Living State Symbols Background

Symbol Adoption Information

In 1901, the saguaro flower was selected as the first state symbol (and we were actually only a territory at the time!). It was not until March 16, 1931, that the Arizona State Legislature passed a bill making it our state flower. That same Legislature made the cactus wren our state bird.

More than 20 years later, the palo verde was adopted as the state tree. It would be another 30 years before another effort would be underway to select the rest of our state symbols. However, this effort would be different from those in previous years. In 1985, the Arizona Game and Fish Department decided to celebrate Arizona Wildlife Month by asking more than 120,000 students to vote on which animals they thought would best represent Arizona. These would join the saguaro flower, cactus wren, and palo verde as our state symbols.

Finally, in 2001, the two-tailed swallowtail became the state butterfly after gardening clubs throughout Arizona promoted an "election" and asked citizens, including schoolchildren, to vote for their favorite butterfly.

Discussion Questions

Below are questions that appear on the "What Do You Think?" slides of the State Symbols PowerPoint and possible answers to those questions.

Some words in the following paragraphs may be new to you or your students. The first time these words are used, they are written in capital letters. The capitalized words may be found in the glossary at the end of this lesson.

Also, beneath each question are some possible student answers, which are underlined, and some background information. Use these to help reinforce correct student responses and redirect incorrect ones.

SAGUARO BLOSSOM

Question: Why does this flower bloom at night and close the next day?
Possible Answers:

- *Bat Pollination – Nectar-feeding bats, like the lesser long-nosed bat, account for some POLLINATION of these flowers. However, many animals visit the blossoms during the day. In fact, it is likely that the saguaro can survive quite well without the assistance of bats.*[5]
- *To take advantage of other NOCTURNAL pollinators (e.g., moths) – It is believed that moths and other nocturnal animals may assist in the pollination of the saguaro blossom. However, bats have been found to be the primary night pollinator for the saguaro blossom.*

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

- *Lower Temperatures – Plants can easily lose water through their STOMATA. However, the stomata need to be open in order for PHOTOSYNTHESIS to occur. Cacti, like the saguaro, have adapted to open their stomata during the night, when temperatures are lower, so they will not lose as much water to evaporation. However, the stomata are found in the green skin of the cacti and not in the flowers. Therefore, the water loss is minimal from the blossom itself.*

Question: What animals might use pollen and nectar from this flower?
Possible Answers:

- *Bats – The flowers seem to be the perfect match for bats, particularly the lesser long-nosed bat. Flowers open at night, are high above the ground, and produce large amounts of nectar. However, it has been found that most of the pollination occurs from other animals during the day. Also, bats rarely go north of Tucson even though the saguaro is found well north of Phoenix, and bats have been found to prefer other cacti, like organ pipe.*[8]
- *Bees – The honeybee is the largest pollinator of the saguaro blossom, flying from one flower to another and dispersing the pollen to each one.*[8]
- *Birds – Many birds, including the white-winged dove, are particularly fond of the nectar produced by the flower. In fact, they rely on it for their liquid refreshment as they continue their migration. By sticking their beak deep into the flower to retrieve nectar, some pollen sticks to their head. At the next flower, this pollen brushes off and pollinates the plant.*[7]
- *Small mammals – Although they would likely be attracted to the melon-like smell of the flower, most small mammals, like rodents and rabbits, cannot reach them because they are too high.*

Question: What does the flower get in return?
Possible Answers:

- *Pollination – The blossoms are not capable of pollinating themselves. As a result, they do require another species to transfer the pollen to other nearby flowers. By attracting various animals to the flower, the animals will unintentionally pick up some of the sticky pollen. When the animals visit another flower, the sticky pollen will fall off and possibly pollinate this flower.*[8]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

