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Advance Copy - 1982 KW Research Report

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APPROXIMATE PUBLICATION SCHEDULE

#1 1983 Current Status and Future Prospects of KW Habitat

#2 1983 Height, Density, and Spacing of Trees in KW Habitat

#3 1984 KW Habitat Management (co-authored)

#4 1984 Characteristics of Ground Cover in KW Habitat

#5 1985 Habitat Niche of the KW

Note: Data, graphs, and early drafts, etc. may be ready a year ahead of this timetable

Study Overview

The NCFES KW habitat study has added several new perceptions to the recovery effort. An analysis of the annual census data has suggested that the reproductive potential of the KW has not been as high as has been supposed, and losses and dispersal of both adults and young may be higher than expected. The annual census data for each of the major areas has been plotted for each year to generate curves that suggest general patterns of occupancy. These patterns have been extrapolated to predict future levels of occupancy in both current areas and potential new habitat.

We have also attempted to evaluate habitat quality through estimates of breeding densities of KW's in selected areas. Observations of KW habitat utilization and subsequent vegetation measurements have suggested the ground cover requirements of the bird are more general than has been previously assumed. It appears that the major determinant of habitat suitability is tree density, coverage and canopy volume. The importance of tree coverage and spacing can be understood by studying the foraging ecology of the KW.

In cooperation with foresters, land managers and wildlife biologists we have summarized management alternatives for KW habitat regeneration, including 5 harvest options, 4 methods of site preparation, and 4 techniques for tree regeneration. The proposed management strategies include (a) alternatives to prescribed fire (b) prescribed densities for trees (c) recommendations for increasing the level of stand occupancy and (d) suggestions for altering ground cover composition. The benefits from these more diverse silvicultural

techniques will be (a) greater flexibility in generating optimal KW habitat, (b) greater cost-effectiveness and (c) optimal wood fibre production from the management areas.

Future research needs include estimates of % pairing by males in different habitat-types and color banding of KW's to determine magnitude of the "floater" population as well as shifts among breeding areas. Research on post-breeding birds and their habitat is seen to be a higher priority than studies during winter and migration. There is a need for experimentation in habitat regeneration and further habitat utilization research. Above all, the details of KW habitat suitability will be primarily demonstrated by future patterns of habitat occupancy.

CURRENT AND FUTURE ACCOMPLISHMENTS

1. A re-interpretation of the annual census results helps explain the slow rate of population increase after cowbird control was initiated. It suggests at least 6 reasons:

   A. Reproductive potential
      1. Not all males are paired (20%)
      2. Post-nesting losses, especially fledglings
      3. Losses off the nesting grounds
      4. Age-distribution skewed toward older birds

   B. Fate of returning birds
      1. Significant #'s of non-breeding ♂'s (mostly 1st yr)
      2. Local and geographical dispersal
      3. Declining habitat quantity

2. Concentration of KW's into a few contemporaneous breeding areas was noted and inferences were for made for 1985-88 habitat shortfall.

3. Numbers of KW's were plotted against age of individual stands and implications were drawn for 1985-88 habitat shortfall.

4. Introduced the concept of # per unit area (density of birds) as measure or indicator of relative habitat quality.

5. Stressed the importance of tree cover and volume as the prime determinant of KW habitat suitability (ordination of (tree ht x cover)).

6. The limitation of tree cover and volume as a limiting factor in KW habitat suitability can be understood through an examination of KW foraging ecology.

7. We have generalized the ground cover requirements of KW's and stressed the relative importance of site quality and shading history as the prime determinants of ground cover composition in critical habitat.

8. We have established 20-25% tree coverage as lower limits for KW habitat suitability in both wildfire and plantation stands. These correspond to about 5,000 stems/acre in wildfire habitat and 1200-1800 in plantations. (Stands with tree density from about 15-20% may support intermittent use by KW's at low densities.)

9. We have summarized management alternatives for 5 harvest options, 4 post-harvest treatments and 4 methods of regeneration for a total of 6-8 methods of KW habitat regeneration and discussed the relative advantages and disadvantages of each.

10. Suggestions are provided for the alteration of ground cover composition by methods other than prescribed fire, should that become necessary in the future.

