2a in the previous section. Do you think that that animal is a primary consumer (it eats only plants), a secondary consumer (it eats plants and primary consumers), or a higher-level consumer (it eats plants and lower level consumers)? Explain your choice.

3. Look at your response to Question 2b in the previous section. Do you think that that animal is a primary consumer (it eats only plants), a secondary consumer (it eats plants and primary consumers), or a higher-level consumer (it eats plants and lower level consumers)? Explain your choice.

4. A food chain is a series of organisms linked together in the order in which they feed on each other. What do you think the food chain is for the species you placed in your park?

5. How might your answer to Question 4 explain the results you recorded for Question 3b of the previous section?

6. What do you think might happen to the tree and animal populations if the bears were removed from the park instead of the trees?

CREATING A COMMUNITY

SIMULATION 4: PREYING ON PREDATORS

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Click anywhere in the Semi-Arid region (the yellow area on the map). Then click on the NEXT arrow.
2. Click on NEW MAP until you find a map that has both land and water.
3. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Pause Simulation.
2. Open the Options menu again and select Rizzo Off.
3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's only land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the GRASSES AND FLOWERS button  on the left.
2. Click on the Geranium card at the bottom of the screen. Plant 30 geraniums by clicking on areas on the ground. You should space out the plants a bit so they have room to grow.
3. Click on the MAMMALS button  on the left.
4. Click on the Jackrabbit card. Place 10 jackrabbits in your park.
5. Click on the BIRDS button  on the left.
6. Click on the Hawk card. Place 1 hawk in your park.

SAVE THIS PARK!

1. You are going to be using the same park to run two different simulations, so it's important to save the park before you run the first simulation.

Open the Park menu from the menu bar and select Save. When asked to name the game, type in PREDATOR. Then click on Save.

RUN SIMULATION 1

1. Select Pause Simulation from the Options menu to start the simulation.
2. In this simulation you are simply going to graph the population growth of the geraniums and jackrabbits over three years.

Click on the COMPUTER tool  on the right side of the screen.

3. Click on the PARK INFO button  (the second button from the right).
4. Click on the POPULATION GRAPHS button .

5. Click on the SPECIES 1 button, and then click on Geranium in the list of species that appears.

Click on the SPECIES 2 button and select Jackrabbit from the species list.

6. Click outside the Park Computer Screen to return to your park.
7. Now it's time to sit back for a bit and wait for nature to take its course.

Watch the Date Indicator . When the date reads "JAN '03," open the Options menu and select Pause Simulation.

8. Click on the COMPUTER tool. You should be back at the Population Graph screen. If not, click on the PARK INFO button, and then click on the POPULATION GRAPHS button.
9. Since your park has been running for over a year, you need to change the time period of the graph to show the previous history of the park.

Select the 5 Year button  at the bottom of the screen.

10. Click on the PRINTER button  near the top of the screen to print your graph. Keep the printed graph in a safe place because you'll need it at the end of the activity.

RUN SIMULATION 2

1. Select Open from the File menu. When asked for the name of the game to open, type in PREDATOR. Then click on Open.
2. In this simulation you are going to remove any hawk that enters the park over a period of three years. Then you will graph the population growth of the geraniums and jackrabbits over that time.

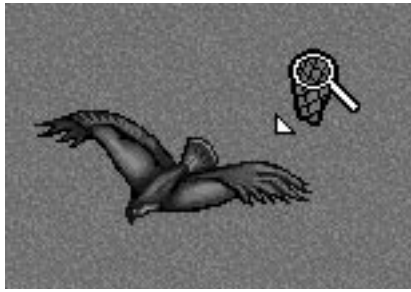
Click on the NET tool  on the right side of the screen.

The Net tool is like the Bulldoze tool, but it removes only animals.

3. Move around the park looking for hawks. You may find it easiest to locate hawks with the Park Map. Just click on the PARK MAP button. Then click on the HIDE MAMMALS button (the little green circle to the left of the mammals button) to hide all the jackrabbits. Any blue dots that then appear on the map are hawks. Move the rectangle over a hawk. Then click outside the Park Map to return to the park screen.

Hawks may appear in your park at any time, so be sure to keep looking around for new hawks.

4. Click on each hawk with the Net to remove it.



If you're having problems catching up with the hawks, just select Pause Simulation from the Options menu to pause the simulation. Then, after you net the hawk, you can select Pause Simulation again to restart the simulation.

5. Keep an eye on the Date Indicator . When the date reads "JAN '03," open the Options menu and select Pause Simulation to stop the simulation.

6. Now you will graph the geranium and rabbit populations for this simulation.

Click on the COMPUTER tool  on the right side of the screen. Then click on the PARK INFO button  (the second button from the right).

7. Click on the POPULATION GRAPHS button .

8. Click on the SPECIES 1 button, and then click on Geranium in the list of species that appears.

Click on the SPECIES 2 button and select Jackrabbit from the species list.

9. Select the 5 Year button  at the bottom of the screen.

You will see a graph of the geranium and jackrabbit populations.

10. Click on the PRINTER button  near the top of the screen to print your graph.

When your graph has printed, you're ready to answer some questions.

You do not need to save this park.

THINK IT OVER

1. Use the graph from Simulation 1 to find the approximate populations of the geraniums and jackrabbits for each of the following dates:

Simulation 1	January 01	January 02	January 03
Geraniums	_____	_____	_____
Jackrabbits	_____	_____	_____

2. Use the graph from Simulation 2 to find the approximate populations of the geraniums and jackrabbits for each of the following dates:

Simulation 2	January 01	January 02	January 03
Geraniums	_____	_____	_____
Jackrabbits	_____	_____	_____

3. Compare the jackrabbit populations for the two simulations. What happened to the jackrabbit population when there were no hawks present? Why do you think this happened?

4. Compare the geranium populations for the two simulations. What happened to the geranium population when there were no hawks present? Why do you think this happened?

