

# Giant Panda

## Teacher Curriculum Guide

### *Table of Contents*

Objectives	2
Introduction	3
About this Teacher Curriculum Guide	4
Activity Grid	5
Activity 1	6
Activity 2	13
Activity 3	16
Activity 4	20
Activity 5	25
Activity 6	27
Activity 7	31
Activity 8	35
Activity 9	38
Activity 10	44
Activity 11	50
Activity 12	52
Appendix	
Giant Panda Background Information	57
Vocabulary List	69
Resources for Further Information	71
Curriculum Guide Evaluation	73

Support for this curriculum guide is provided by a generous grant to Friends of the National Zoo and the Smithsonian National Zoological Park from the FujiFilm Corporation.



# Objectives

The general objectives of this module are the following:

- Learn about weights and measurements using pandas and other animals as examples.
- Learn about giant panda behavior and habitat requirements.
- Learn the continents, using animals and where they live as a hook.
- Learn about the giant panda's Chinese temperate forest habitat and the other creatures living there.
- Explore creative projects using a panda theme.
- Learn about giant pandas and the world's seven other bear species, including where in the world they live.

# About the Curriculum Guide

The Giant Panda Exhibit's graphics present succinct and accurate information on Zoo research and giant panda natural history. This curriculum guide is designed to help teachers take the next step--by assisting them in teaching kindergarten through fourth grade students about basic scientific principles relating to giant pandas, other wildlife, and their habitats. The guide's interdisciplinary activities will help students learn beginning principles of ecology, conservation, and biology and open gateways to learning in other areas of science, math, social studies, language arts, reading, music, and art.

Vocabulary words are underlined the first time they appear and are keyed to the guide's **vocabulary list**. The **activities** touch on all of these areas, some in combination.

The guide's text and activities also highlight the National Science Education Standards' Life Science content for grades K-4, focusing on:

- characteristics of organisms
- life cycles of organisms
- regulation and behavior
- organisms and environments.

# Introduction: Why Giant Pandas?

Why did we dedicate an entire curriculum guide to just one species? The decision was easy. Giant pandas are among the best-loved, most mysterious, and rarest creatures on earth. From an educator's point of view, studying giant pandas opens many doors for teachers striving to spark student interest in a wide variety of topics.

Popular and endangered animals, giant pandas represent worldwide efforts to save wildlife from extinction. Many of the world's animal and plant species face threats similar to those impinging upon these black-and-white bears, but few have as many fans. In addition, giant pandas serve as furred ambassadors, symbolizing the only country in which they live in the wild—China. Home to one-sixth of the world's human population, China is nonetheless poorly known to many North Americans. Its history, geography, culture, natural history, and environmental challenges are both complex and fascinating.

The Smithsonian National Zoological Park is one of the best places in the world to learn about giant pandas. Not only can you find a pair of the rare animals living here—you also can learn about Zoo scientists and their Chinese and North American colleagues, who work at the front lines of scientific discovery. Since 1972, the Zoo has been a leader in giant panda research and husbandry. Zoo scientists and their colleagues study the reproductive biology, wild and zoo habitat and nutritional needs, habits, and medical health of giant pandas—all in an effort to pull giant pandas from the edge of extinction.

# Curriculum Guide Activities

	Science	Math	Soc. Studies	Language	Reading	Art	Geography
Activity 1	X	X			X	X	X
Activity 2	X					X	
Activity 3	X					X	
Activity 4	X		X				
Activity 5	X			X			
Activity 6	X					X	X
Activity 7	X				X	X	X
Activity 8	X	X					
Activity 9	X				X	X	X
Activity 10	X					X	X
Activity 11				X	X	X	
Activity 12	X		X	X		X	

# Appendix

# Meet the Zoo's Giant Pandas: Exhibit Orientation

**Tian Tian** ("t-YEN t-YEN") and **Mei Xiang** ("may sh-ONG") were both born at the China Research and Conservation Center for the Giant Panda in Wolong, Sichuan Province, China. Tian Tian is the male. His name means "more and more," and he was born August 27, 1997. Mei Xiang, the female—whose name means "beautiful fragrance"—was born on July 22, 1998. The pair is on a 10-year loan to the Zoo, under an agreement with the China Wildlife Conservation Association. It is everyone's hope that the young pair will breed.

These giant pandas live at the Zoo's Giant Panda Exhibit. The exhibit consists of both indoor enclosures and outdoor habitats. Interesting graphics explain giant panda natural history and the history of giant pandas in China and at the Zoo. Among the topics covered:

- wild giant pandas in China
- zoo pandas
- panda feeding adaptations
- giant panda reproduction
- giant panda *behavior*
- conservation of giant pandas and their *habitat*
- the history of the National Zoo's first pair of giant pandas, Ling-Ling and Hsing-Hsing
- the biology of bamboo.

