Lesson Title	Australian Ecology and Bushfires
Length of Lesson	30 minutes
Created By	Lucas Pounders
Subject	Earth Science
Grade Level	8th
State Standards	4a,c;
DOK Level	1,3
DOK Application	Inquire, classify, process
National Standards	A. Inquiry, Life Science – Populations and ecosystems
Graduate Research Element	Wildfires and factors

Student Learning Goal:

State Standards

3. Determine the economic factors that influence the regulation and behavior of organisms. (L,E)

a. Appraise the economic factors associated with regulations and protection of the environment.

4. Examine the physical factors of populations as they relate to the formation of ecosystems. (L, E)

a. Analyze the adaptation of representative organisms to aquatic or terrestrial environments.

c. Analyze how predation and food webs help structure communities.

National Standards

Materials Needed (supplies, hand-outs, resources):

Lesson Performance Task/Assessment:

The first step to this lesson is to define the terms Fire and Ecology for the students and explain them. Fire is defined as the rapid oxidation of a material in the chemical process of combustion, releasing heat, light, and various reaction products. This means that combustion, or burning when accompanied by heat, occurs as a reaction with oxygen to change the makeup of a fuel. Ecology is defined as the scientific study of the relation of living organisms to each other and their surroundings. This includes all parts of an ecosystem even the parts like fire, wind and rain and their interactions.

Fire is a crucial part to any ecosystem. It plays different roles in different system, some bad and some good. The type of ecosystem plays a large role in the effects of fires on that system. For instance:

Desert – mostly sand and dirt. Plants are very hearty and sparsely placed. Although a fire can occur it will most likely not be a fire of any great size or time. This is due to the lack of potential fuels in the system.

That leads us into the talk about what a fire needs in order to exist. First and foremost a fire needs oxygen to take place. Secondly would be some sort of fuel. In nature these fuels can be defined as grasses, trees, shrubbery and other types of plants. Also many plants secrete oils and become more flammable in the absence of water. But why, isn't the chemical makeup of water H2O and doesn't fire use oxygen? YES!

There are two main reasons why fire is suppressed by water. One reason is that it introduces more hydrogen into the reaction which over rides the oxygen in the reaction. The other reason is the temperature factor. Water suppresses the temperature enough that in most cases it can suppress the fire. This also works in the case of plants. Plants absorb water through their root system. During times of draught plants tend to become more dry. This is due to the absence of water which results in more fuel for fires.

So how does this apply to Ecology?
In the case of a grassland, grasses tend to dry out rapidly. They also tend to burn more rapidly than other fuels. This is due to their size and placement which allows for the interaction of oxygen, speeding up the burn. Fires like this not only destroy the grassland it also provides the soil with nutrients needed to rejuvenate the landscape. Animals are displaced for a small amount of time but they come back to a much richer habitat.

In the case of pine forest, the trees tend to burn fairly slowly. They do not dry out as quickly as grasses and therefore can withstand drought for a larger amount of time. However when pine trees begin to dry out the start to drop their needles and branches which dry out very quickly and become fuel. This fuel can feed a fire to the point that eventually the trees themselves will begin to burn. If a fire is controlled in this environment it can be beneficial. Burning off undergrowth in pine forest eliminates other plants that take nutrients and water away from the pine trees. This allows the pine trees to obtain more nutrients from the soil and the burned fuels also rejuvenate the soil faster in most cases.

In a tropical rainforest there is an abundance of water. However there are still fuels from dead trees and shedding of plants. There are normally very small and easily extinguished fires. Most of the fires that take place in a rainforest are extinguished after a short period of time by themselves.

Lastly in eucalyptus forest there is a unique issue with fire. Most people relate eucalyptus trees and Koala bears together. Most people don't relate these trees and intense fire together. But in fact this is where some of the most destructive fires can happen. Not only do these forest have the same problems as most other forest the trees also secrete oils that burn. When these trees become stressed the leaves secrete a oil that in times of stress can protect them. This also happens when they begin to dry due to fire

but it does not help at all. In fact the extra oils turn a normal brushfire into an oil based fire that is not easily extinguished by conventional methods.

One other element of an ecosystem that plays a part in the spreading of fires is the physical aspect of the landscape. If a fire start at the bottom of a wooded hill it can spread up the hill and become extinguished by itself. On the other hand in a flat area winds can play a much larger factor in the spread and intensity of the fire. Fires can be controlled by natural breaks in the landscape and by constant monitoring in most cases.

Lesson Relevance to Performance Task and Students:
This lesson is designed to help the students understand fire from the view of chemical reactions. It is also designed to show the students both positive and negative benefits of fires in ecology and why in some ecological systems fires can be very beneficial and not just destructive.

Anticipatory Set/Capture Interest:
The concept of fire in itself is enough to capture the interest of the students. Getting them plugged into the conversation by asking them questions such as what types of fire can they come up with? Is fire good or bad? How do fires happen?

Guided Practice:
Ask the students questions during this lesson to lead them in the thought process that you would have them follow. Ask them transition questions to lead them into the next topic of conversation. Also they can follow an outline and fill in the blanks of a set lecture if wanted.

Independent Practice:
Homework can be given in the form of a research project. Ask the students to research and bring an article with them to the class containing information about a wildfire or controlled burn instance. Examples can be passed out to the students if wanted so that the students do not all end up with the same instance. Also ask them to pick out one interesting fact to be shared with the class at the next class meeting.

Remediation and/or Enrichment:
Follow Student IEP. If no IEP exist prepare to have a question and answer session with the students.

Check(s) for Understanding:
The checks for student understanding come in the form of asking the students questions individually as the lecture takes place. Students that are not able to answer a given question about the topic should be recorded in order to reiterate or ask another question at a later time.

Closure:
Closure comes in the form of a question and answer session with the students to answer and ask any question the students or the instructor may have.

Possible Alternate Subject Integrations:
Chemistry, Botany, Biology, Mathematics.

Teacher Notes:
Always know and understand your material before the presentation.