11. Working with land managers, we have helped develop criteria for prioritizing the need for prescribed burning KW critical habitat. (see attachment)

12. In the search for potential habitat in other geographical areas, we have made limited inspections in 7 of 9 areas in the Mich. Upper Peninsula selected from old vegetation maps, Hiawatha NF compartment data, and advice of various individuals. In general, most areas appear to be older, smaller in area , and better in site than should be required to support KW's.

PREDICTIONS AND RECOMMENDATIONS

1. Planting Prescriptions

For plantations, a rectangular spacing pattern should provide better KW habitat than a square pattern. (For example, 4x6 should be better than 5x5 and 5x7 better than 6x6. For tight spacing patterns, this should ease difficulties in the mechanics of planting, as well.) I have recommended a less extreme variable density planting scheme for USFS that would combine 4x6 spacing with 5x7. This experiment would provide a contrast with the 4x4 and 6x8 plan for the State plantations.

2. Extending Stand Occupancy

a) Fill-in planting of large openings (>2A) in wildfire areas should be standard management practice and should be done 5-7 years after the fire at 4x6 or 5x6 spacing.

b) Variable density plantations should attract KW's early and hold them late, but experimentation with several alternative densities should be encouraged to develop optimal spacing.

c) Bill Irvine has suggested the planting of dense patches of about 2 acres for areas of appreciable but insufficient natural regeneration. The optimal patch size may vary with the amount of natural regeneration. (see "Research Needs")

d) Residual patches of mature trees within wildfire areas can show substantial advance regeneration about 10 years after burns, and could provide the patches necessary to extend stand occupancy. Such areas have been used for nesting at Muskrat L. and could stretch out the length of time that nesting area is used by KW's.

e) Stands with more than 40% tree coverage or 8,000 stems/acre at 7 yrs age should be weeded or thinned by clearing long, narrow strips.

f) Decrease tree growth potential of stand by intensive utilization practices.

3. Achieving prescribed densities

Since seed tree burns have almost always failed to achieve significant natural regeneration, alternative methods should be attempted.

a) Increasing standing volume of Jack Pine for prescribed burns.

b) In unburned areas with appreciable natural regeneration, fill-in planting with 4x6 planting or 2-4 acre patch planting should be sufficient.

c) In unburned areas lacking advance regeneration, a shelterwood cut followed by supplemental planting could provide the required tree cover for KW's.

d) Areas receiving no significant regeneration would have to be fully planted to variable spacing prescriptions.

4. Non-commercial harvest

Given the enormous expense of planting stands the most cost-effect way of regenerating KW habitat may be abandonment of commercial harvest. If the poorest sites cannot be planted for economic reasons, and do not show successful shelterwood regeneration, it may be best to burn whole stands to achieve the most cost-efficient regeneration.

5. Ground-cover regeneration

If the ground cover requirements of the KW are no more specific than a low, light cover of shrubs and grass sedge it should be possible to generate suitable habitat without fire. If future patterns of habitat occupancy indicate a more specific ground cover requirement, there are alternatives to maintain or increase the xeric shrubs and/or retard succession on the better sites.

a) Mechanical disturbance such as plowing or discing breaks up sod and heavily favors low shrubs such as blueberry. This treatment is probably more effective than fire for altering ground cover composition.

b) The provision of optimal tree densities for unburned stands will provide sufficient shade to help favor shrubs over grass/sedge.

c) Conversely, stands with a long history of strong shade could be thinned to keep shrubs from being shaded out before harvest and regeneration. This option should be expensive under current conditions.

d) Site impoverishment (including intensive utilization, grazing, etc.) have potential for retarding plant succession, should that objective become desirable.

e) Non-commercial regeneration of Lovells N both without and without fire in the next decade.

6. Snags, residuals, hardwoods

Snags and residual trees spared from wildfire or harvest can be valuable song perches for KW's, and are clearly beneficial when accompanied by cowbird control. Residual oak and pine trees are used for both singing and foraging, and hardwood coppice is actively used for foraging by KW's. Oak sprout-growth should not be sprayed as it may help provide the minimum foliage volume required for KW foraging where jack pine regeneration is marginal. It may be difficult to control oak with prescribed fire, spraying, cutting or tree injection. However, hardwood presence may not be disadvantageous to KW's when accompanied by dense jack pine growth. Similarly, the amount of overstory tolerated by KW's may have to be determined by future patterns of habitat occupancy.

