

## Answers to the Student Worksheet for the Cove Forest Virtual Field Trip

Please answer the following questions.

1. What characteristics define a Cove Forest?
  - \* *found in North America in the Southern Appalachian Mountains of the United States*
  - \* *mixed deciduous forest (lose their leaves in the fall)*
  - \* *restricted to mountain coves, bowl shaped valleys with rich, fertile, damp soil and usually a stream*
  - \* *greatest tree and plant diversity of any forest type in the US*
2. Which 4 State Parks in South Carolina have Cove Forest communities within their boundaries?
  - \* *Jones Gap*
  - \* *Table Rock*
  - \* *Oconee*
  - \* *Caesars Head*
3. How can the presence of forested lands around reservoirs and rivers protect our drinking water resources?
  - \* *by reducing soil runoff and absorbing excess nutrients*
4. What does the term "mesophyte" mean?
  - \* *organisms (in this case plants) that are adapted to relatively cool, moist environments and rich soils*
5. What are the 3 differences between coniferous and flowering trees?
  - \* *coniferous - seeds in cones, needle-like leaves, evergreen*
  - \* *flowering - seeds in fruit, broad leaves, deciduous*
6. What are the different vegetation layers found in a Cove Forest and what is a general description of the plants are found in each layer?
  - \* *canopy - large, closely bunched trees form a canopy which blocks out the light underneath. most of the photosynthesis in a forest takes place here*
  - \* *understory - contain smaller individuals of canopy tree species and other genetically smaller trees*
  - \* *shrub - woody plants with several stems that are generally smaller than trees*
  - \* *herbaceous - green plants with soft, rather than woody stems*

7. Give an example of a tree species found in the canopy layer and tell me something interesting that you found out about this species.
- \* *beech - Fagus grandifolia, smooth gray bark, sharp pointed buds, and papery toothed leaves, tolerates deep shade, beech nuts are good food for wildlife*
  - \* *basswood - Tilia americana, medium to large tree with large heart shaped leaves that a finely toothed and asymmetrical at the base, flowers and fruits occur in clusters on slender stalks attached to a leaf-like bract, bees actively forage for on nectar from the flowers, basswood honey is highly favored*
8. Give an example of a tree species found in the understory and tell me something interesting that you found out about this species.
- \* *flowering dogwood - Cornus florida, small understory tree widely planted in residential areas, in spring, clusters of small greenish flowers surrounded by 4 large white petal like bracts are produced which develop into red berries in the fall, berries are important food source to wildlife, especially birds. becoming scarce due to parasitic fungus called anthracnose*
  - \* *Carolina silverbell - Halesia tetraptera, distinctive white-yellow vertical streaks on young stems, early spring produces white bell shaped flowers, that develop into dry fruit with 4 conspicuous wings*
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  - \* *yellow buckeye - Aesculus flava, palm shaped leaves of deciduous trees divided into 5 to 7 large leaflets, first to leaf out in the spring, produces clusters of tubular yellow flowers that develop into large round fruits with 1 to 3 dark shiny seeds, both leaves and seeds contain chemicals toxic to animals*
  - \* *ironwood - Carpinus caroliniana, slow growing that occurs along streams and in moist bottomlands forests, wood is extremely hard and used to make gold heads, mallets, and tool handles.*
9. Give an example of a plant species found in the shrub layer and tell me something interesting that you found out about this species.
- \* *sweet shrub - Calycanthus floridus, common name refers to its fragrant leaves, twigs, and flowers, has distinctive maroon or brownish flowers that develop into large brown pods, white footed mice often chew a hole in the pods and eat the seeds within*
  - \* *rosebay - Rhododendron maximum, evergreen shrub or small tree that forms a dense thicket in cool, moist, partially shaded site such as stream banks ravines and mountain slopes, has thick leathery leaves and in the spring produces dense clusters of white to pale pink flowers that are pollinated by bumble bees.*

