UNIT: H01 TITLE: Intro to Wildland Fire

TYPE: Slideshow Script

Slide 1: Today you will be introduced to the tallgrass prairie and the role that fire plays in this ecosystem. Click

Please use the Click prompts that are embedded in the slideshow script to coordinate the narration with corresponding images.

Slide 2: This is an example of a landscape typical of the tallgrass prairie. Grasses are the dominant vegetation which means it is often possible to see great distances. Trees are growing along low-lying areas where, perhaps, small waterways flow when there is enough rainfall. Walking through this area would certainly reveal other plants and many animals that are well-adapted to this ecosystem. No fire is visible in this image. However, evidence of fire's impact is present. During this presentation, you will complete a worksheet by answering questions, completing tables, and drawing images. Before we begin, be sure that you have the worksheet and, at least, two pens/pencils of different colors. Click

Slide 3: Let's take a moment to see how familiar you are with where the tallgrass prairie is found in North America. If you have a smartphone, Chromebook, or computer, go to a mapping application (e.g. Google Maps, Maps on iPhones, Google Earth), switch to "satellite view" and zoom in until the United States is centered on the screen. Feel free to zoom in and move around your reference map as needed. Click If you do not have a Chromebook/laptop, refer to this slide. On the worksheet's map "Tallgrass Prairie Distribution," draw a boundary around where you think the tallgrass prairie is located. Feel free to use what you know about biomes! Be sure to respond to the prompts beneath the map concerning the evidence and reasoning you used. *After students have a minute or two to come up with their range maps, have them compare with their colleagues'*. Take a moment to compare your map with your neighbors'. How are your maps matching up? Now let's see how well your maps compare with those of experts. Click

Slide 4: How does your distribution map match up to this one? With a differently colored pen or pencil, quickly draw the boundary of this distribution on your map. As you can see, the tallgrass prairie extends from the Gulf Coast of Texas to southern Manitoba, Canada and from just east of the 100th Meridian to the Illinois-Indiana border. What do you think are some of the factors that "confine" the tallgrass prairie within this map's

boundary? *Take a few student responses. Answers might include references to temperature, precipitation, soil, farming/ranching, fire, rivers, etc*. Click The overlay is a map showing the original tallgrass prairie (light green) according to the Nature Conservancy and areas where tallgrass prairie remnants can be found (dark green). What do you think contributes to the tallgrass prairies being reduced to "remnant sites?" *Answers might include references to farming/ranching, urban development, climate change, fire, storms, etc*. Click

Slide 5: What abiotic factors are shown in these two great plains maps? On your worksheet, describe each map. Would anyone like to read their description of the precipitation map? *Average annual precipitation has a gradient from east to west (or west to east). Either the average annual precipitation decreases as you move from east to west, or the average annual precipitation increases as you move from west to east.* Would anyone like to read their description of the temperature map? *Average annual temperature has a gradient from north to south (or south to north). Either the average annual temperature increases as you move from north to south, or the average annual temperature decreases as you move from south to north.* From your understanding of where the tallgrass prairie is located, do these abiotic factor gradients seem to influence the distribution of the tallgrass prairie? *Dominant tallgrass prairie plant species are able to survive in a variety of growing seasons with differences in precipitation.* It seems that there must be other factors involved in determining tallgrass prairie location. What are some other factors that may have contributed to the historic distribution of the tallgrass prairie? *Responses might include types of soils, rocks, bison, rivers, trees, competition with other vegetation, fire, tornadoes/storms, mountains, etc.* List a few of the class' "suggested factors" you think are most probable on your worksheet. Did you notice that some of the suggested factors could be described as disturbances? (*Bison grazing, fire, tornadoes, floods*). Now let's take a look at the important role one of these disturbances plays on the Tallgrass Prairie. Click

Slide 6: This is a fire burning in the Kansas Flint Hills which is part of the tallgrass prairie. Can the season of the year in which this fire took place be determined? *Probably winter*. In "Box A" of the handout, develop a drawing/diagram of this fire. What are some details that should be included in the drawing/diagram (*e.g. flame height relative to vegetation present, direction of wind*)? *Give students time to produce their drawings.* Click

