

Project Subject/Title: Oak lk. Fire Regeneration

County: Washburn

TRS: T40N R13W sec. 9 and 10

Contact Person: Jim Halvorson, 715-635-4081

Type of Prescription: Regeneration surveys after a large wildfire

Year initiated: 1980, 1981? and 1984

Abstract/Prescription:

In April of 1980 the Oak Lake wildfire swept through 11,418 acres of Washburn County. The burned area consisted largely of jack pine. In the fall of the year a regeneration study was conducted by the WDNR in the burn area. They did regeneration surveys in the area and found 48,000 seedlings per acre. The following year a student from UW-Stevens Point conducted regeneration surveys. This study was conducted to examine the establishment, survival, and growth of regeneration following wildfire and effects of salvage operations on the regeneration.

The harvest area, in addition to one control (no harvest), was studied. Both areas had mature stands of jack pine prior to the burn with very little aspen component. Millacre, circular plots were sampled for jack pine. Plot centers were located by a running transect. The transects and each plot were spaced at 2 chains intervals. A total of 30 plots were taken in each area.

Additional, regeneration and survival surveys were conducted in 1984 by WDNR forestry personnel.

Results:

Results of student's study (1981):

- In the salvage logged area, an average of 17,200 seedlings per acre were found.
- In the uncut area, an average of 27,300 seedlings per acre were found (37% higher).
- In general, more seedlings were found along (but not in) the skid trails.
- Less seedlings were found in areas heavily covered with slash.
- Very little regeneration of other species were documented (oak, aspen, hardwood).

WDNR regeneration results (fall 1980):

- Jack pine regen was about 60% of original stocking after the fire (7300/ac) well distributed and avg height 16 feet tall.
- Scrub oak and scattered patches and represented of 1/3 the area
- Where fires failed to crown the heat was insufficient to open serotinous cones or to burn competing vegetation.
- Jack pine had a delayed germination, noticed 4-5 yrs after fire.
- Once established jack pine over came competing vegetation.

Discussion/Recommendations:

- Interesting to note that jack pine has the ability to maintain stocking levels in partially shaded conditions. Some areas that were planted with PR, jack pine sprouted up within 3-4 years (delayed germination).
- Ability to release jack pine even in densely stocked aspen stands.
- Some damage to regeneration during salvage operation

76 NATURAL REGENERATION OF JACK PINE FOLLOWING WILDFIRE
AND SUBSEQUENT SALVAGE LOGGING

JIM PETERSON, U.W. - Stevens Point

In April of 1980, the Oak Lake Burn swept through 11,418 acres of Washburn county, Wisconsin. The area burned consisted largely of jack pine (Pinus banksiana). In the fall of that year, a regeneration study was conducted in the burn area by the Wisconsin Department of Natural Resources. The objectives of that study were "to examine the establishment, survival and growth of the new stand following the fire." (Wisconsin D.N.R., 1980).

One factor which may influence the regeneration of jack pine following fire, but which could not be evaluated at the time of the 1980 survey, is the utilization of fire-killed trees by salvage logging operations. Many of the mature jack pine stands which were damaged by the fire have been sold for salvaging. There is some measure of concern as to how these operations will effect natural regeneration. The objective of this study is to examine the effect of salvage logging operations on the regeneration of jack pine stands following a wildfire.

LITERATURE REVIEW

Fire has had more influence on the occurrence of jack pine in the Lake States than any other factor. Fire in pure, mature jack pine and mixed pine stands containing considerable amounts of jack pine, promotes reproduction of jack pine over other pine species. The serotinous nature of the jack pine cone allows large quantities of seed to accumulate over several growing seasons. The intense heat of a forest fire causes the cones to open, dispersing the seed. Since the fire will normally destroy any organic material on the ground, a preferable seed bed is simultaneously prepared. In short, fire creates an almost perfect growing environment for the seeds.

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Unlike red pine (Pinus resinosa), jack pine seeds have the capacity to germinate in an ash layer overlying mineral soil. Many other species of both annual and perennial plants are eliminated during a fire, lessening competition. Furthermore, jack pine seedlings are relatively unaffected by the rapidly growing herbs which are common following a fire (Ahlgren, 1976). Fire can be seen to perform three major functions in aiding natural jack pine reproduction; (1) preparing an adequate seedbed, (2) reducing competition from other species, and (3) releasing seed from the otherwise serotinous cones. (Davis, 1959).