5. Hypothesize what might happen to the animals and plants living in an area if there were no predators living in that area.

ECOSYSTEMS AND THE ENVIRONMENT

SIMULATION 1A: COMPARING CLIMATES

TROPICAL CLIMATE GROUP

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Click anywhere in the Tropical region (the peach area near the bottom of the map).



2. In the spaces provided, record the average rainfall as well as the minimum and maximum temperatures for this climate. (These are indicated to the right of the map).

Average Rainfall: _____ inches/year.

Average Minimum Temperature: _____ °F

Average Maximum Temperature: _____ °F

3. Click on the NEXT arrow.
4. Click on NEW MAP until you find a map that has roughly equal amounts of land and water.
5. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Pause Simulation.

Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. Open the Options menu again and select Rizzo Off.

3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.

Click on the Black Walnut card. Plant 10 black walnuts by clicking on areas on the ground.

Click on the Cottonwood card. Plant 10 cottonwoods.

Click on the Joshua Tree. Plant 10 joshua trees.

Note: You'll have to move around a bit to have room to plant all the plants. You can do this by clicking on one of the Compass Arrows and holding down the mouse button. When you're done moving, just let go of the mouse button.

2. Click on the SHRUBS button  on the left.

If you need to, click once on the DOWN ARROW arrow to find the Saguaro card. Then click on the card and plant 10 saguaros.

3. Click on the GRASSES AND FLOWERS button  on the left.

Click on the Fern card. Plant 10 ferns.

MAKE YOUR PREDICTIONS

1. In this simulation you're going to chart the population growth of plants living in a tropical climate. Another group of students is going to chart the population growth of the same plants living in another climate.

Before you start the simulation you should predict how the population for each species you just planted is going to change. You can use the Park Computer Field Guide to help you make these predictions.

Click on the COMPUTER tool  on the right side of the screen.

2. Click on the FIELD GUIDE button  (the third button from the left).
3. The Field Guide contains information about all the species you can include in your park. To use the Field Guide, choose a plant or animal category by clicking on the appropriate button at the bottom of the screen. Then click on the plant or animal name from the species list that appears for that group.



Read the Field Guide entries for Black Walnut trees, Cottonwood trees, Joshua trees, Saguaros, and Ferns. Then use the information to predict whether that plant population will grow, stay about the same, or decline in a tropical area. If you aren't sure, make a guess. Circle your prediction for each species:

Black Walnut Population:	increase	no change	decrease
Cottonwood Population:	increase	no change	decrease
Joshua Tree Population:	increase	no change	decrease
Saguaro Population:	increase	no change	decrease
Fern Population:	increase	no change	decrease

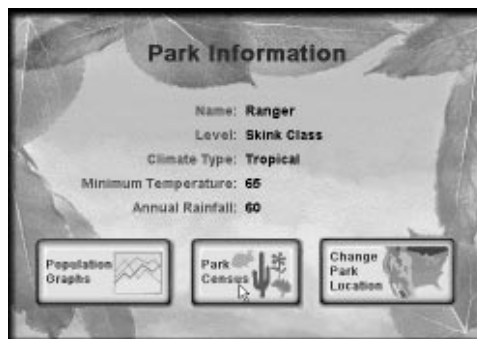
4. Click outside the Park Computer screen to return to your park.

MONITOR YOUR PLANTS

1. Open the Options menu and select Pause Simulation to start the simulation.
2. Now it's time to see how well your plants grow in this climate.

Keep an eye on the Date Indicator **Aug '00**. When the date reads "AUG '00," open the Options menu and select Pause Simulation.

3. Click on the COMPUTER tool  on the right side of the screen.
4. Click on the PARK INFO button  (the second button from the right).
5. Click on the PARK CENSUS button .



6. The numbers in parentheses next to each plant (or animal) species in the Park Species list tells you how many of that species are currently living in your park.

Record the current number for each of the plants you planted in the “August ’00” column. If the plant name is not listed, record a 0 for that plant.

	August ’00	August ’01	August ’02
Black Walnut			
Cottonwood			
Joshua Tree			
Saguaro			
Fern			

7. Click outside the Park Computer screen to return to your park.
8. Select Pause Simulation from the Options menu to start the simulation running again.
9. When the Date Indicator reads “AUG ’01,” pause the game. Repeat steps 3-8, but this time record the plant populations in the “August ’01” column of the table.

While you’re waiting for time to pass, you might want to interview your plants to see how they are faring. To do this, you need Rizzo’s help.

Select Rizzo from the Options menu to turn Rizzo on. Then click on the MICROPHONE tool  on the right side of the screen. Click on a plant (or animal) you want to interview. Rizzo will let you know how it’s doing. When you’re done interviewing plants, open the Options menu and select Rizzo Off. (This will prevent Rizzo from talking to you while you run the simulation.)

10. When the Date Indicator reads “AUG ’02,” pause the game. Repeat steps 3-7, then record the plant populations in the “August ’02” column of the table.

Now it’s time to compare how well the plants did in your climate to how well they did in another climate.

You do not need to save this park.

THINK IT OVER

1. Which of the plant species had increases in population? Did this match your predictions?

2. Which of the plant species had decreases in population? Did this match your predictions?

3. Which of the plant species that you planted do you think are best adapted to a tropical climate? Why?

4. Which of the plant species that you planted do you think are least adapted to a tropical climate? Why?

Answer the following questions either as a class, or with students from the Arid Climate group.

5. Suppose you had a plant that survived well in hot, wet areas. In which climate do you think it would do better, a tropical climate or an arid climate?

6. Suppose you had a plant that survived well in hot, dry areas. In which climate do you think it would do better, a tropical climate or an arid climate?

7. Specialists are species that are basically adapted to live in only one area. Based on your results, are any of the plants you planted specialists? If so, which species, and what type of climate is each adapted to?

8. Generalists are species that are able to live in a number of different areas. Based on your results, are any of the plants you planted generalists? If so, which species?