Slide 7: Here is the typical aftermath of a fire similar to the one shown on the previous slide. Would someone like to describe this image? Once again, in which season of the year did this fire take place? To the right, we can see some unburned vegetation. How would you describe the vegetation during this season? *Dormant*. This first type of fire is often referred to as a dormant season burn. Let's move on to another situation. Click

Slide 8: Before we make any comments about this image, sketch it in Box B. *Give students time to produce their drawings.* Would anyone like to describe any similarities and/or differences with the first fire image we saw? *Students should notice the green grass and, perhaps, some "brown" grass from the year before. Students might describe a difference in fire intensity.* Okay, let's check out the aftermath of this type of fire. Click

Slide 9: What do we see here? There appears to be some vegetation that survived. Some of the green plants shown will "brown" and the above ground portions of such plants will "top killed" as a result of the fire that passed. However, some of the vegetation was not affected. What might be some reasons a growing season fire is unable to burn off all of the vegetation in this image? *Typical responses might include a lack of dry/dead fuel to burn within the green patches, water content of green vegetation, change of wind direction, rain, fire was "put out," etc.* This type of fire is often categorized as a growing season burn. Let's take a look at one more case. Click

Slide 10: No comments! In Box C, draw this fire. *Give students time to produce their drawings.* What is your emotional response to this fire compared to the others we've seen? *This is an extremely large, intense, and dangerous fire. This fire would be very difficult to control.*This is an image of a wildfire on the tallgrass prairie. For the tallgrass prairie, what might be considered "out of place" in this image? Let's take a look at video of a similar situation. Click

Slide 11: *Play the video**. This is a stand of eastern redcedar trees burning during a prescribed burn conducted at night. What would we expect to find in the morning? *Give students an opportunity to respond.* Click

**In case there is a problem showing this video, it is also included in the online teacher resources for this lesson.*

Slide 12: This is a stand of eastern redcedar trees that has been burned in a wildfire. For these trees, the fire's effect is devastation. We can also imagine the direct and indirect impacts to animals. Burns, heat stress, asphyxiation. Loss of food, loss of nest sites, exposure to predation. Even though the damage shown in this image is dramatic, how could a stand of dead cedar trees be good for the tallgrass prairie? *Fire reduces the amount of woody vegetation in an area which can allow grasses and wildflowers to be more prevalent.* Fire can protect grassland areas from being invaded by trees. Click

Slide 13: Of these three "aftermath" images, which area has the best chance of recovering? *Wait for student responses*. This is a trick question! Click The time until "recovery" will probably differ, but vegetation in all three areas will recover as will animal populations. We are now going to introduce some of the most recognizable tallgrass prairie species and their relationships to fire. As we go through these species, develop a food web that might be found on the tallgrass prairie in the "Tallgrass Prairie Food Web" box on your worksheet. Be sure to label your food web with common names, trophic "category" (e.g. producer, secondary consumer, omnivore, autotroph, etc.), and other relevant information. *Be sure that students are familiar with trophic terminology before continuing*. Feel free to use species not included in the discussion. Remember, you have been asked to draw a food web not a food chain. It shouldn't be a surprise that the first species will be a tall grass…. Click

Slide 14: Big bluestem. This is a native species. 3-8 feet tall (100-250 cm). Why do you think this grass is sometimes called "turkeyfoot?" Big bluestem is characteristic of grasslands throughout the tallgrass prairie. Historically, big bluestem once blanketed the tallgrass prairie comprising from 70 to 90 percent of the vegetation. Big bluestem provides food and cover for numerous wildlife species. It is both palatable and nutritious, and livestock often prefer it over other grasses on summer ranges. Upland game birds and songbirds eat the seeds. Having evolved in a grassland environment subjected to frequent fires, big bluestem is well adapted to fire. After aboveground foliage is consumed by fire, new growth is initiated from rhizomes found belowground. Click

