

## Alaskan Forests – Answer Key

Rees and Juday (2002) examined the effects of natural fires and logging by humans on the number of plant species present at different times following disturbance. Multiple sites were chosen that represented different times following burning or logging. The results are shown in the figure.



- 1) Fire and logging are examples of disturbances
- 2) The development of communities after events such as fire or logging is called: secondary succession
- 3) Describe the results shown in the figure (pattern, numerical values, whether significant difference or not, if p-value or \* provided).

Example answer:

The number of plant species initially increased from ~81 species 2-5 years after burning to ~91 plant species 30-38 years after burning, which was the greatest number of species observed at the sites. The number of plant species subsequently declined to ~82 species 75-95 years after burning, which was similar to the number of species observed early in succession.

The opposite pattern was observed after logging. The number of plant species initially declined from a high of ~77 species 2-5 years after logging to ~65 plant species 30-38 years after logging. The number of plant species subsequently increased to ~75 species 75 to 95 years after logging.

Note – no information was given about whether differences were significant or not.

- 4) Describe how fire could alter resource availability for plant communities.

More space may be available if some plants and/or underbrush was removed by the fire.

More sunlight may be available if taller plants/overstory species did not survive the fire; and/or underbrush was burnt. But, this could also mean less shade available for plants that are not tolerant of direct sun.

Vegetation that was burned may add more nutrients (e.g. N) to the soil.

There may potentially be less water available due to water evaporating from the increased heat.

- 5) Most of the common species present 2-5 years after burning were absent in sites 75-95 years after burning. What is the most likely reason for these species being absent in older locations?

Example answer:

The most likely reason that species common 2-5 years after burning were absent in sites 75-95 years after burning is they were outcompeted for essential limited resources, such as light, space and/or water by the later successional species.

Plant species that were present early in succession, i.e. 2-5 years after burning were likely r-selected, and therefore were putting their energy towards reproduction than competitive ability. As a result, they would be weak competitors. In contrast mid and later successional species were likely more K-selected, and put their energy towards being a strong competitor. For example, perhaps the later successional species put its energy towards growth, and grew taller than the early successional species. The later successional species would then intercept the light necessary for photosynthesis. If the early successional species could not tolerate the lower light levels they could not survive at the site.

*Epilobium* is a small, perennial (growing year after year from an underground stem), flowering plant that is found in sites 2-3 years after fire or logging but is absent from 75- 95 year old sites. White spruce, a conifer tree 40m tall begins to dominate the 75-95 year old sites. For each statement below, circle the plant species that you would associate with each of the following characteristics?

- Allocates a large amount of resources to competition: *Epilobium* / **White Spruce** / Neither
- Tolerant of abiotic stress: *Epilobium* / White Spruce / Neither
- Reaches reproductive maturity quickly: *Epilobium* / White Spruce / Neither
- Long lived: *Epilobium* / **White Spruce** / Neither
- Produces many small, easily dispersed seeds: *Epilobium* / White Spruce / Neither
- Allocates a large amount of resources to growth: *Epilobium* / **White Spruce** / Neither