There is a current events bulletin board where you can find recent articles about giant pandas. The Panda House, first opened in 1972, was revamped before the arrival of the Zoo's latest giant pandas, both of which arrived in December 2000. The pair is on exhibit daily from 9 a.m. to 4:30 p.m. However, the best time to see them is as early in the morning as possible (9 a.m. to 11 a.m.), when the animals are most active and the number of visitors is lower. The giant pandas are also usually active between 2 p.m. and 4 p.m. At particularly crowded times, especially weekends, you may have to wait in line for a little while before seeing the pandas.

From the National Zoo's north gate at Connecticut Avenue, the bus parking lot, or parking lots A and B, you will easily reach the exhibit within a few minutes' walk. From the other, lower, parts of the park, the walk will be a bit longer. Please note that parking at the Zoo is limited. Metrorail, Metrobus, or taxis are recommended.

The outdoor habitats provide many opportunities for viewing panda behavior, especially in the morning and during cooler weather. A dividing wall separates the large habitats, but an opening in the fence's far end allows the animals access to both. Also, mesh windows allow the pandas to interact visually at times when they are not together. Zoo staff members carefully observe the two giant pandas' interactions to detect their compatibility and preferences. They are also experimenting with different plants, substrates (such as soil and sand), and large objects such as rocks, trees, and artificial

objects such as balls to determine Tian Tian's and Mei Xiang's likes and dislikes.

You and your students can observe the Zoo's giant pandas' interactions with the following elements of the outdoor habitats:

- sand baths – for "dirt-bathing"
- mist grove – a misty retreat from the heat that allows public viewing
- fog grove – a foggy retreat from the heat that allows public viewing
- chilled-rock den – chilled water in embedded pipes cools this cave
- cold-air den – air-conditioned shallow, open cave
- pools – for dips during hot days
- tree and rock structures – for climbing and exercise
- various trees and shrubs – for shade and cover. From time to time, new types will be planted. Outdoor habitat vegetation includes firs, hemlocks, various shrubs, red cedars, and dawn redwoods of the same or similar species as those found in China.

Inside the Giant Panda Exhibit, you will find three separate but connected enclosures. Hand-painted murals of central Chinese mountains lend a fitting backdrop to the giant pandas when they are indoors. The giant pandas also have indoor dens where they can rest in a more private setting. When necessary, this area and the outdoor viewing area can be closed off from the public. This might occur, for example, if the Zoo staff determine that Mei Xiang is pregnant.

At the exhibit, Friends of the National Zoo volunteers are on hand seven days a week, from 10 a.m. to 4 p.m. They meet visitors and answer questions about giant pandas, and may have some panda brochures and interesting artifacts on hand, such as casts of panda skulls. You can also ask about special panda programs at the Visitor Center, located just inside the Zoo's Connecticut Avenue gate. Keepers do not feed Tian Tian and Mei Xiang at set times. You may find the animals feeding at any time of day.

# Giant Panda

## Background Information

This material will help you answer many questions and augments the information provided in the Teacher Background Information sections preceding each activity.

### ***When did people outside of China learn about giant pandas?***

You might be surprised to learn that despite their current popularity, giant pandas were a fairly recent "discovery" for people living outside of China. The first Westerner to describe the animal was probably French missionary and naturalist Père Armand David, who, while in China, described a panda skin in his journal in 1869 and later sent several to a Paris museum. In 1916, German zoologist Hugo Weigold became the first Westerner to see a live giant panda—a cub he bought while on an expedition.

### ***Do other species benefit from giant panda habitat protection?***

Many species benefit under the umbrella of protection afforded to large, popular animals that require large protected areas for survival. In the case of the giant panda, their natural habitat falls within some of the world's most biologically diverse temperate forests.

Around the world, other "flagship" species, whose protection benefits many other animals and plants, include:

- jaguar (Central and South America)
- brown bear (North America, Europe, Asia)
- gray wolf (North America, Europe, Asia)
- tiger (Asia)
- orang utan (Asia)
- lion (Africa and Asia–northwest India)
- golden lion tamarin (South America)

A good example of the umbrella protection provided by giant pandas can be found at China's Wolong Nature Reserve. Set aside primarily to protect giant panda habitat, Wolong has great biological diversity, hosting many other creatures and plants. Scientists have recorded 92 other mammal species, 275 bird species, 20 of reptiles, 17 of amphibians, and 9 of fish, not to mention about 4,000 plant and thousands of invertebrate species. Many of these are rare and/or have localized ranges.