Slide 15: Indian grass. This is a native species. 3-6.5 feet tall (90-200 cm). In the northern parts of the tallgrass prairie, Indiangrass is not as plentiful as big bluestem. In southern areas, it may comprise over 90 percent of a stand. Numerous songbirds and small mammals eat the seeds. Indiangrass is highly palatable to cattle/bison during the summer. Indiangrass provides excellent nesting and security cover for pheasants, northern bobwhite, mourning doves, prairie chickens, and numerous songbirds. Without periodic fires Indiangrass declines in terms of reproductive effort and relative cover. Indiangrass survives fire primarily by sprouting from on-site surviving rhizomes. Click

Slide 16: Now let's take a look and a few forbs native to the tallgrass prairie. Forbs are nonwoody plants that aren't grasses. Click This first image is butterfly milkweed, *Asclepias tuberosa*. After a fire, milkweed likely regenerates from both seed and by sprouting from deeply buried rhizomes and from the root crown. Milkweed seeds from nearby, unburned sites are readily wind-dispersed onto burned areas. Of course, most of you recognize milkweed as an important host plant for the monarch butterfly. Click Next is prairie purple coneflower, *Echinacea angustifolia*. This forb is valuable because of its use in a variety of medicines and herbal remedies. Many pollinators visit purple

coneflower for its sweet nectar. Because purple coneflower is well-adapted to fire, it is often found in sites disturbed by fire and grazing. Click And last is Maximilian sunflower, *Helianthus maximiliani.* This sunflower has good fire tolerance in the dormant state and can reproduce by rhizomes. It produces numerous, small, wind-dispersed seeds which can establish on burned sites. Maximilian sunflower thrives in the open, sunny conditions created by fire. Click

Slide 17: Having presented a few of the producers found in tallgrass prairie food webs, let's take a look at some consumers. We'll begin with insects. Click Everyone has heard of the monarch butterfly (*Danaus plexippus*), right? Here we see it visiting a milkweed plant to feed on nectar. Click Next is the bumble bee (*Megabombus pennsylvanicus*) visiting which flower from the previous slide? Correct! The purple coneflower. Bees and butterflies are great examples of pollinators which play an important role in the reproduction of many plants and, thus, in our food supply. Click To continue, you can't have a list of insects from the tallGRASS prairie without a grasshopper. This is the migratory grasshopper (*Melanoplus sanguinipes*) which is an important primary consumer and food item for many secondary consumers. Click Our last species is the prairie mound ant (*Formica montana*). On flowering sideoats grama grass, the ants are tending a group of aphids which produce honeydew that the ants use as a food source. Fire can have direct and indirect impacts on all tallgrass prairie animals. Direct impacts include burns, heat stress, and predation as animals flee a fire. Indirect impacts include changes in food availability, loss of nesting sites, and increased predation pressure due to a loss of cover. Click

Slide 18: Birds are often species that familiar us because of their visibility and singing. Click The Eastern Meadowlark is one of the most common birds in the tallgrass prairie. Click The Greater Prairie-Chicken is an icon of the tallgrass prairie. Patchy fires described earlier provide the Greater Prairie-Chicken with display leks on recently burned areas and with cover from predation in areas that have recovered from the previous year's fires. Click The Northern Harrier likes to hunt near the ground over wide open spaces with few trees. Click The Upland Sandpiper prefers to feed in recently burned areas but selects areas with taller and denser vegetation for nesting. Click Finally, we have Henslow's Sparrow which, like so many other tallgrass species, is experiencing a decline in populations due to habitat loss. Disturbance is necessary to maintain prairies, and fire is a disturbance that can provide a variety of habitats to meet the life history needs of many species. Click

Slide 19: Even though reptiles and amphibians are relatively abundant on the tallgrass prairie, they are usually not as noticeable as other species. Click The Great Plains Toad has adapted to the relative scarcity of water on the tallgrass prairie. To lay its eggs, this species of toad takes advantage of depressions (e.g. bison wallows) that fill with water

after heavy rainfall. Click The Ornate Box Turtle is well camouflaged for a life on the prairie. Click The Prairie Racerunner can be found in more open areas near cover such as rocky areas. Click The majority of tallgrass prairie snakes are nonvenomous, but some venomous species, like this Prairie Rattlesnake, are present. Burrows, rocks, and cracks in the soil can provide protection for smaller animals during a fire. Click However, it is not uncommon to find individuals killed by a passing fire. Click Remember that natural systems are not wasteful, and some species will always be ready to make the most of a "bad" situation like this Swainson's Hawk. Click