7. Habitat shortages

All of the five major KW breeding areas currently in use (ages 16-20 yrs) should show significant population declines by 1984, during which time we would hope for about a 10% population increase as measured by the annual census. Since the first 2-3 years and last 2-4 years of stand occupancy may hold only a fraction of the KW's present during the middle period, new habitat may not be suitable in time to overlap with the decline of current major breeding areas from 1984-88. This could create a habitat deficit for as many as 150 males which would not be alleviated until 1988-90.

8. Use of secondary habitat

While "surplus" birds might colonize young habitat at an earlier age, it is more likely that they will disperse to "secondary habitat" (unburned stands of marginal tree volume) where their pairing success is probably lower. The resulting depression in overall reproductive potential could prevent maximal utilization of the Mack Lake Fire area during the peak years of 1990-2000.

9. Fill-in planting of stands having natural regeneration about 2-4 ft in height could attract KW's by 1986 if planted this spring. At 5-15 per 100 A, about 500-1000 acres planted near currently occupied habitat would be required to create habitat for 50-100 breeding pairs.

10. Relative habitat quality

It appears that the best predictors of KW habitat quality will be optimal tree coverage of about 40-55%. A more direct correlation may be obtained using (cover x interspersion), as the younger or more open stands tend to be more interspersed.

11. Management areas and KW dispersal

If 1st and 2nd year KW's are more likely to colonize suitable habitat closer to their natal grounds, it could be important to make every effort to keep individual management areas on their scheduled rotation.

FUTURE RESEARCH NEEDS

Life History Research

1. Predation

There are apparently heavy losses of nests to predators and probably serious losses of fledglings as well. Studies could be initiated to (a) estimate population levels of potential predators, (b) estimates of predation loss of fledglings of a bird species in the same habitat as the KW, such as the Vesper Sparrow.

2. Percent pairing and habitat

It would be possible to get an estimate of the relative pairing success of male KW's in different habitats, without handling birds or finding nests. I suggest that the % pairing would be lower in (a) old habitat (b) young habitat (c) peripheral habitat (d) marginal, secondary habitat.

3. Post-breeding habitat

The best place to pilot-test radio tracking of KW's would be in Michigan during the post-nesting period. Such a study could determine post-breeding habitat preferences and possibly provide information about predation on fledglings. It might be desirable to do initial work on a species of similar size in the same habitat.

4. Color-marking KW's

Intensive color-marking of KW's in a single breeding area could help determine the magnitude of a floating population of first-year males. It would also yield information on shifts among breeding areas, particularly in declining habitat. Muskrat Lake might be the best area for such a study for 1982.

5. Migration Survival

Requires large sample of birds with minimal chance of altering mortality factors.

6. Winter Survival

Same as above; check for birds with tape recorders in March before radio-tracking is attempted.

(a) Habitat (b) Weather (c) Predation (d) Food

7. Cross-fostering
8. Captive-breeding

} Research sould be encouraged on related species

9. Food-Habits

No losses of nestlings to starvation, hence little need.

HABITAT REGENERATION

1. Habitat preferences

a) Need for fire -NCFES will have a fairly complete set of comparisons among wildfire, prescribed burn and unburned occupied habitat. Future unburned occupied habitat should be sampled as part of a habitat monitoring program.

b) Relative habitat quality-More intensive work could be conducted on a more limited series of areas. The use of small-scale maps of the areas is strongly recommended. Caution: patterns of occupancy should be observed for 3-5 years before judging habitat as "not used".

c) There is little knowledge of the post-breeding habitat requirements of KW's. This is the mot obvious area to pilot-test radio telemetry techniques.

d) Ground-cover requirements-a more specific study on the relationship of ground covers to degrees of shading and history of shading would be informative.

2. Habitat Utilization

a) Significance of social interactions for pair formation, habitat selection, etc.

b) Seasonal shifts in foraging behavior

c) Foraging radius about nest for optimal patch size and spacing in different habitats

3. Historical review of habitat quantity and records of treatment

This is a low-cost project with no disturbance to the KW, and much work has been initiated in the recent past. (It would be important to check the spacing patterns of plantations occupied in the 1951 and 1961 censuses.)

