NATURAL SCIENCE (ACT)

This passage is adapted from Wildland Fire in Ecosystems: Effects of Fire on Fauna*, published by the United States Department of Agriculture, Forest Service in 2000.*

Fire regimes—that is, patterns of fire occurrence, size, uniformity, and severity—have been a major force, shaping landscape patterns and influencing productivity throughout North America for thousands of years. Faunal communities have evolved in the context of particular fire regimes and shown patterns of response to fire itself and to the changes in vegetation composition and structure that follow fire.

Animals' immediate responses to fire are influenced by fire season, intensity, severity, rate of spread, uniformity, and size. Responses may include injury, mortality, immigration, or emigration. Animals with limited mobility, such as young, are more vulnerable to injury and mortality than are mature animals.

The habitat changes caused by fire influence faunal populations and communities much more profoundly than fire itself. Fires often cause a short-term increase in productivity, availability, or nutrient content of forage and browse. These changes can contribute to substantial increases in herbivore populations, but potential increases are moderated by animals' ability to thrive in the altered, simplified, structure of the post-fire environment. Fires generally favor raptors by reducing hiding cover and exposing prey. Small carnivores respond to fire effects on small mammal populations (either positive or negative). Large carnivores and omnivores are opportunistic species with large home ranges. Their populations change little in response to fire, but they tend to thrive in areas where their preferred prey is most plentiful—often in recent burns. In forests and woodlands, understory fires generally alter habitat structure less than mixed-severity and stand-replacement fires, and their effects on animal populations are correspondingly less dramatic. Stand-replacing fires reduce habitat quality for species that require dense cover and improve it for species that prefer open sites. Population explosions of wood-boring insects, an important food source for insect predators and insect-eating birds, can be associated with fire-killed trees. Woodpecker populations generally increase after mixed-severity and stand-replacement fires if snags are available for nesting. Secondary cavity nesters, both birds and mammals, take advantage of the nest sites prepared by primary excavators.

Many animal-fire studies depict a reorganization of animal communities in response to fire, with increases in some species accompanied by decreases in others. Like fire effects on populations, fire effects on communities are related to the amount of structural change in vegetation. For example, understory fires and stand-replacement fires in grasslands often disrupt bird community composition and abundance patterns for only one to two years, but stand-replacement fires in shrublands and forests cause longer lasting effects, which are initially positive for insect- and seed-eating species and negative for species that require dense, closed canopy. Bird abundance and diversity are likely to be greatest early in succession. When shrub or tree canopy closure occurs, species that prefer open sites and habitat edges decline and species that prefer mature structures increase.

Major changes to fire regimes alter landscape patterns, processes, and functional linkages. These changes can affect animal habitat and often produce major changes in the composition of faunal communities. In many Western ecosystems, landscape changes due to fire exclusion have changed fuel quantities and arrangement, increasing the likelihood of large and severe fires.

Where fire exclusion has changed species composition and fuel arrays over large areas, subsequent fires without prior fuel modification are unlikely to restore pre-

settlement vegetation and habitat. In many desert and semidesert habitats where fire historically burned infrequently because of sparse fuels, invasion of weedy species has changed the vegetation so that burns occur much more frequently. Many animals in these ecosystems are poorly adapted to avoid fire or use resources in postfire communities.

In the past 10,000 years, fire in North American ecosystems has not operated in isolation from other disturbances, nor has it occurred independent of human influence. In many areas, however, fire has been prevented or excluded for nearly 100 years, a level of success that is not likely to continue. Collaboration among managers, researchers, and the public is needed to address tradeoffs in fire management, and fire management must be better integrated with overall land management objectives to address the potential interactions of fire with other disturbances such as grazing, flood, windthrow, and insect and fungus infestations.

Source: http://www.fs.fed.us/rm/pubs/rmrs_gtr042_1.pdf

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1. A faunal community might also be described as:
   A) a community of animals.
   B) a place of lush vegetation.
   C) a dry place conducive to fire.
   D) a place where animals and humans live in close proximity.

2.According to the passage, woodpecker populations are prone to increase after fires because woodpeckers:
   A) are able to fly for long periods of time.
   B) do not require much food to survive.
   C) feed on wood-boring insects, which benefit from fires.
   D) are considered predators rather than prey.

3. Fire regimes are typified by all of the following qualities EXCEPT:
   A) the area burned by fires.
   B) the frequency of fires.
   C) the damage caused by fires.
   D) the response of animals to fires.

4. The purpose of this passage is to:
   A) describe the response of North American faunal communities to fire regimes.
   B) explain how animals are becoming extinct due to fire regimes.
   C) prove that fire regimes are better survived by predatory species.
   D) explain why carnivores and omnivores better survive fires than do herbivores.

5. Deserts have been more affected by fire in recent times because:
   A) they are getting drier.
   B) irrigation monopolizes water that was previously used to fight fires.
   C) new forms of vegetation are growing in deserts.
   D) oil, which is highly flammable, is found in the desert.

6. In the context of the passage's discussion of animal-fire studies, the statement "Like fire effects on populations, fire effects on communities are related to the amount of structural change in vegetation" (lines 61-63) implies that, following a fire, the response of:
   A) plant communities depends primarily on changes to the structure of faunal populations.
   B) plant populations depends primarily on changes in animal communities.
   C) faunal populations depends primarily on the fire's effect on vegetation.
   D) faunal communities develops largely irrespective of the plant populations.

7. The article identifies all of the following factors as affecting animals' response to fires EXCEPT:
   A) the rate of the fire's spread.
   B) the weather following the fire.
   C) the intensity of the fire.
   D) the season in which the fire starts.

8. Where might this passage be published?

A) A PETA (People for the Ethical Treatment of Animals) newsletter
B) The web page of the United States Forest Service
C) An anthropology textbook
D) A local newspaper

9. Populations of large carnivores and omnivores are less affected by fires than are those of herbivores and smaller animals because large carnivores and omnivores:

A) have large stores of body fat and can go for a long time without eating.
B) can run faster from or fly above fires.
C) have large home ranges and can more readily adapt to new circumstances.
D) consume readily burned plant matter and can easily find shelter among downed trees.

10. The final sentence of the passage (lines 106-114) serves to:

A) warn conservationists about dangers to future fire regimes.
B) recommend ways to improve fire management.
C) reprimand hikers and campers who may be careless around fauna.
D) suggest how fire regimes a century from now may differ from those at present.