9. Suppose there was a sudden change in climate in a region. Which type of species do you think would be most likely to survive—a specialist or a generalist. Why?

ECOSYSTEMS AND THE ENVIRONMENT

SIMULATION 1B: COMPARING CLIMATES

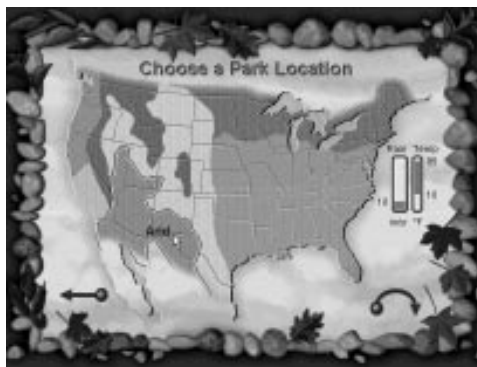
ARID CLIMATE GROUP

BEGIN THE GAME

1. **Start SimPark.**
2. **Click on START A NEW PARK.**
3. **Type in your name.**
4. **Click on the EASY game option. Then click on the NEXT arrow** .

CHOOSE YOUR LOCATION

1. **Click anywhere in the Arid region (the orange area on the map).**



2. **In the spaces provided, record average rainfall as well as the minimum and maximum temperatures for this climate. (These are indicated to the right of the map).**

Average Rainfall: _____ inches/year.

Average Minimum Temperature: _____ °F

Average Maximum Temperature: _____ °F

3. **Click on the NEXT arrow.**
4. **Click on NEW MAP until you find a map that has roughly three-quarters land and one-quarter water.**
5. **Click on START GAME** .

PREPARE YOUR SCREEN

1. **Open the Options menu and select Pause Simulation.**

Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. **Open the Options menu again and select Rizzo Off.**

3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.

Click on the Black Walnut card. Plant 10 black walnuts by clicking on areas on the ground.

Click on the Cottonwood card. Plant 10 cottonwoods.

Click on the Joshua Tree. Plant 10 joshua trees.

Note: You'll have to move around a bit to have room to plant all the plants. You can do this by clicking on one of the Compass Arrows and then holding down the mouse button. When you're done moving, just let go of the mouse button.

2. Click on the SHRUBS button  on the left.

If you need to, click on the DOWN ARROW arrow to find the Saguaro card. Then click on the card and plant 10 saguaros.

3. Click on the GRASSES AND FLOWERS button  on the left.

Click on the Fern card. Plant 10 ferns.

MAKE YOUR PREDICTIONS

1. In this simulation you're going to chart the population growth of plants living in an arid climate. Another group of students is going to chart the population growth of the same plants living in another climate.

Before you start the simulation you should predict how the population for each species you just planted is going to change. You can use the Park Computer Field Guide to help you make these predictions.

Click on the COMPUTER tool  on the right side of the screen.

2. Click on the FIELD GUIDE button  (the third button from the left).
3. The Field Guide contains information about all the species you can include in your park. To use the Field Guide, choose a plant or animal category by clicking on the appropriate button at the bottom of the screen. Then click on the plant or animal name from the species list that appears for that group.



Read the Field Guide entries for Black Walnut trees, Cottonwood trees, Joshua trees, Saguaros, and Ferns. Then use the information to predict whether that plant population will grow, stay about the same, or decline in an arid area. If you aren't sure, make a guess. Circle your prediction for each species:

Black Walnut Population:	increase	no change	decrease
Cottonwood Population:	increase	no change	decrease
Joshua Tree Population:	increase	no change	decrease
Saguaro Population:	increase	no change	decrease
Fern Population:	increase	no change	decrease

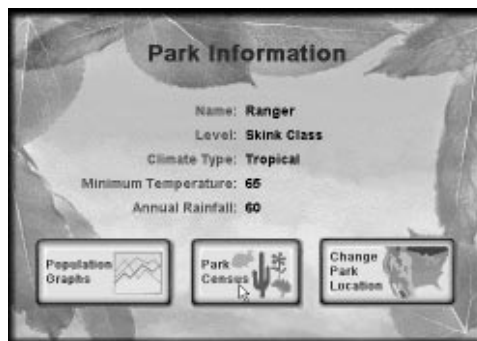
4. Click outside the Park Computer screen to return to your park.

MONITOR YOUR PLANTS

1. Open the Options menu and select Pause Simulation to start the simulation.
2. Now it's time to see how well your plants grow in this climate.

Keep an eye on the Date Indicator **Aug '00**. When the date reads "AUG '00," open the Options menu and select Pause Simulation.

3. Click on the COMPUTER tool  on the right side of the screen.
4. Click on the PARK INFO button  (the second button from the right).
5. Click on the PARK CENSUS button .



6. The numbers in parentheses next to each plant (or animal) species in the Park Species list tells you how many of that species are currently living in your park.

Record the current number for each of the plants you planted in the “August ’00” column. If the plant name is not listed, record a 0 for that plant.

	August ’00	August ’01	August ’02
Black Walnut			
Cottonwood			
Joshua Tree			
Saguaro			
Fern			

7. Click outside the Park Computer screen to return to your park.
8. Select **Pause Simulation** from the **Options** menu to start the simulation running again.
9. When the Date Indicator reads “AUG ’01,” pause the game. Repeat steps 3-8, but this time record the plant populations in the “August ’01” column of the table.

While you’re waiting for time to pass, you might want to interview your plants to see how they are faring. To do this, you need Rizzo’s help.

Select **Rizzo** from the **Options** menu to turn Rizzo on. Then click on the **MICROPHONE** tool  on the right side of the screen. Click on a plant (or animal) you want to interview. Rizzo will “talk” to the plant and let you know how it’s doing. When you’re done interviewing plants, open the **Options** menu and select **Rizzo Off**. (This will prevent Rizzo from talking to you while you run the simulation.)