4. Management options for trees and ground cover

a) Harvest options

1) whole-tree harvest
2) conventional harvest
3) seed tree
4) shelterwood
5) non-commercial

b) Site treatments

1) roller chop slash
2) disc, plow
3) burn
4) burn and scarify

c) Regeneration

1) natural seeding and direct seeding
2) natural seeding and fill-in planting
3) shelterwood advance regeneration and fill-in planting
4) full planting

5) Future market prospects

a) full-tree harvesting
b) short rotation
c) intensive utilization
d) species conversions

ATTACHMENT #2

Prioritizing Stands for Prescribed Burning

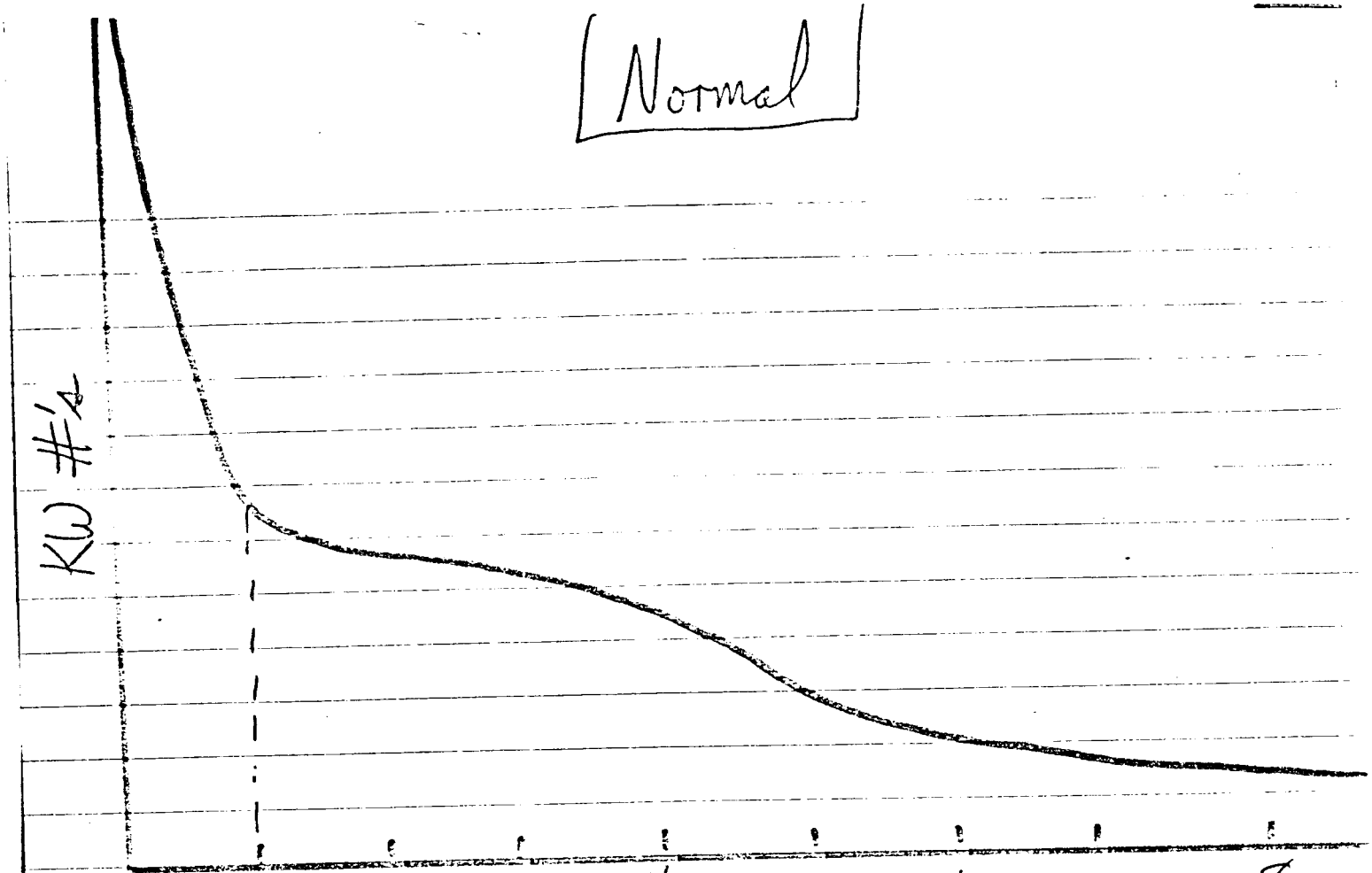
Higher Priority Stands

1. Many residual jack pines
2. Abundant slash
3. Better sites
4. Heavy hardwood undergrowth
5. No other site prep anticipated
6. No fire history during last rotation