- *The spread of seeds – The fruit of the saguaro, created after pollination, is a favorite of many animals. When they eat the fruit, they inadvertently transfer the seeds, through their FECES, to other parts of the desert. This is particularly significant with birds, which tend to land on tree branches and "plant" the seeds in the shade of the tree. This tree then becomes a nurse plant for the cactus.*[8]

Question: Why might this flower be large and grow in clusters?
Possible Answer:

- *Easier to see at night – White is a contrasting color to the night sky. As a result, it stands out much more than other colors, like red. In addition, since the flowers are large and grow in clusters, the amount of white is increased. Night pollinators can more easily see the flower.*

CACTUS WREN

Question: Why is it called the cactus wren?
Possible Answer:

- *It lives in cacti – Although many wrens will build a nest on a cactus or other thorny plant, they have also been known to take over the abandoned homes of Gila woodpeckers that are actually carved into the cactus itself.*[7]

Question: How can the cactus wren survive without drinking water?
Possible Answers:

- *It gets water from the food it eats, like cacti – The cactus wren is considered an OMNIVORE. Even though it is known to eat the pulp from cactus fruit, it will also eat insects and seeds.*[8]
- *It gets water from the air – Because the nest is partially closed, moisture accumulates in the nest. The high humidity allows the baby birds to survive on the small amount of water they get from the insects that their parents feed them.*[7]

Question: Why do cactus wrens choose cholla cactus or thorny trees for nest locations?
Possible Answers:

- *Protection from predators – By building deep within the spines of these plants, it is very difficult for predators to gain access to the nests.*[7]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

- *Protection from heat – It has been discovered that the large amount of thorns on cacti and similar plants actually serve as shade to cool off the plant. Since cactus wrens tend to nest late in the spring when the temperature has started to increase, the birds use this shade to cool their nests as well.*[7]

Question: What makes a cactus wren's nest unusual?
Possible Answers:

- *The size and shape – The cactus wren's nest is similar in size and shape to a football. Unlike many other birds' nests, which resemble a bed, the wren's nest is more like a room with an opening at the end.*[8]
- *The material it is made from – The nest of a cactus wren is constructed from grass and lined with feathers. Many desert birds, including roadrunners, use twigs instead of grass.*
- *The birds construct more than one nest – In some cases, the cactus wren is known to create dummy or fake nests, presumably to fool predators. In addition, the birds will actually use more than one nest at a time. After the first brood has hatched, the male will construct a new nest that the female will use to lay and incubate new eggs. In the meantime, the male will watch over the first brood while constructing another nest.*[8]

PALO VERDE

Question: Why are the bark and branches of this tree green?
Possible Answer:

- *For photosynthesis/making food – CHLOROPHYLL is the ORGANELLE in plant cells responsible for photosynthesis. Normally, this is found in the leaves of plants. However, in some desert plants, like the palo verde, the green tissue in the bark also contains chlorophyll. As a result, the tree can get enough energy despite the fact that it has very small leaves.*[5]

Question: Why are the leaves and flowers so small?
Possible Answers:

- *Not enough water for them to develop – Although water is certainly an issue in the desert, most desert plants, including the palo verde, have developed numerous ADAPTATIONS that ensure they get enough water, even during droughts.*
- *To save water – Because small leaves have less surface area exposed to the sun, there is less water that can evaporate from the leaves.*[9]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

Question: What do this tree and the saguaro have in common?
Possible Answers:

- *Both are green – Both the saguaro and the palo verde are primarily green. This is a desert adaptation to ensure the plant can still carry out photosynthesis without leaves.*
- *Both contain thorns or spines – Thorns or spines are a very common adaptation in desert plants. Since there are typically not as many plants for herbivores (animals that eat plants) to feed on, the plants that are around will be eaten more often. As a result, the plants have developed thorns to keep many of the animals from eating them.*[9]

Question: How has the palo verde adapted to the lack of water in the desert?
Possible Answers:

- *It does not keep its leaves year-round – Since photosynthesis can occur in the bark of the tree, the plant can drop its leaves during hot months in order to conserve water and still be able to carry out this necessary life function.*[8]
- *It has very deep roots – The deep roots of the palo verde allow it to tap into ground water and survive during times of drought.*

ARIZONA TREEFROG

Question: What adaptations help the Arizona treefrog survive?
Possible Answers:

- *It hibernates during the dry seasons – Many of the frogs in Arizona spend much of the year in a DORMANT phase. The Arizona treefrog is no exception. It is unknown where the frogs spend this time, but they do come out of their inactive state just before the rainy season.*[4]
- *It has special feet to help it climb trees – These frogs have small disc-like pads on the tips of their toes, which give them a better grip on trees and other climbing surfaces.*[4]

Question: What does it mean to be "insectivorous"?
Possible Answer:

- *The animal eats insects – The Arizona treefrog does eat insects and other small INVERTEBRATES, primarily beetles, spiders, earthworms and flies.*[3]

Question: What is the purpose of the male's vocalization?
Possible Answers:

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

- *To attract a female – The summer rains always trigger the breeding season. At this time, the frogs come out of dormancy. Only the males can vocalize. This chorus of songs will only last about two days, after which the frogs will leave the breeding grounds.*[3]
- *To scare away predators or other male frogs – Although there is no specific information about this behavior, most scientists agree that the vocalizations are used for breeding purposes since they always coincide with the brief breeding season. In addition, the frogs are primarily found in temporary water sources that were created from the storms. As a result, they encounter very few aquatic predators.*[3]

Question: In what part of our state would you find the Arizona treefrog?
Possible Answer:

- *Any place that has water – The Arizona treefrog is an amphibian that requires water. However, its range is much smaller. Primarily, it is found in the mountains along the Mogollon Rim in central Arizona. In addition, a small, isolated population is found in the Huachuca Mountains in the southeastern part of the state.*[4]

APACHE TROUT

Question: Why do you think this species nearly became extinct?
Possible Answers:

- *Overfishing – Although this is often a cause of endangerment and extinction for marine animals, this is not the primary cause for the Apache trout's decline. However, for a while, streams with Apache trout were closed to fishing to ensure no further reduction of the species.*[2]
- *Habitat loss – The Apache trout has certainly seen a significant decline in its available habitat. Some estimates claim the fish may have lost up to 95% of its original habitat. This loss is due to a number of factors, including habitat degradation from cattle grazing, logging, damming and irrigation, as well as takeovers by competing species of fish that have been introduced.*[2]
- *Non-native species introduction – Although the Apache trout has lost a significant part of its original range and habitat, the largest threat to the existence of the fish is the introduction of non-native species of fish, particularly the brown and brook trout. Not only do these other fish compete for the limited space and food resources, but also they HYBRIDIZE, which lowers the amount of pure Apache trout. In addition, since these non-native species of*

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

trout spawn earlier in the year, they actually eat the eggs and young of Apache trout.[2]

Question: How have humans helped this species to recover?
Possible Answers:

- *Removal of competing species – Chemicals have been added to many streams to remove the non-native species. In addition, barriers have been established on many streams to prevent these fish from entering again.*[2]
- *Habitat restoration – Many of the original streams are being studied to see if external factors such as erosion and drought have affected the water. Management of these waterways is being designed and implemented to bring them back to their historic levels.*[2]
- *Reintroduction of Apache trout – A large-scale Apache trout hatchery has been established to ensure that a constant supply of the PUREBRED fish can be reintroduced into the preserved waters. In addition, hatchery programs have been developed to ensure that sport fish, like rainbow trout, can remain at levels so that people do not have to fish for Apache trout.*[2]

Question: In what part(s) of Arizona would you find this species?
Possible Answer:

- *In the streams and rivers of Arizona – Many of the streams and rivers in Arizona do not have the right conditions for this fish to survive. In fact, the Apache trout is found primarily in the lakes and rivers located in the White Mountains. Many other types of trout, including the Gila trout, can be found in other waterways throughout Arizona.*[2]