10. When the Date Indicator reads “AUG ’02,” pause the game. Repeat steps 3-7, then record the plant populations in the “August ’02” column of the table.

Now it’s time to compare how well the plants did in your climate to how well they did in another climate.

You do not need to save this park.

THINK IT OVER

1. Which of the plant species had increases in population? Did this match your predictions?

2. Which of the plant species had decreases in population? Did this match your predictions?

3. Which of the plant species that you planted do you think are best adapted to an arid climate? Why?

4. Which of the plant species that you planted do you think are least adapted to an arid climate? Why?

Answer the following questions either as a class, or with students from the Tropical Climate group.

5. Suppose you had a plant that survived well in hot, wet areas. In which climate do you think it would do better, a tropical climate or an arid climate?

6. Suppose you had a plant that survived well in hot, dry areas. In which climate do you think it would do better, a tropical climate or an arid climate?

7. Specialists are species that are basically adapted to live in only one area. Based on your results, are any of the plants you planted specialists? If so, which species, and what type of climate is each adapted to?

8. Generalists are species that are able to live in a number of different areas. Based on your results, are any of the plants you planted generalists? If so, which species?

9. Suppose there was a sudden change in climate in a region. Which type of species do you think would be most likely to survive—a specialist or a generalist. Why?

ECOSYSTEMS AND THE ENVIRONMENT

SIMULATION 2: HOME SWEET HOME

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Find your home state on the Climate Selection map. If your state contains only one climate zone, then click on that climate. If your state contains more than one climate zone, click on the climate that is closest to the area in which you live.
2. What is the climate in your area?

3. In the spaces provided, record the average rainfall as well as the minimum and maximum temperatures for this climate. (These are indicated to the right of the map).

Average Rainfall: _____ inches/year.

Average Minimum Temperature: _____ °F

Average Maximum Temperature: _____ °F

4. Click on the NEXT arrow.
5. Click on NEW MAP until you find a map that has roughly equal amounts of land and water.
6. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Pause Simulation.

Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. Open the Options menu again and select Rizzo Off.
3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.

Choose three trees from the Trees cards to plant in your park. List the names of the trees here:

Tree 1: _____

Tree 2: _____

Tree 3: _____

2. Plant 10 of each tree you listed in your park.

3. Click on the SHRUBS button  on the left.

Choose three shrubs from the Shrubs cards to plant in your park. List the names of the shrubs here:

Shrub 1: _____

Shrub 2: _____

Shrub 3: _____

4. Plant 10 of each shrub you listed in your park.

5. Click on the GRASSES AND FLOWERS button  on the left.

Choose three grasses or flowers from the Grasses and Flowers cards to plant in your park. List the names of the grasses or flowers here:

Grass/Flower 1: _____

Grass/Flower 2: _____

Grass/Flower 3: _____

6. Plant 10 of each grass or flower you listed in your park.

7. Select Pause Simulation from the Options menu to start the simulation.

MONITOR YOUR PLANTS

1. Now it's time to watch how well your plants grow in your home climate.

Keep an eye on the Date Indicator . When the date reads "AUG '00," open the Options menu and select Pause Simulation.

2. Click on the COMPUTER tool  on the right side of the screen.

3. Click on the PARK INFO button  (the second button from the right).



4. Click on the PARK CENSUS button  .

5. Write the name of each plant you planted in the Plant Name column of the table. Record the current number for each of the plants you planted in the “August ’00” column. If the plant name is not listed, record a 0 for that plant.

Plant Name	August ’00	August ’01	August ’02

6. Click outside the Park Computer screen to return to your park.

7. Select Pause Simulation from the Options menu to start the simulation running again.

8. When the Date Indicator reads “AUG ’01,” pause the game. Repeat steps 2-7, but this time record the plant populations in the “August ’01” column of the table.

While you’re waiting for time to pass, you can look around your park to see what animals have appeared. Or you can use the Field Guide to read up about the plants you planted. To use the Field Guide, click on the COMPUTER tool. Then click on the FIELD GUIDE button  at the top of the Park Computer screen (it’s the third button from the left). Choose a plant (or animal) category by clicking on the appropriate button at the bottom of the screen. Then click on a plant (or animal) name from the species list that appears. If you do this, don’t forget to return to your park occasionally to make sure you don’t miss the August date.

9. When the Date Indicator reads “AUG ’02,” pause the game. Repeat steps 2-6, and record the plant populations in the “August ’02” column of the table.

You do not need to save this simulation

THINK IT OVER

1. Which of the plants you planted seemed to be most adapted to your climate? How can you tell?

2. Which of the plants you planted seemed to be least adapted to your climate? How can you tell?

3. Suppose your area suddenly became much hotter than normal, and stayed that way over an extended period of time. What might happen to the plants in your area? What might happen to the animals in your area? Explain.

4. Suppose your area suddenly became much wetter than normal, and stayed that way over an extended period of time. What might happen to the plants in your area? What might happen to the animals in your area? Explain.

ECOSYSTEMS AND THE ENVIRONMENT

SIMULATION 3: ALL DRIED UP

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Click anywhere in the Maritime region (the dark green area on the left side of the map).
2. Record the average rainfall as well as the minimum and maximum temperatures for this climate zone in the spaces provided. (These are indicated to the right of the map).

Average Rainfall: _____ inches/year.

Average Minimum Temperature: _____ °F

Average Maximum Temperature: _____ °F

3. Click on the NEXT arrow.
4. Click on NEW MAP until you find a map that has roughly equal amounts of land and water.
5. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Pause Simulation.

Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. Open the Options menu again and select Rizzo Off.
3. Open the Disasters menu and select No Disasters.
4. Click on the PARK MAP button  on the right.
5. Click and drag the pink rectangle until there's both water and land within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.

Click on the White Fir card. Plant 10 white firs by clicking on areas on the ground.

If you need to, click on the DOWN ARROW arrow to find the Ponderosa Pine card. Click on the Ponderosa Pine card. Plant 10 ponderosa pines.

