



Title: Gopher Tortoises of Central Florida

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Purpose:

Students learn that human actions-- such as farming, phosphate mining and processing, building roads, commercial and housing developments-- have an impact on the environment. Students learn the importance of protecting our endangered or threatened species.

Vocabulary:

Burrow apron, carapace, commensalism, community, environmental consultant, prescribed burn, end chamber, forage, gular, habitat, hatchling, herbivore, herpetologist, juvenile, keystone species, land reclamation, limiting factor, mitigation bank, plastron, recipient site, refuge, scute, transects, uplands, Upper Respiratory Tract Disease (URTD), Xeric.

Procedure:

Part 1 (Day One) Introduction:

1. Use KWL method to check for prior knowledge and understanding of the concepts. ("What do you know about the gopher tortoise and its habitats?")
2. Present the background information to students using Gopher Tortoise Council's PowerPoint presentation, Gopher Tortoise a Species in Decline. (Be sure to print the note pages to assist with the presentation.)

Part 2 (Day Two) The game:

1. Using an overhead projector or LCD projector with desktop camera provide students with an explanation of the rules of the Gopher Tortoise Game.
2. Divide students into appropriate groups of 3 or 4 and distribute the game folders and materials.
3. Monitor students during the playing of game. If students finish too quickly, suggest that they begin again and read aloud the draw cards. 20-30 minutes would be an appropriate amount of time for playing.
4. Ask follow-up questions after playing is complete.

Part 3 (Day Three) Review and follow up:

1. Ask students to list the factors that limit the gopher tortoises' survival.
2. Ask students for specific recommendations to increase the successful reproduction and survival of the gopher tortoises.
3. Redistribute the KWL sheets for assessment or use another method of assessment. (See Assessment section.)

Standards:

Grade: 7

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
 SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

Activity:

Students watch and listen to a PowerPoint presentation giving background information about the gopher tortoise. In small groups they play a board game the life of a gopher tortoise reinforcing the information taught in the PowerPoint. Students follow up with a group activity such as creating a public service poster, pamphlet or video report.

Objectives:

Students will...

1. understand and be able to describe the problems of the gopher tortoise's survival and cause of its habitat loss.
2. draw inferences about the effects of limiting factors on gopher tortoises.
3. describe efforts to protect gopher tortoises made by mining companies, commercial and housing developers and private or government agencies.
4. discuss ways in which the public (including students) can protect and preserve gopher tortoises, their burrows and habitats.
5. will design a poster, pamphlet or video report to share with classmates, other students, and community.

Supplies:

Writing paper for KWL activity
 Overhead projector or LCD projector with desktop camera and computer
 Legal size manila folder per group
 Copies of game board (attachment)
 Copies of game directions (attachment)
 Copies of "Cool Gopher Tortoise Facts" (attachment)
 Enough game board markers/tokens for each student in class
 One dice for each group
 Cut-out copies of limiting factor cards-- 12 per game board (card stock)
 Cut-out copies of data sheets-- 4 per game board (card stock)
 Optional: poster board paper (assessment activity)

Background:

Gopher tortoises, *Gopherus polyphemus*, in Florida are a species of special concern. The gopher tortoise inhabits well-drained sandy soil areas, such as longleaf pine-xeric oak sandhills, scrub, pine flatwoods, xeric hammock, dry prairie, coastal grasslands and dunes, mixed hardwood-pine communities and a variety of disturbed habitats. Gopher tortoises excavate burrows in these sandy soils that average 14 feet in length and six feet deep. The burrows serve as protection from extreme temperatures, predators, and serve as refuges for approximately 360 other species. The tolerant gopher allows many species to share the burrow either full-time or part-time. Some of these tenants are so dependent on burrows that when the gopher tortoise disappears, they disappear as well.* For that reason the gopher tortoise is named "keystone species."

Some animals that share the gopher tortoise burrow:

*eastern indigo snake	gopher frog	Florida mouse
Florida pine snake		southern toad
wolf spider	burrowing owl	quail
mole skink	black racer	

Paleontologists have discovered fossils from the Miocene Epoch that are closely related to the modern gopher tortoise. The modern animal survived many hardships; it has endured climate changes and other challenges. Fifty years ago mankind became the species' worst enemy. Men have collected the tortoises and sold them as pets; snake hunters have poured gasoline in the burrows to flush out rattlesnakes; drivers have crushed animals on the highways. Yet the most extreme threat man poses is destruction of the gopher's habitat. Timber companies clear away pine forests in which gopher tortoises made their homes. Bulldozers raze other "high and dry" habitats, replacing burrows with houses, tourist resorts, and other commercial projects. In 1978 the Gopher Tortoise Council was established to promote research studies and determine best practice methods of protecting the gopher tortoise and the gopher's habitats. The Florida Fish and Wildlife Conservation Commission enforces the rules and regulations regarding the gopher tortoise. When phosphate mining companies must clear land, and tortoises are onsite, they are required to obtain permits to relocate the tortoises.

Estimated Time:

Three to four 45-minute class periods

Preparation:

1. Download the PowerPoint, [Gopher Tortoise: A Species in Decline](http://www.gophertortoisecouncil.org/), from <http://www.gophertortoisecouncil.org/>. Print the notes pages to use during the presentation. Reserve or setup computer and LCD projector.
2. Prepare enough games for groups of three or four. Use card stock to print out the Limiting Factor cards and Data Sheets. Cut out the LF cards and Data Sheets. Print out the game directions and "The Gopher Tortoise Speaks" poem on regular Xerox paper to use as supporting material for each game board. These sheets could be placed in a plastic insert sheet. Print out the game board templates on legal size Xerox paper. Glue or staple the game board templates on the inside of a legal size manila folder. Fill a baggy with 3-4 game markers and one dice for each game board.
3. Gather materials needed for the assessment components.