### ***Why are giant pandas so boldly colored?***

Scientists don't know the answer to this question, although some think that these bears' unusual bold coloration actually helps them blend in with their shade-dappled, snowy, and rocky surroundings. Others guess that it plays an important role in communication between individual pandas.

### ***Are giant pandas as cuddly as they look?***

With unique and boldly patterned coats, giant pandas are easy to identify. Giant pandas' ears, eye patches, muzzles, legs, and shoulders are black, and pretty much all else is white. Eye-catching and widely recognized, giant pandas frequently inspire plush toy manufacturers and their prospective buyers. However, although they look cute, giant pandas, if threatened or approached, can be as dangerous as any other bears. They are certainly neither approachable nor cuddly.

***Do all giant pandas have exactly the same markings?***

No, they do not. In fact, you can identify the Zoo's two giant pandas by their markings. The male, **Tian Tian**, has black "knee socks," a black band across his shoulders that is narrower in the middle, and two black dots adorn the bridge of his nose. The female, **Mei Xiang**, has black "stockings," a black band across her shoulders that is wider in the middle, and a pale black bar across the bridge of her nose.

***How long do giant pandas live?***

The answer for wild giant pandas remains a mystery, but they likely don't live as long as zoo pandas. The National Zoo's Hsing-Hsing died in 1999 at the age of 29, and was one of the oldest pandas on record. However, Chinese scientists have reported zoo pandas that lived as old as 35 years.

### ***How do wild giant pandas breed and when do their young go it alone?***

Giant pandas are slow breeders and their young remain dependent for quite a while. They do not reach breeding age until between four and eight years old. Mating season is brief, occurring only in spring. During that time, females are in estrus and interested in mating for only two or three days. Calls and scent-marking draw males and females to each other. It is likely that many wild giant pandas that mate already know each other from previous encounters. Female giant pandas give birth between 95 and 160 days after mating. Although females may give birth to two young, only one survives. Baby giant pandas are born helpless and tiny—only about the size of a stick of butter and weighing only four to six ounces. Except for marsupials such as kangaroos, possums, and their kin, baby giant pandas are the smallest newborn mammals relative to their mothers' size.

Nutritionally speaking, giant panda cubs are usually weaned from their mothers' milk by one year old, but many nurse for an additional year. They may stay with their mothers for up to three years before striking out on their own. In a lifetime, a female may successfully raise only five to eight cubs.

### ***How many wild giant pandas are there?***

Only about 1,000 to 1,100 giant pandas survive in the wild, in scattered patches of mountainous habitat in central China's Sichuan, Shaanxi, and Gansu provinces. Scientists believe that many of these

habitat patches are too small to sustain giant panda populations far into the future. The first survey of the wild population since 1988 is now underway. This project will hopefully shed more light on exactly how many wild giant pandas are left and where they live.

### ***Are giant pandas easy to breed in zoos?***

No. For reasons scientists hope to soon learn, zoo giant pandas have poor and inconsistent breeding success. Natural breeding of zoo giant pandas is still a fairly rare occurrence. Few cubs are born each year and few of these survive longer than one year. While about 70 percent of the world's zoo giant panda population is of breeding age, only about 30 percent of males and 45 percent of females have successfully bred, either by natural (mating) or assisted (artificial insemination) means. Although efforts are underway to change this situation, zoo giant pandas are not currently managed as one unit, so coordination is difficult. The zoo giant panda population cannot yet sustain itself.

### ***Will giant panda reintroduction be easy?***

Reintroduction is the term used for returning members of an animal species to an area where the species once occurred. Such efforts are costly and often difficult, but they have worked for several species, including golden lion tamarins in South America and black-footed ferrets in the western United States. (Zoo scientists have been involved in both of these successful ventures.) While currently not feasible because the zoo population is not yet self-sustaining, giant panda reintroduction is a hopeful prospect. But successful

reintroductions require that many variables fall into place. For example, suitable habitat must be identified and protected. Local people must know about the project and support it. But even if these things work out, getting a zoo-born animal to thrive in the wild is a tall order. A reintroduced giant panda must be able to go it alone. It must know:

- how to find its own food
- how to orient itself quickly
- how to avoid predators, including people
- how to socialize and reproduce with wild pandas
- how to identify and use local resources, such as dens and trees.

# Some of China's Other Rare Animals

## ***Reptiles* (about 30 species threatened with extinction):**

Chinese alligator

## ***Birds* (about 80 species threatened with extinction):**

black-necked crane

red-crowned crane

crested ibis

brown-eared pheasant

Sichuan hill partridge

cinereous or Eurasian black vulture

## ***Mammals* (about 75 species threatened with extinction)**

tiger

snow leopard

clouded leopard

brown bear

red panda

Asian small-clawed otter

white-cheeked gibbon

Yangtze River dolphin, or baiji

Asian elephant

Przewalski's horse

Bactrian camel

white-lipped deer

Eld's deer

Père David's deer

wild yak

takin

argali sheep

Tibetan antelope

# Trees Found Both in the D.C. area and Central China

(Note: In most if not all cases, the tree *species* found in China are different from those found in the eastern U.S. This list refers to trees in the same or similar families. In some cases, such as dawn redwood, Chinese species now live in the eastern United States.)