If you need to, click on the DOWN ARROW arrow to find the Sycamore card. Click on the Sycamore card. Plant 10 sycamores.

Note: You'll have to move around a bit to have room to plant all the plants. You can do this by clicking on one of the Compass Arrows and then holding down the mouse button. When you're done moving, just let go of the mouse button.

2. Click on the SHRUBS button  on the left.

If you need to, click on the DOWN ARROW arrow to find the Winterberry card, then click on the card. Plant 10 winterberries.

3. Click on the GRASSES AND FLOWERS button  on the left.

Click on the Sedge card.

Sedge grows in marsh, so use the Compass Arrows to move around until there's marsh (the light blue next to the water) on your screen. Then plant 10 sedges by clicking on areas in the marsh.

MAKE YOUR PREDICTIONS

1. In this simulation you're going to see what happens when drought strikes an area.

Before you start the simulation you should predict how the population for each species you just planted is going to change. You can use the Park Computer Field Guide to help you make these predictions.

2. Click on the COMPUTER tool  on the right side of the screen.

3. Click on the FIELD GUIDE button  (the third button from the left).

4. The Field Guide contains information about all the species you can include in your park. To use the Field Guide, choose a plant or animal category by clicking on the appropriate button at the bottom of the screen. Then click on the plant or animal name from the species list that appears for that group.

Read the Field Guide entries for White Fir trees, Ponderosa Pine trees, Sycamore trees, Winterberry, and Sedge. Then use the information to predict whether that plant population will grow, stay about the same, or decline when a drought hits the area. If you aren't sure, make a guess. Circle your prediction for each species:

White Fir Population:	increase	no change	decrease
Ponderosa Pine Population:	increase	no change	decrease
Sycamore Population:	increase	no change	decrease
Winterberry Population:	increase	no change	decrease
Sedge Population:	increase	no change	decrease

5. Click outside the Park Computer screen to return to your park.

MONITOR YOUR PLANTS

1. Open the Options menu and select **Pause Simulation** to start the simulation.
2. Now it's time to watch how well your plants grow in the normal climate for this area. You're going to track your plant populations for several years using the Park Computer.

Click on the **COMPUTER** tool  on the right side of the screen.

3. Click on the **PARK INFO** button  (the second button from the right).
4. Click on the **POPULATION GRAPHS** button .

5. To use the graph, you need to select the species whose populations you want to graph.

Click on the **SPECIES 1** button, and then click on **White Fir** in the list of species that appears.

Click on the **SPECIES 2** button and select **Ponderosa Pine** from the species list.

Click on the **SPECIES 3** button and select **Sycamore** from the species list.

Click on the **SPECIES 4** button and select **Winterberry** from the species list.

Click on the **SPECIES 5** button and select **Sedge** from the species list.

6. Now that the graph is set up, you can return to the main park screen by clicking outside the Park Computer screen.

BRING ON A DROUGHT

1. Watch the **Date Indicator** . When the date reads "**JAN '02**," it's time see what happens when a drought occurs.
2. Because we can't stop the rain from falling in the park, we have to change the park location to a dry area to simulate a drought.

Click on the **COMPUTER** tool  on the right side of the screen.

3. Click on the **PARK INFO** button  (the second button from the right).
4. Click on the **CHANGE PARK LOCATION** button .

5. The **Change Park Location** features lets you choose a new location for your park. To move your park to a dry area, click anywhere in the **Arid** region (the orange area of the map).



6. Next, click on the **CHANGE** button at the bottom of the screen. A message will appear warning you that changing the park location may cause problems to the plants and animals. Click on **OK** to change the park location.



7. Click outside the Park Computer Screen to return to the main park.
8. Use the Park Map or the Compass to move around your park and observe what happens to the plant and animal populations when the drought strikes.
9. Watch the Date Indicator **Jan '03**. When the date reads “JAN '03,” open the Options menu and select **Pause Simulation**.

ANALYZE THE POPULATION-GROWTH GRAPHS

1. Click on the **COMPUTER** tool  on the right side of the screen.
2. Click on the **PARK INFO** button and then on the **POPULATION GRAPHS** button to return to the **Populations Graphs** screen.

The graphs on the screen show the populations over the previous 12 months in your park's history. You can change the amount of time the graph shows by selecting on the **NUMBER OF YEARS** buttons at the bottom of the screen.

3. Select the **5 Year** button **5** at the bottom of the screen. Use the graph to answer the following questions:

Look at the population lines for the first two years of the simulation.

- a. Which species had the greatest increase in population over the first two years?

- b. Which species had the least increase in population over the first two years?

4. Select the **1 Year** button **1** at the bottom of the screen. Use the graph to answer the following questions:

Look at the population lines for the last year of the simulation.

- a. Did any of the plant populations increase once the drought hit? If so, which ones?

- b. Did any of the plant populations remain the same once the drought hit? If so, which ones?

- c. Did any of the plant populations decrease once the drought hit? If so, which ones?

You do not need to save this park.

THINK IT OVER

1. Which of the five plant species seems to be best adapted to the Maritime climate? How can you tell?

2. Which of the five plant species seems to be least adapted to the Maritime climate?

3. What is a drought? What types of changes occur in an area during a drought?

4. Which of the plant species was most affected by the drought?

5. Which of the plant species was least affected by the drought ?

6. Some types of plants are called drought-tolerant plants. In what type of climate do you think these plants do well? Why?

PARK MANAGEMENT

SIMULATION 1: GOING PUBLIC

BEGIN THE GAME

1. Start SimPark.
2. Click on START A NEW PARK.
3. Type in your name.
4. Click on the EASY game option. Then click on the NEXT arrow .

CHOOSE YOUR LOCATION

1. Click anywhere in the Continental Warm region (the purple area on the map). Then click on the NEXT arrow.
2. Click on NEW MAP until you find a map that has roughly equal amounts of land and water.
3. Click on START GAME .