- \* *snowy hydrangea* - *Hydrangea radiata*, deciduous shrub with peeling bark on its stems, occurs in open woods, along streams, and moist roadside areas, flowers form dense clusters with showy white bracts on the outer margin that apparently help attract pollinators.
- \* *doghobble* - *Leucothoe fontanesiana*, evergreen shrub that forms dense thickets in ravines and along streams, leaves are thick and leathery and the upside-down, urn shaped fragrant flowers bloom in early spring.
- \* *spice bush* - *Lindera benzoin*, upright deciduous shrub that occurs along streams and in rich, moist woods, produces dense clusters of small yellow flowers in early spring and bright red berry-like fruits in the fall, birds feed on the fleshy fruits and help disperse the seeds.
- \* *maple leaf viburnum* - *Viburnum acerfolium*, small, clump forming shrub with three-lobed leaves that resemble maple leaves, showy clusters of white flowers that produce fleshy, berry-like fruits dispersed by birds, maples, on the other hand, have inconspicuous flowers and winged fruits that are dispersed by wind.
- \* *Dutchman's pipe* - *Aristolochia macrophyllum*, looks like a tangled shrub, but is actually a woody vine with large heart shaped leaves and small flowers that look like old-time smoking pipes, toxins in the leaves prevent most animals from feeding on this plant.

10. Give an example of a plant species found in the herbaceous layer and tell me something interesting that you found out about this species.

- \* *trout lily* - *Erythronium americanum*, has a very short growing season, emerge in late winter-early spring as soil temperatures rise, a few weeks later (when canopy tree leaf out and forest floor is in deep shade) it goes dormant, easily recognized by its nodding solitary yellow flowers and narrow spotted leaves, markings on the leaf surface loosely resemble the splotches on a brook trout.
- \* *mayapple* - *Podophyllum peltatum*, widespread herb that carpets the forest floor in early spring, single large white flower with yellow centers that hang down beneath large umbrella-like leaves, chemicals from this plant are currently used to treat certain types of cancer.
- \* *large flowered trillium* - *Trillium grandiflorum*, easily recognized by having a single whorl of three leaves and one conspicuous flower, which are initially white, but change to pink as the flower ages, seeds are dispersed by ants.
- \* *jack-in-the-pulpit* - *Arisaema triphyllum*, produces one or two leaves, each of which is divided into 3 leaflets, a cluster of tiny flowers is produced at the base of the striped tubular structure (called a spathe) that resembles a hooded pulpit with "Jack", the minister, standing within, a dense cluster of bright red fruits is produced in late summer.
- \* *yellow lady's slipper* - *Cypripedium calceolus* var. *pubescens*, large yellow flowers with a conspicuous pouch, depends on deception for pollination because it offers no food reward to potential pollinators, becoming increasingly less common due to collection from the wild.

- \* *large-flowered heartleaf - Hexastylis shuttleworthii*, low growing plant with evergreen heart-shaped leaves, large jug-shaped flowers occur on the soil surface, often under decomposing leaves, ant-dispersed seeds.
- \* *wood nettle - Laportea canadensis*, has stinging hairs on its stems and leaves maybe to deter animals from feeding on it.
- \* *Christmas fern - Polystichum acrostichoides*, evergreen fern commonly occurring on moist sites such as ravines and rocky slopes, only the leaves emerge above ground (stem is underground), reproduces by tiny wind-dispersed spores rather than seeds.
- \* *bloodroot - Sanguinaria canadensis*, one of the first plants to bloom in spring, only one flower and one leaf produced per plant, large white flower opens during the day and closes at night, bloodroot refers to the bright orange-red juice produced by the underground stem (rhizome), Native Americans used the juice as dye for clothing and baskets and for body paint.
- \* *Canada violet - Viola canadensis*, relatively tall violet with heart-shaped leaves, produces many white flowers that fade to purple with age, often found in clumps, individuals spread via seed as well as by lateral branches that root in the soil to form new plants.
- \* *Oconee bells- Sortie galacifolia*, small evergreen species related to galax with white flowers produced in March. discovered by French botanist Andre Michaux in 1787 growing in the confluence of the Horsepasture and Keowhee Rivers, found in only 2 small areas: the Savannah River drainage in northwestern South Carolina, southwestern North Carolina, and northeastern Georgia and in McDowell county, North Carolina.

11. Give an example of a mammal found in a Cove Forest community and tell me something interesting that you found out about this species.