**dogwood**

**sassafras**

**maple**

**birch**

**larch**

**poplar**

**cherry**

**apple**

**oak**

**basswood**

**fir**

**hemlock**

**spruce**

**dawn redwood**

# Vocabulary List

1. **artificial insemination (AI)** – Introduction of sperm to egg via human intervention rather than the mating of two animals.
2. **behavior** – an animal's response to external and internal stimuli.
3. **biodiversity** – short for biological diversity. Variety in the world's organisms.
4. **biology** – the study of living organisms and their vital processes.
5. **carnivore** – an organism that eats animals.
6. **coniferous** – refers to trees and shrubs in the plant order Coniferales, which includes such evergreens as pines, spruces, cedars, hollies, and yews.
7. **deciduous** – refers to plants that shed their leaves periodically. Such familiar trees as maple, oak, birch, elm, and beech are deciduous.
8. **ecology** – the study of the relationships between organisms and their environment.
9. **estrus** – during ovulation of the egg, a time of heightened female readiness for mating.
10. **extinction** – the irreversible disappearance of a species.
11. **habitat** – a place where an animal, plant, or microorganism, or a community of different organisms lives, eats, grows, and successfully reproduces.
12. **herbivore** – an animal whose diet primarily consists of plant matter.

13. **nutrition** – the process by which organisms obtain and use nutrients.
14. **omnivore** – an organism that eats both animal and plant matter.
15. **range** – the geographic area where a species is usually found.
16. **reintroduction** (verb, to reintroduce) – Releasing animals back to a wild area where they once occurred. There are two categories of reintroductions: "soft releases," which may include preparation and training for animals prior to release and support afterwards, and "hard releases," which do not include any preparation or support.
17. **species** – a population or populations of organisms that can produce fertile offspring.
18. **vocalization** – a call, song, or other communicating sound made by an animal.
19. **wean** – switching a young mammal from its dependence upon mother's milk to other foods.

# Resources for Further Information

## **Books and Magazines:**

ZooGoer Magazine, special giant panda issue, January/February 2001. (See also FONZ website at [www.fonz.org/zoogoer/zg-archives.htm](http://www.fonz.org/zoogoer/zg-archives.htm))

ZooGoer Magazine, special bear issue, March/April 1999. (See also FONZ website at [www.fonz.org/zoogoer/zg-archives.htm](http://www.fonz.org/zoogoer/zg-archives.htm))

*The Last Panda*, by George B. Schaller; University of Chicago Press, 1993 (latest printing).

*The Giant Pandas of Wolong*, by George B. Schaller, Hu Jinchu, Pan Wenshi, and Zhu Jing; University of Chicago Press, 1985.

## **Websites:**

FONZ Giant Panda Website (info about wild and the National Zoo's pandas):

<http://www.fonz.org> or <http://pandas.si.edu/>

National Zoo Panda Cams:

<http://pandas.si.edu/pandacam/index.htm>

Zoo Atlanta:

<http://www.zooatlanta.org>

Friends of the National Zoo

The Bear Den (information on bear conservation programs):

<http://www.bearden.org/beartag.html>

China Wildlife Conservation Association:

<http://www.sepaec.gov.cn/english/NGO/CWCA.htm>

Conservation Breeding Specialist Group:

<http://www.cbsg.org/>

San Diego Zoo:

<http://www.sandiegozoo.org>

World Wide Fund for Nature (WWF) information on giant pandas:

<http://www.panda.org/resources/publications/species/pandas/index.htm>

[m](#)

# Curriculum Guide Evaluation

Dear Teachers:

We would like to hear from you regarding this curriculum guide and how it helped meet your classroom needs. Please take a few moments to give us your feedback by completing this questionnaire. When completed, please mail it back to us at:

FONZ Department of Education and Volunteer Services  
National Zoological Park  
3001 Connecticut Avenue, N.W.  
Washington, D.C. 20008

## **Evaluation questions:**

(Please feel free to continue your comments on the back of this sheet.)

1. Which part of the guide did you end up using the most?
2. When you ordered this module what did you expect?
3. Now that you have used the guide, did it meet your expectations?  
Why or why not?
4. What did you like least about it?
5. How many of the activities did you conduct with your students?  
(Please also let us know which worked and which did not.)
6. Any other comments or suggestions?