PREPARE YOUR SCREEN

1. Open the Options menu and select Rizzo Off.
2. Click on the PARK MAP button  on the right.
3. Click and drag the pink rectangle until there's both land and water within the rectangle. Then click outside the Park Map to close it.

SET UP YOUR PARK

1. Click on the TREES button  on the left.
2. Click on the Beech card. Plant 20 beeches by clicking on areas on the ground.
3. Click on the SHRUBS button .
4. Click on the DOWN ARROW arrow to find the Willow Card. Then click on the card and plant 10 willows.
5. Click on the GRASSES AND FLOWERS button  on the left.
6. Click on the Cattail card. Cattails only grow in marsh areas, so make sure you're in an area of your park that has marsh. Plant 10 cattails by clicking on areas in the marsh.
7. Click on the DOWN ARROW arrow to find the Water Lily card. Then click on the Water Lily card. Water lilies only grow in water areas, so make sure you're in an area of your park that has water. Plant 10 water lilies by clicking on areas in the water.



Click on the Lupine card. Plant 10 lupines by clicking on areas in the ground.

WATCH YOUR PARK GROW

1. Animals will start entering your park as soon as you've adding plants. Use the Compass Arrows or the Park Map to move around your park and observe the animals.
2. Watch the Date Indicator . When the date reads "JAN '02," open the Options menu and select Pause Simulation.
3. Click on the COMPUTER tool  on the right side of the screen.
4. Click on the PARK INFO button  (the second button from the right).
5. Click on the PARK CENSUS button .
6. The Park Census lists all the animal species currently living in your park. The numbers in parentheses next to each animal in the Park Census list tell you the current population of that species.

List the species name and population for each animal on the Park species list.

7. When you completed the list, click outside the Park Computer screen to return to your park.

BRING PEOPLE TO YOUR PARK

1. Now it's time to have some people to visit your park. To bring people into your park, you need to add objects that people will use. Let's start by adding some park benches, picnic tables, drinking fountains, and campfire rings.

Click on the PEOPLE STUFF button .

2. If you need to, click on the DOWN ARROW arrow to find the Park Bench card. Then click on the card. Place 4 benches in your park by clicking on areas of the ground.



3. Click on the Dirt Path card. Place 15-20 path tiles in any direction you like.
4. Click on the Picnic Table Card. Place two picnic tables in the park.
5. Click on the Drinking Fountain card. Place a drinking fountain near each picnic table.
6. Click on the Campfire card. Place a campfire near each picnic table.
7. Select Pause Simulation from the Options menu to restart the simulation.

KEEP AN EYE OUT FOR PROBLEMS

1. Check the Park Map occasionally to see if any fires or garbage problems occur.

You can use the Park Map to keep an eye out for possible problems like fire and garbage dumps. All PEOPLE STUFF are shown as dark gray dots on the Park Map. People will appear as white dots. Fires will appear as large red patches. Garbage dumps will appear as large dark gray patches. Normally, you would want to control problems like fire and garbage, but for now just keep an eye out to see if they occur.

Click outside the Park Map to return to the main park.

2. Now that people are entering your park, you should also check to see how your plants and animals are doing. Rizzo, the park's froggy guide, can help you out.

Select Rizzo from the Options menu to turn Rizzo on.

3. Click on the MICROPHONE tool  on the right side of the screen.

The microphone will let Rizzo get information about different organisms so he can tell you how they're doing.

4. Click the Microphone on different plants to interview them.

Are any of the plants commenting about the humans in the park? If so, what types of comments are they making?

5. Click the Microphone on different animals to interview them.



Are any of the animals commenting about the humans in the park? If so, what types of comments are they making?

6. Click the Microphone on some humans.

Do the people like your park? If so, why? If not, why not?

7. Let the simulation run until the Date Indicator reads “JAN ’05.” Then select Pause Simulation from the Options menu.

CHECK YOUR PARK POPULATIONS

1. Click on the COMPUTER tool  on the right side of the screen.
2. Click on the PARK INFO button  (the second button from the right).
3. Click on the PARK CENSUS button .
4. List the species name and population for each animal on the Park species list.

You do not need to save this park.

THINK IT OVER

1. Did the people entering your park affect any of the park animal or plant populations? Explain how you determined your answer.

2. If any animal or plant populations increased, what are some factors that might have caused the increase?

3. If any animal or plant populations decreased, what are some factors that might have caused the decrease?

4. Did the people in your park cause any negative effects? If so, what were they?

5. Did the people in your park cause any positive effects? If so, what were they?

6. What are some ways in which people might be able to minimize the impact they have on a natural area?

PARK MANAGEMENT

SIMULATION 2: A TEAM EFFORT

BEGIN THE GAME

1. **Start SimPark.**
2. **Click on START A NEW PARK.**
3. **Type in your name.**
4. **Click on the EASY game option. Then click on the NEXT arrow**  **.**

CHOOSE YOUR LOCATION

1. **Click anywhere in the Subtropical region (the bright green area on the map). Then click on the NEXT arrow.**
2. **Record the average rainfall as well as the minimum and maximum temperatures for this climate zone in the spaces provided. (These are indicated to the right of the map).**

Average Rainfall: _____ inches/year.

Average Minimum Temperature: _____ °F

Average Maximum Temperature: _____ °F

3. **Click on the NEXT arrow.**
4. **Click on NEW MAP until you find a map that has roughly equal amounts of land and water.**
5. **Click on START GAME**  **.**

PREPARE YOUR SCREEN

1. **Open the Options menu and select Pause Simulation.**

Note: Whenever you want more time when doing any part of this lesson, just pause the simulation by selecting Pause Simulation from the Options menu.