- \* *golden mouse - Ochrotomys nuttali*, adult fur is light to brilliant orange-gold, uses shrubs or vines as aerial highways and nests above ground in structures that hang in the shrub layer, eats seeds, nuts, and berries.
- \* *deer mouse - Peromyscus maniculatus*, important prey item for avian and mammalian predators, most widespread of North American rodents, nocturnal, nests in trees and under rocks, eats fruits, nuts, and underground fungus, in cold weather, can enter a type of deep sleep (daily torpor) with body temperatures dropping to 50°F from 98°F for up to 12 hours.
- \* *red backed vole - Clethrionomys gapper*, relative of muskrat and lemming, found in high altitude cove forests, semifossorial (uses underground runways and spaces between rocks and tree roots, adults have a broad reddish band running g from their head to their rum, eat underground fungi, nuts, seeds, ferns, lichens, and berries.
- \* *masked shrew - Sorex cinereus*, insectivore, related to the common moles, smallest mammal in United States (2-5grams), constantly active with a high metabolism, eats it weight in food everyday (insects and worms), can crawl through tunnels created by its prey.
- \* *short-tailed shrew - Blarina brevicauda*, very common, one of the largest of the shrew species (11-30grams), eats earthworms, snails, and insects, but can

*kill salamanders, frogs, and even small mice, poisonous saliva is used to subdue large prey, emit sonar to navigate through tunnels.*

- \* *Eastern chipmunk - Tamias striatus, burrowing ground squirrel that is adept at climbing through trees, eats nuts and seeds, but can also eat flowers, leaves, fungi, and small amphibians or birds, emits bird-like chirping when it is alarmed, true hibernator.*
- \* *flying squirrel - Glaucomys volans, most common squirrel in cove forest, strictly nocturnal so seldom seen, glides, but doesn't fly using flaps of skin (patagium) that extends between the wrists and rear legs, flat tail acts as a rudder, can glide up to 270 feet.*
- \* *gray fox - Urocyon cinereoargenteus, widely distributed and associated with deciduous forests, omnivore (eats fruit, insects, and small mammal prey items), only fox that can climb trees (individuals have been seen up to 50 feet above the ground).*
- \* *Eastern pipistrelle Bat - Pipistrellus subflavus, smallest bat in the southern US, one of the most common bats in the cove forest, very early evening feeder that tends to feed at treetop levels.*
- \* *red bat - Lasiurus borealis, roost in trees and shrubs during the day, moths are their preferred prey items.*

12. Give an example of an amphibian found in a Cove Forest community and tell me something interesting that you found out about this species.

- \* *wood frog - Rana sylvatica, medium sized frog, primarily a northern species with a southerly distribution associated with the cove forests of the mountains of SC, easily identified by the dark mask extending back from the eye, early breeder sometimes laying eggs with snow on the ground, has ability to freeze and thaw without any detrimental effects.*
- \* *Fowler's toad - Bufo fowleri, commonly found in the deciduous forests of the Carolinas, has more than 2 warts on each dorsal dark spot, large glands behind the eyes are called parotid glands (secretes whitish poisonous fluid that deters predators).*
- \* *red salamander - Pseudotriton ruber, colors range from purplish brown to deep orange-red, lungless, terrestrial, eggs laid in water, prolonged larval period (up to 3 years), undergoes metamorphosis into an adult, eats other salamanders, produces toxic skin secretions to deter predation.*
- \* *black bellied salamander - Desmognathus quadramaculatus, largest of the lungless salamanders, usually found in streams that have a rocky bottom and rest on wet rocks near the stream, feed on other smaller salamanders.*
- \* *Ocoee salamander - Desmognathus ocoee, lungless, found in streams and wet areas adjacent to streams, highly variable dorsal color patterning (usually a series of connected, paired blotches), tail is rounded.*
- \* *Jordan's salamander - Plethodon jordani, lungless, extremely abundant at higher altitudes, sticky mucus secreted by the tail to prevent predation, live in moist conditions (under logs and rocks), eggs laid on land, not water.*
- \* *two-lined salamander - Eurycea bislineata, one of the smallest salamanders found in the cove forest, found under logs and rocks in moist soil conditions,*

*usually near water, breeding occurs within rocks and debris in small streams and seepages, well-developed sense of smell due to nasal cirri (fingerlike projections that extend below the lips).*

- \* *spotted salamander - Ambystoma maculatum, shiny black back with large yellow to yellow-orange spots, early breeder (laying eggs in February with ice sometimes present), adults are terrestrial, eat insects and worms.*

13. Give an example of a bird found in a Cove Forest community and tell me something interesting that you found out about this species.