RIDGENOSED RATTLESNAKE
Question: Why does it have a rattle?
Possible Answers:

- *To protect itself – The sound of the rattle is intended to be a message that the snake sends to potential predators, or even large animals, like humans, that otherwise might not see it and could ultimately step on it.*[5]
- *To help it capture its prey – The rattlesnake uses its nose and tongue during the day, or its heat-sensitive pits if it is hunting at night, to pick up the scents of potential food. By lying in wait and striking at lightning-fast speeds, the snake relies on silence and surprise to catch its prey. The rattle is not used in hunting. In fact, it would more than likely scare away any rodents and small birds.*[5]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

Question: How does this rattlesnake fit into the cycle of life in our desert?
Possible Answer:

- *<u>It eats animals that we consider pests</u> – Rattlesnakes are the natural predators of mice and rats. These animals can cause severe damage to plants and may carry diseases that can spread to other animals. The snakes keep the populations of these rodents under control.*[8]

Question: This is a *protected* species. What does that mean?
Possible Answers:

- *<u>We are not allowed to kill the animal</u> – In fact, protection means more than just not killing an animal. If an animal is protected in Arizona, then it is illegal to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect it.*
- *<u>There are not many of them left in the wild</u> – Although this animal is not considered endangered or even threatened, it is widely thought that there are less of these snakes than there were 25 years ago. As a result, certain measures have been put in place to ensure that further habitat destruction and loss -- from recreation, mining and logging -- does not push the animal into decline.*[1]

RINGTAIL
Question: Why do some people call the ringtail a miner's cat or ringtail cat?
Possible Answer:

- *<u>Because they were used by miners to see in dark caves</u> – Although they are timid at first, ringtails quickly lose their fear of humans. The creatures like to explore dark caves created by miners. People used to DOMESTICATE the ringtail by providing food and shelter. In exchange, the ringtail would rid the miners' cabins of mice and other rodents.*[7]

Question: How is it different from a cat?
Possible Answers:

- *<u>It eats different types of food</u> – Ringtails are known as omnivores, which means they will eat just about anything, whether it is animal or vegetable. In fact, they will eat anything they can get their claws on, including rodents, birds, snakes, lizards, insects and fruit.*[8]
- *<u>It doesn't hunt its food</u> – As the miners of early Arizona discovered, ringtails make excellent "mousers." They are good at finding mice and other rodents, pouncing on them, and killing them.*[8]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

- *<u>It does not have retractable claws</u> – The claws of ringtails are unique. Like cats, they have SEMI-RETRACTABLE claws. However, they are actually capable of rotating their hind feet 180°. This gives them a better grip as they descend down steep cliffs face-first.*[8]
- *<u>It emits a smell</u> – Unlike cats, ringtails have scent glands from which they can emit an odor when they are frightened.*[8]
- *<u>It only comes out at night</u> – Ringtails are purely nocturnal animals. Their large eyes and ears make them particularly suited for hunting at night.*[8]

Question: How has the ringtail adapted to its habitat?
Possible Answers:

- *<u>Large eyes and ears make it good at surviving at night</u> – Most animals that are nocturnal have these common characteristics. The large eyes make them better able to pick up movement with less light. In addition, the larger ears magnify sounds and allow them to focus in on the precise locations of sounds.*[8]
- *<u>It comes out when the temperatures are cooler</u> – Many desert animals have developed this adaptation. Since it is most active at night, the ringtail is able to avoid the hot temperatures that are associated with daylight in the desert. As a result, the animal does not need as much water and can remain active for a longer period of time.*

Question: Why might the ringtail have such a long tail?
Possible Answers:

- *<u>Balance</u> – The ringtail is commonly found near canyons. The long tail improves its balance and allows it to move easily and swiftly from canyon walls and trees.*[8]
- *<u>Holding on to tree branches</u> – Unlike monkeys, the ringtail does not have a PREHENSILE tail. As a result, it cannot be used like a hand to grab on to objects like branches.*

TWO-TAILED SWALLOWTAIL BUTTERFLY
Question: Does this butterfly really have two tails?
Possible Answer:

- *<u>No</u> – In reality, the tails are actually extensions of the hind wings. This butterfly derives its name because each hind wing has two "tails." Tail-like extensions are common in many species of butterflies and may be used to trick predators into thinking that they are antennas. When it comes down to bite the head, the butterfly can then fly off in the opposite direction.*[6]

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

Question: How many different species of swallowtail butterflies live in Arizona?
Possible Answer:

- *Arizona is a desert, so there can't be a lot of butterflies here* - *Although exact numbers can sometimes be difficult to determine, about 14 species of swallowtail butterfly are believed to live in Arizona. This state is very active for butterfly species. Well over 200 butterfly species can be seen throughout Arizona.*[6]

Question: Of all the butterflies in Arizona, why was this selected as the state butterfly?
Possible Answer:

- *There was an election, and the people chose* – Gardening clubs throughout Arizona promoted an "election" and asked citizens, including schoolchildren, to vote for their favorite butterfly. This species was selected through that process.

Glossary

ADAPTATIONS – changes in an organism that make it better suited to survive in its environment
CHLOROPHYLL – a green chemical found in plants that helps make food for the plant
DOMESTICATE – to remove from the wild and make tame
DORMANT – a time in which all normal activity is suspended (i.e. hibernation)
FECES – solid waste from an animal
HYBRIDIZE – to breed animals of different species; crossbreed
INVERTEBRATES – animals without backbones
NOCTURNAL – primarily active at night
OMNIVORE – an animal that eats both plants and meat
ORGANELLE – a small structure located inside a cell that performs a specific function
PHOTOSYNTHESIS – the process in which a plant uses sunlight to make food
POLLINATION – fertilization of a plant by the transfer of pollen from the male part to the female part
PREHENSILE – able to grip
PUREBRED – containing no genetic material from other species of animal
SEMI-RETRACTABLE – claws that can be partially pulled in when not in use
STOMATA – tiny openings on the surface of leaves that allow water to enter and exit

References

[1] Arizona Game and Fish Department. 2001. *Crotalus willardi willardi*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 5 pp.

[2] Arizona Game and Fish Department. 2001. *Oncorhynchus apache*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 6 pp.

[3] Arizona Partners in Amphibian and Reptile Research. *Mountain Treefrog*. 25 March 2005. < http://www.reptilesofaz.com/Turtle-Amphibs-Subpages/h-h-wrightorum.html>

[4] Arizona State Libraries, Archives, and Public Records: Museum Division. "*Arizona State Amphibian*." 25 March 2005. < http://www.lib.az.us/museum/symb-amph.cfm>

[5] Lazaroff, David Wentworth. *Book of Answers*. Tucson: Arizona-Sonora Desert Museum Press, 1998.

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov

[6] Northern Prairie Wildlife Research Center. *Butterflies of Arizona*. 17 March 2005. <http://www.npwrc.usgs.gov/resource/distr/lepid/bflyusa/az/toc.htm>
[7] Olin, George. *House in the Sun*. Tucson: Southwest Parks and Monuments Association, 1994.
[8] Phillips, Steven J. and Patricia Wentworth Comus, Eds. *A Natural History of the Sonoran Desert*. Tucson: Arizona-Sonora Desert Museum, 2000.
[9] Southwest Center for Education and the Natural Environment. "*Desert Patterns*." 25 March 2005. < http://scene.asu.edu/habitat/patterns.html>

Arizona Game and Fish Department
Education Branch
2221 W. Greenway Road
Phoenix, AZ 85023
azgfd.gov