2. **Open the Options menu and select Rizzo Off.**
3. **Click on the PARK MAP button**  **on the right.**
4. **Click and drag the pink rectangle until there's both land and water within the rectangle. Then click outside the Park Map to close it.**

SET UP YOUR PARK

1. Choose ten plants from the Trees, Shrubs, and Grasses and Flowers cards to plant in your park. Use the Field Guide to help you choose plants you think will do well in the Subtropical climate. List the names of the plants here:

Plant 1: _____

Plant 2: _____

Plant 3: _____

Plant 4: _____

Plant 5: _____

Plant 6: _____

Plant 7: _____

Plant 8: _____

Plant 9: _____

Plant 10: _____

2. Plant 10 of each plant on your list. Remember that marsh plants have to be planted in marsh, and water plants have to be planted in water. Be sure to space out your plants over the area of the park.
3. Choose ten animals from the Mammals, Birds, and Reptiles cards to add to your park. Use the Field Guide to help you choose animals you think will do well in the Subtropical climate. List the names of the animals here:

Animal 1: _____

Animal 2: _____

Animal 3: _____

Animal 4: _____

Animal 5: _____

Animal 6: _____

Animal 7: _____

Animal 8: _____

Animal 9: _____

Animal 10: _____

4. Use the Field Guide to determine which of the animals on your list are primary consumers and which are higher-level consumers. Put 10 of each primary consumer animal on your list in your park. Put 5 of each higher-level consumer in your park. Any animal that lives in the water should be placed in water areas.
5. Select Pause Simulation from the Options menu to start the simulation.
6. Let the plants and animals in your park adjust to their new home. Run the simulation until the Date Indicator reads "JAN '01" before continuing to the next step.

BRING PEOPLE TO YOUR PARK

1. Now it's time to bring people into your park.

Click on the PEOPLE STUFF button .

2. Select whatever objects you think humans might want to use in your park.

List the objects you select:

3. Place as many of each object on your list as you want. But remember, placing objects costs money, and you may need some of your money later.

MANAGE YOUR PARK

1. As a park ranger, you need to try to make sure that every species in your park is as happy and healthy as possible. Therefore you need to pay attention to any problems that occur in your park. Luckily you don't have to do this alone, you've got lots of tools and helpers to help you out.

Steps 2 - 6 tell you ways to monitor the species in your park. Use any or all of the methods as necessary. Then go to step 7 for ideas for solving any problems you run into.

2. Use Rizzo to keep up on what's going on.

Rizzo is the Park's guide frog. He'll pop up now and again to give you hints or information about your park.

First, open the Options menu and remove the arrow from Rizzo Off by clicking on it. When Rizzo tries to get your attention, click on the part of his body that you see. He'll come on-screen to tell you what he has to say. You can follow his advice, or ignore him if you wish.

3. Interview the organisms in your park.

You can also use the microphone to interview the plants, animals, and people in the park.

Click on the MICROPHONE tool. Then click on a plant, animal, or person.



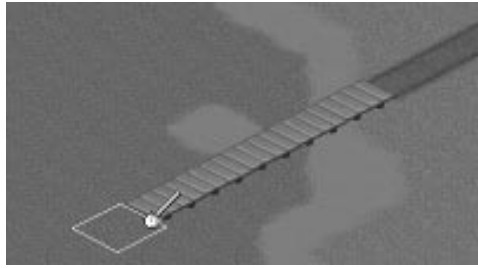
4. Read your e-mail.

Once your park is up and running, you'll start getting e-mail from the park boss, other park rangers, various organizations, and maybe even your mother! You can use the e-mail to keep track of how things are going. Plus some of the organizations may donate money to your park, and some of the rangers may offer to send you extra plants and animals.

To get your e-mail, click on the COMPUTER tool  Then click on the E-MAIL  button at the top of the Park Computer screen.

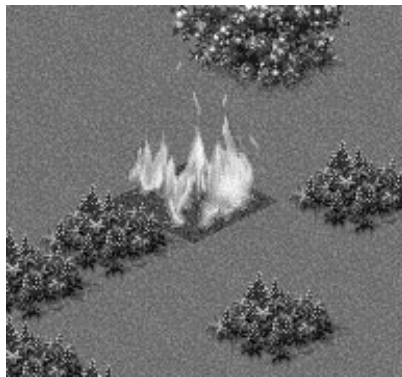
Trampled Plants:

Once people start entering the park, they may trample the plants. To solve this problem, add some paths to your park. First, click on the PEOPLE STUFF button , then click on the PATH card. Click and drag on the ground to lay paths. Click and drag on the water to place bridges.



Fire:

You can help prevent fires in your park by placing fire hydrants when you add PEOPLE STUFF. First, click on the PEOPLE STUFF button , then click on the FIRE HYDRANT card. Place fire hydrants by clicking on the ground.



Once a fire has broken out, you have three options: either bulldoze or place a path around the fire using the PATH card to keep the fire from spreading, or place water around the fire using the WATER card. To use the Water card, click on the PEOPLE STUFF button , then click on the Water card. Click twice on one spot to add water to your park (clicking once will just place areas of marsh).

Garbage:

You can prevent people from dumping garbage in your park by adding trash cans. First, click on the PEOPLE STUFF button , then click on the TRASH CAN card. Place cans by clicking on the ground.



Once there's a garbage dump in your park, the only way you can get rid of it is by waiting for rats and other garbage eaters to eat it all up.

8. Keep monitoring your park and fixing problems until the Date Indicator reads "JAN '08." Then select **Pause Simulation** from the Options menu.

CHECK YOUR PARK'S SPECIES DIVERSITY

1. Click on the **COMPUTER** tool  .
2. Click on the **PARK INFO** button  (the second button from the right).
3. Click on the **PARK CENSUS** button  .
4. Count the number of plant species currently living in your park. How many plant species are there?

5. Count the number of animal species currently living in your park. How many animal species are there?

6. When you've finished, you can save your park on a personal or group disk for later use. Open the **File** menu from the menu bar and select the **Save**. When asked to name the game, type in **DIVERSE PARK** then click on **Save**.

Congratulations! You've just put in a good day's work as a park ranger!