One plant which is not removed from competition by fire, is aspen (Populus spp.). Rather, aspen thrives on fire; particularly trembling aspen (P. tremuloides) and big tooth aspen (P. grandidentata) in the Lake States. While the above-ground portions of the aspen is easily killed by fire, the root system remains alive. The roots, shallow and wide-spread, send up "suckers" to replace the lost tree. In this way the reproductive capacity of aspen is far above that of other species. Aspen suckers grow rapidly, and often prove detrimental or even fatal to slower growing species. Aspen is one of the primary concerns of the reproduction of jack pine in the study area (Davis, 1959).

DESCRIPTION OF STUDY AREA

The area studied actually consisted of two adjacent areas; one which had been logged following the fire and one which had not. The cut area was located in the NE $\frac{1}{4}$ Sec. 9, NW $\frac{1}{4}$ Sec. 10 T. 40N. R. 13W. The uncut area was located in the N $\frac{1}{2}$ SE $\frac{1}{4}$ Sec. 9, N $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 10 T. 40N. R. 13W. Both were located in Washburn County, Wisconsin. Both the salvaged and unsalvaged stands were mature jack pine stands prior to the burn, with very little aspen mixed in.

METHODS

In order to evaluate regeneration in the salvaged area compared

to the unsalvaged area, milacre, circular plots were sampled. Plot centers were located by running parallel transects through the cut area. The transects were spaced at two chain intervals and plots were established every two chains along the transects. A total of thirty plots were taken in the logged area.

In order to make an accurate comparison, thirty plots were then taken in the uncut portion of the study area. A similar method was used for determining these plot locations.

Data collected from the study plots included number of seedlings by species and general observations of the plots. Such observations included location of the plot in regard to skid trails and roads, slash cover, shade, herbaceous vegetation, etc.

RESULTS AND DISCUSSION

In the cut-over area, an average of 17,200 seedlings per acre were found. In the adjacent uncut area, the average was approximately 37% higher, at 27,300 seedlings per acre. Both of these figures were significantly lower than seedling densities found in the 1980 survey. This reflects Cayford's (1963) findings for mortality of jack pine on a dry site. Cayford found approximately 57% mortality of jack pine seedlings in the first year following a fire. At the time of this study, seedling densities in the uncut stand had declined by 43% from the 1980 survey (see graph I).

The additional 37% decline in survival in the logged area does not necessarily indicate a serious problem, due to the very large number of seedlings present. Cayford (1963) showed an initial regeneration of only 7,000 seedlings per acre on a similar site and reported 63% stocking.

In addition to the general effects of salvage logging, the impact of specific logging practices was noted. Of the thirty plots sampled in the logged area, four were located directly on skid trails. Since all trees were bucked where they fell and hand carried to a

(4)

"packerback" which remained on the trails, damage by skidding was limited to these trails. A decrease in seedling densities of about 85% was noted on these plots (see graph I). A decrease in density of 71% noted among the two plots which were heavily covered by slash. Stocking increased by over 100% on the four plots which were located along, but not directly on skidding trails. Although these data seem to indicate that damage to reproduction is greater on skid trails and where heavy slash piling occurs and that reproduction is encouraged along trails, more data are needed before conclusions can be drawn on these topics.

LITERATURE CITED

- Ahlgren, C.E. 1976 Regeneration of Red Pine and White Pine Following Wildfire and Logging in Northeastern Minnesota. J. Forestry 74 (3) 135-140.
- Davis, K.P. 1959. Forest Fire, Control and Use. McGraw Hill, New York. xii & 584 pp.
- Wisconsin Department of Natural Resources 1980. First Progress Report; Oak Lake Burn Regeneration Study. Unpublished, 4pp.
- Cayford, J.H. 1963. Some Factors Influencing Jack Pine Regeneration After Fire in Southeastern Manitoba. Canadian Department of Forestry Publication no. 1016.

Jack Pine

REPRODUCTION IN A MATURE JACK
PINE STAND FOLLOWING A WILD FIRE
AND UNDER VARIOUS CONDITIONS.

Graph I