Slide 20: Large mammals are some of the most well known animals on the tallgrass prairie. Click I'm sure you all recognize the Bison. The bison is considered a keystone species because of impacts caused by large herds intensely grazing as they migrate. Bison wallows provide open habitats for other species, and hoof action on soil can help with moisture absorption and nutrient cycling. The combination of bison grazing and fire (pyric-herbivory) is now considered to be the complex disturbance that allowed the tallgrass prairie to repel tree invasions for thousands of years. Click White-tailed Deer is another large herbivore species that feeds on a variety of producers. Click The most common large predator is now the Coyote. Click We can't overlook the numerous small mammal species that are so important on the prairie. One of these small mammals is the Deer Mouse which is found over the entirety of the tallgrass prairie. Click This is the Eastern Red Bat. Wherever a few trees are found, there's a chance that this predator could be roosting during the day. So, can the Eastern Red Bat find trees on the tallgrass prairie? If you remember the very first image, Click even though not numerous, trees are present. Click

Slide 21: Post Oak. This is a native species. Why are we mentioning a tree as a species in the tallgrass prairie? Well, if there isn't enough fire, trees will begin to grow, especially on the eastern boundary. Post oaks are one of the most common species in the transition zone from the eastern deciduous forest to the tallgrass prairie. Post oak occurs as a dominant tree in savannas and in woodlands adjacent to grasslands. Post oak provides cover and habitat for birds and mammals. Cavities provide nest and den sites, and leaves are used for nest construction. The acorns are an important food source for wildlife including white-tailed deer, wild turkey, and squirrels and other rodents. Post oak is moderately resistant to fire. Smaller trees are easily killed by fire, but sprout vigorously from the root collar. So, for grasses to dominate in an area, fires must occur frequently. Click

Slide 22: Eastern Redcedar. This is a native species. Even so, it is often considered to be invasive. Fire suppression has resulted in the spread of eastern redcedar into grasslands. Where eastern redcedar dominates, species diversity is commonly low. Eastern redcedar does not survive on sites subject to frequent fire because it

reproduces solely by seed; there is no “resprouting” like most other native trees. Eastern redcedar is susceptible to fire kill because of its thin bark, shallow roots, inability to resprout, and highly combustible evergreen foliage (remember the video from earlier?). Click

Slide 23: So what is the “take home” message? In the two boxes beneath your food web, there are two questions I would like for you to answer. Click First, what would happen to your food web if a fire passed through the area where it is found? Click Obviously, there will be dramatic short-term impacts, Click but how will your food web respond in the following months or years? *Give students time to complete their written responses.* Would anyone like to share your response? *Fire can have direct and indirect impacts on all tallgrass prairie animals. Direct impacts include burns, heat stress, and predation as animals flee a fire. Indirect impacts include changes in food availability, loss of nesting sites, and increased predation pressure due to a loss of cover.* Click Next, what would happen to your food web if fire never occurred in the area where it is found? Click Once again, keep short-term and Click long-term impacts in mind. *Give students time to complete their written responses.* Would someone like to share their answer with us? *The biggest long-term problem with a lack of fire on the tallgrass prairie would be the transition from prairie ecosystems to woodland ecosystems. This would cause most tallgrass prairies to disappear from that area along with most of the species associated with them. This is also the concept important for the final question.* Click Finally, compose a paragraph describing the role fire plays in tallgrass prairie ecosystems. *Give students time to respond to this prompt on their worksheets*. Click This is a portion of a map we looked at earlier showing tallgrass prairie remnants in dark green. Click The region within the red oval is known as the Flint Hills. Why do you think this is the largest area of tallgrass prairies remaining in North America? *This region has a “fire culture” that continues to manage the land with fire to increase livestock productivity (pyric-herbivory). The Flint Hills are typically too rocky to be converted to the production of crops such as corn and wheat so ranching is the dominant agricultural practice.* Click

Slide 24: *Read the slide.*

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