- \* *piliated woodpecker - Drycopus pileatus, largest woodpecker in the US, produces rectangular holes on dead trees, favorite food in the carpenter ant, favors mature hardwood forest, requires large tract of land for its territory.*
- \* *white breasted nuthatch - Sitta carolinensis, found in mature hardwood forests, forages for insects on the trunk and large branches of trees, moves by hopping up and down the tree while clinging to the bark, stores food items in the crevices of the outer bark for the winter.*
- \* *red-eyed vireo - Vireo olivaceus, one of the most common birds on a cove forest, rarely seen since they live in the treetops, eats insects.*
- \* *black-throated blue warbler - Dendroica caerulescens, prefers to forage in the shrub layer, likes higher elevation sites, but can be found in lower elevations, forages for insects such as caterpillars and moths, and has been observed stealing insects from spider webs.*
- \* *scarlet tanager - Piranga olivacea, common, prefers to forage in oak trees and in forests with closed canopies, feed on insects usually high above ground level.*
- \* *worm-eating warbler - Helmitheros vermivorus, insect eater that does not feed heavily on earthworms, eats at ground or shrub level, prefers dense wooded areas, especially cool, shaded gullies and steep forested slopes.*
- \* *Acadian flycatcher - Empidonax vireescens, prefers moist habitats such as along rivers, likes high shrub densities, feed on insects caught on the wing (in midair), also snatches insects off leaves while hovering.*
- \* *ovenbird - Seiurus aurocapillus, has to have mature hardwoods for successful breeding, walks on the leaf litter on the forest floor searching for insects, calls "teacher...teacher..", nests in ground structures that resemble old-fashioned clay domed ovens.*
- \* *hooded warbler - Wilsonia citrina, common, feeding activity concentrated in the understory bushes, consume insects on the ground and in bushes, and will pick insects off of understory leaves during short foraging flights, nest in bushes close to ground level.*

14. Give an example of a reptile found in a Cove Forest community and tell me something interesting that you found out about this species.
- \* *Eastern box turtle - Terrapene carolina, very common, terrestrial, males have red eyes and the bottom of the shell (plastron) is scooped out, females have brown/yellow eyes and flat plastron, eat snails, insects, earthworms, plants, and even poisonous mushrooms.*
  - \* *Eastern garter snake - Thamnophis sirtalis, range extends into the northern reaches of Canada, eats frogs and salamanders, gives birth to an average of 33 young, live birth (viviparous).*
  - \* *copperhead - Agkistrodon contortix, poisonous snake, pit located on each side of the head between the eyes and nasal opening, pit is a heat sensor, eats, insects, amphibians, reptiles, birds, and mammals, gives birth to live young.*
  - \* *Northern water snake - Negroid sip don, aquatic, found in slow moving bodies of water, often found basking on logs in water or on rocks close to the water, eats fish and amphibians, temperamental and may sometimes be mistaken for the copperhead.*
  - \* *rat snake - Elaphe obsoleta, diurnal, adept climber, frequently found climbing trees and nesting in tree cavities, high above ground level, eats small mammals and birds and their eggs, constricts its prey to kill it.*
  - \* *ringneck snake - very secretive, nocturnal, found under logs and rocks in moist areas, eats earthworms and small salamanders.*
15. Besides using animals such as insects, how else can pollen be transported from flower to flower?
- \* *wind*
16. What is a frugivore?
- \* *animals that feed on fruits*
17. What kinds of defenses do plants have to prevent animals from grazing on them? Give examples of each kind.
- \* *mechanical - hairs, spines, and thorns. ex. wood nettle*
  - \* *chemical - leaves, stems, and roots can contain chemicals that deter herbivores. ex. oak leaves and their bitter tasting tannins.*
18. Give an example of a federally listed endangered species found in a Cove Forest community and explain why it is endangered.
- \* *persistent trillium - Trillium persistens - found in acidic coves and gorges, endangered due to habitat lose*

19. Give an example of an introduced invasive species to the Cove Forest community and explain the problems this species is causing to the forest and the organisms that live there.
- \* *European wild boar - eat, trample, uproot, and kill a large number of plants, compete with native animals for food, maybe even out competing them during years when food is scarce.*
  - \* *Japanese stilt grass - forms dense mats of vegetation that may eliminate native plants*
  - \* *chestnut blight - killed the dominant tree species in the cove forest. the chestnut provided food and shelter for the animals found in the cove forest, it was also the cornerstone species for the forest, with that gone the entire forest and its inhabitants had to change or they died off.*
  - \* *dogwood anthracnose - killing dogwoods, without the dogwoods, a large fall food supply would be gone*