Assessment:

1. Students use the internet to find various agencies and organizations that help protect the gopher tortoise. (Examples include Gopher Tortoise Council, Florida Fish and Wildlife Conservation Commission, The Gopher Tortoise Organization.) Have students describe the functions of these agencies.
2. In small groups create a brochure, PowerPoint presentation, poster, or video report to share with other students and community. This project communicates ways in which the general public can help preserve and protect the gopher tortoises, their burrows and their habitat.
3. Each student writes an essay including at least four limiting factors that prevent tortoises from reaching the adult reproducing stage.

Prior Student Knowledge:

Understand that all animals need food, water, shelter and space to survive.

Recognize basic habitats and communities of central Florida. (scrub, forested uplands, wetlands, and sandhills.)

Know that tortoises are reptiles.

Understand that tortoises are turtles adapted for living on land.

Understand that gopher tortoises in Florida have survived for many years-- from as early as the Miocene Epoch.

Extension:

Gopher tortoises are found in all 67 counties in Florida. Due to higher water tables and unsuitable soil for drainage, the tortoises are found near the coast in the lower peninsula counties. Most counties have state parks or county parks that provide habitats protection for the gopher tortoise. Plan a short field trip to a local park of known active gopher tortoise burrows.

Survey gopher tortoise burrows at a nearby park or preserve. Share data with park officials. Collect the following information in the survey:

- Gopher Tortoise burrow number (stake number)
- Elevation
- Habitat type
- Nearby vegetation type
- Active or Inactive
- Juvenile or adult (width/height of opening)
- Evidence of "commensal" species (tracks, scat, etc.)
- GPS waypoint
- Photo number (in camera)

Educator's Notes/Additional Material

Wood, Don A.. *Florida's Fragile Wildlife Conservation and Management*. Gainesville, FL: University Press of Florida, 2001.

Schueler, Donald G.. *The Gopher Tortoise*. Berkeley Heights, NJ: Enslow Publishers, Inc., 2003.

Ashton, Patricia Sawyer, and Ray E. Ashton Jr.. *The Gopher Tortoise A Life History*. Sarasota, FL: Pineapple Press, Inc., 2004.

Enge, Kevin M., Joan E. Berish, Rebecca Bolt, Annie Dziergowski, Henry R. Mushinsky. "Biological Status Report Gopher Tortoise." Florida Fish and Wildlife Conservation Commission. (2006).

Gopher tortoise facts that can be used for assessment:

Gopher Tortoise (*Gopherus polyphemus*)

Order- Testudines; Family- Testudinidae

Southeastern US only, one of four North American species

Occur in all 67 counties of FL

Limiting factors--habitat destruction or degradation associated with phosphate mining, citrus farming enterprises, urban and suburban development.

Human predation (poaching) historically panhandle. (Florida Game and Fresh Water Fish Commission-regulation in 1988.)

FGFWFC- listed as threatened in 1975, reclassified in 1979 to Special concern. Current status- Threatened.

15" (39cm) carapace length

24 lbs. (11 kg)

Adults grayish to brownish

Hatchlings are yellowish orange, 1.5-2.0" in length

Difficult to distinguish sex, only in mature adults

Forelimbs are shovel-like, hind are elephantine

Habitat--well-drained, sandy soils with low-growing herbs and other vegetation (prickly-pear cactus, gopher apple...)

Longleaf pine, xeric scrub oak sandhills, as well as sand pine scrub, pine flatwoods, dry prairies, and mixed pine-hardwood communities, disturbed habitats, roadsides. High quality abundant herbaceous forage can sustain up to 4 tortoise per acre.

Life history and behavior--burrows, provide refuge from temp extremes, moisture loss, and predators.

Extend up to 30 in length, average 14-15 feet.

Keystone species--important to the habitat and the community because it provides shelter and sometimes food to 300-400 other species.

--Axley, E. 1999. "Gopherus polyphemus" (Online), *Animal Diversity Web*. Accessed June 23, 2007 at

http://animaldiversity.ummz.umich.edu/site/accounts/information/Gopherus_polyphemus.html.

Directions to Play “Survival: The Gopher Tortoise Game”

Number of players: 3-4

Materials: 3-4 game markers, one dice, limiting factor cards, data sheet cards, game board sheets

Goal: Move a tortoise playing piece ahead through the burrow to the space marked “Adult,” when the tortoise is capable of successful reproduction. (Females reach sexual maturity around 9 – 21 years of age.)

1. All playing pieces begin in the nest. The nest is located either in the burrow apron or near the apron. To leave the nest a player must roll a one or two on the dice. (One roll per turn.)
2. Once a player has rolled appropriately to move out of the nest, the playing piece is placed on the end chamber. At the next turn, the player rolls the dice again and proceeds counting the correct number of spaces.
3. Player rolls the dice, moves to corresponding space. They read aloud the directions or information on the space that they have landed on. The player follows directions on the spaces. (See list below.)
4. If a player lands on a space shared by another player, they can continue to play as normal.
5. To reach adulthood, a player must roll the exact number of spaces to land on the adult gopher tortoise at the burrow opening.

Spaces:

Limiting Factor- draw card and follow directions (take no other action as written on the new space).

Capture and Release- draw Data Sheet Card and keep the card. Use it to trade for a Limiting Factor card if needed. If a player lands on a Limiting Factor space, return the Data Sheet Card to the pile and remain on that space until the next turn.

Free space- remain until next turn, take no other action.

Forest fire, hurricane, brush fire and freezing weather- follow the directions on that space.

Commensal- move two spaces forward, take no other action.