THINK IT OVER

1. What types of problems occurred in your park?

2. What did you do to solve those problems?

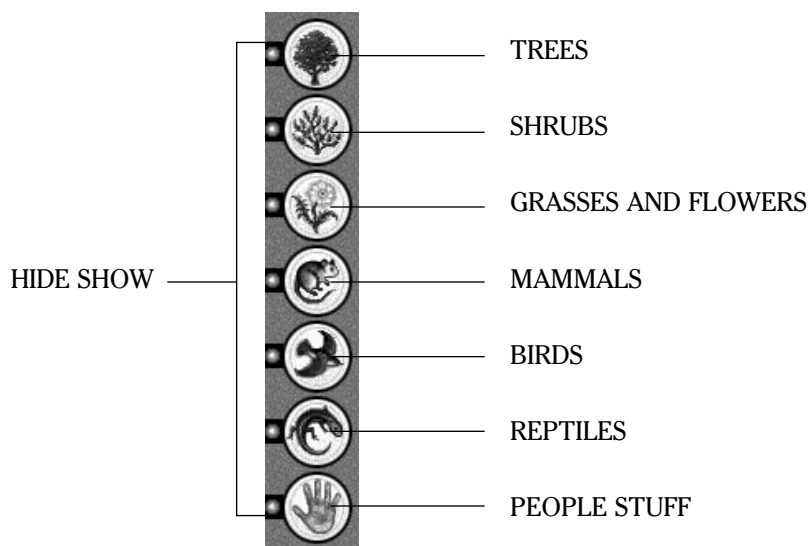
3. Was the number of plant species living in your park higher, lower, or the same as when you started?

4. Was the number of animal species living in your park higher, lower, or the same as when you started?

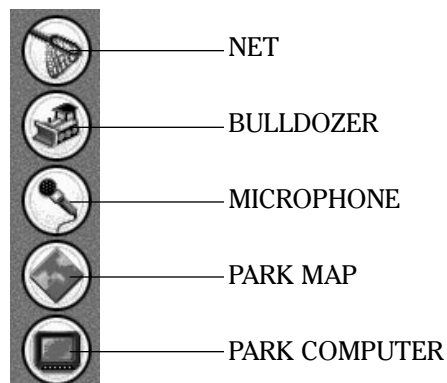
5. Biodiversity is the total variety of plants and animals living in an area. What are some possible reasons why biodiversity is important?

SIMPARK CONTROLS REFERENCE SHEET

Species Buttons



Park Tools



Additional Tools

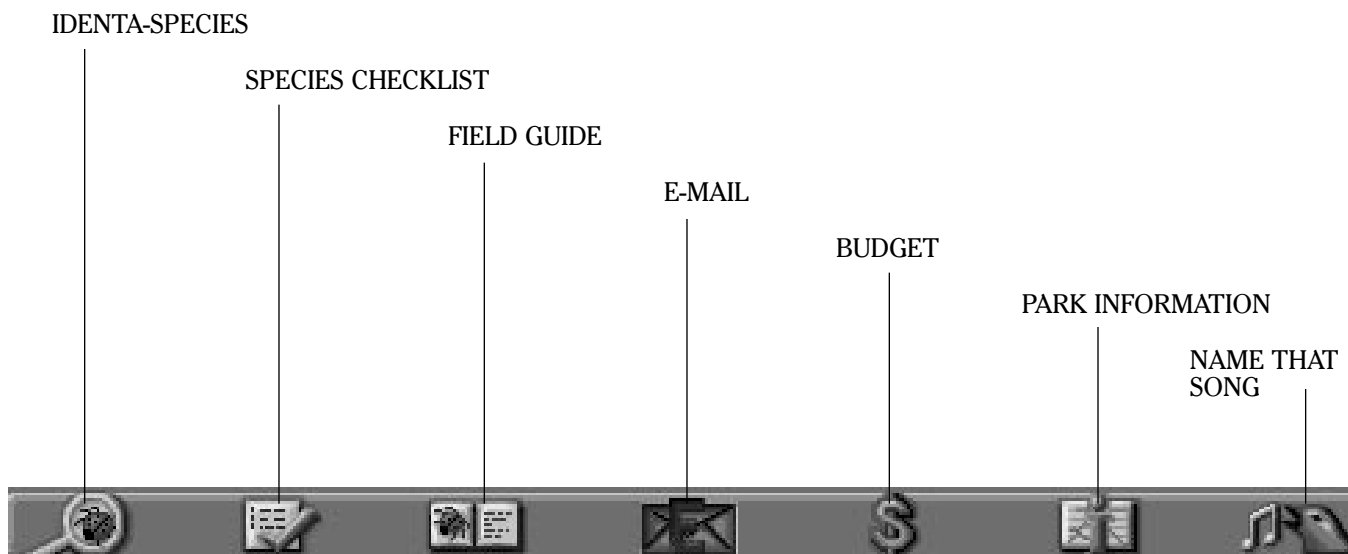


COMPASS



DATE/BUDGET INDICATOR

Park Computer Buttons



RESOURCES

In addition to this Teacher's Guide and your own ingenuity and classroom experience, there are a number of other resources to help you use SimPark.

- The Quick-Start Guide has a reference section that explains the SimPark screens.
- The Tutorial that can be accessed from the game will explain the basics of using SimPark.
- The SimPark Activities Guide contains off-computer experiments and activities that your students can do that relate to the concepts covered in SimPark.

You may also contact us directly:

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CUSTOMER SERVICE

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ftp-ftp.maxis.com

World Wide Web-www.maxis.com

Prodigy:

E-mail address is MAXI99A

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Margy Kuntz has been involved in educational publishing, as both a writer and an editor, for more than 12 years. She has written numerous educational supplements, basal text materials, and trade books dealing with science, math, computers, art, and literature. She also authored the Teacher's Guide and the Experiments and Activities Manual that accompanies Maxis' Widget Workshop.