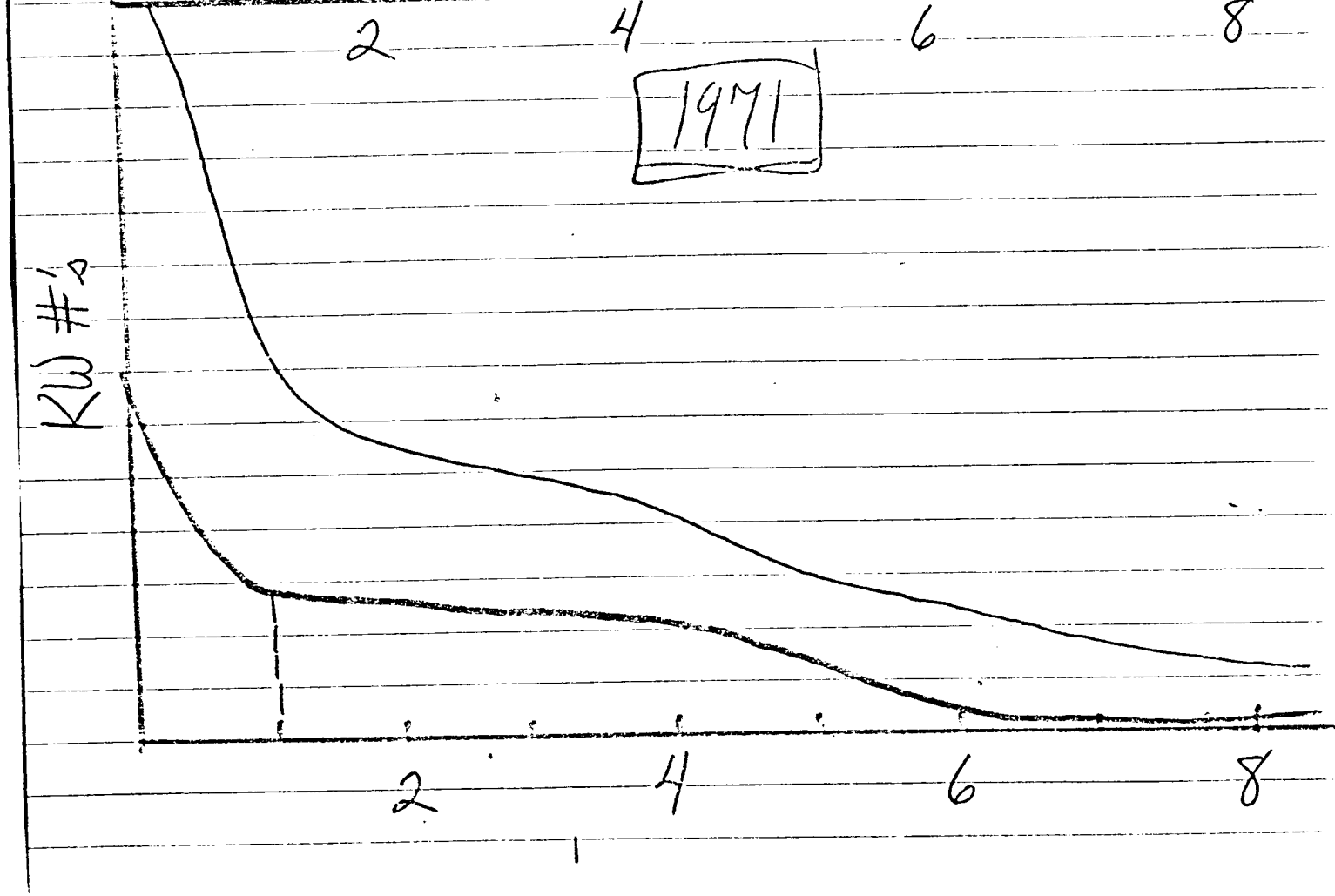
Lower Priority Stands

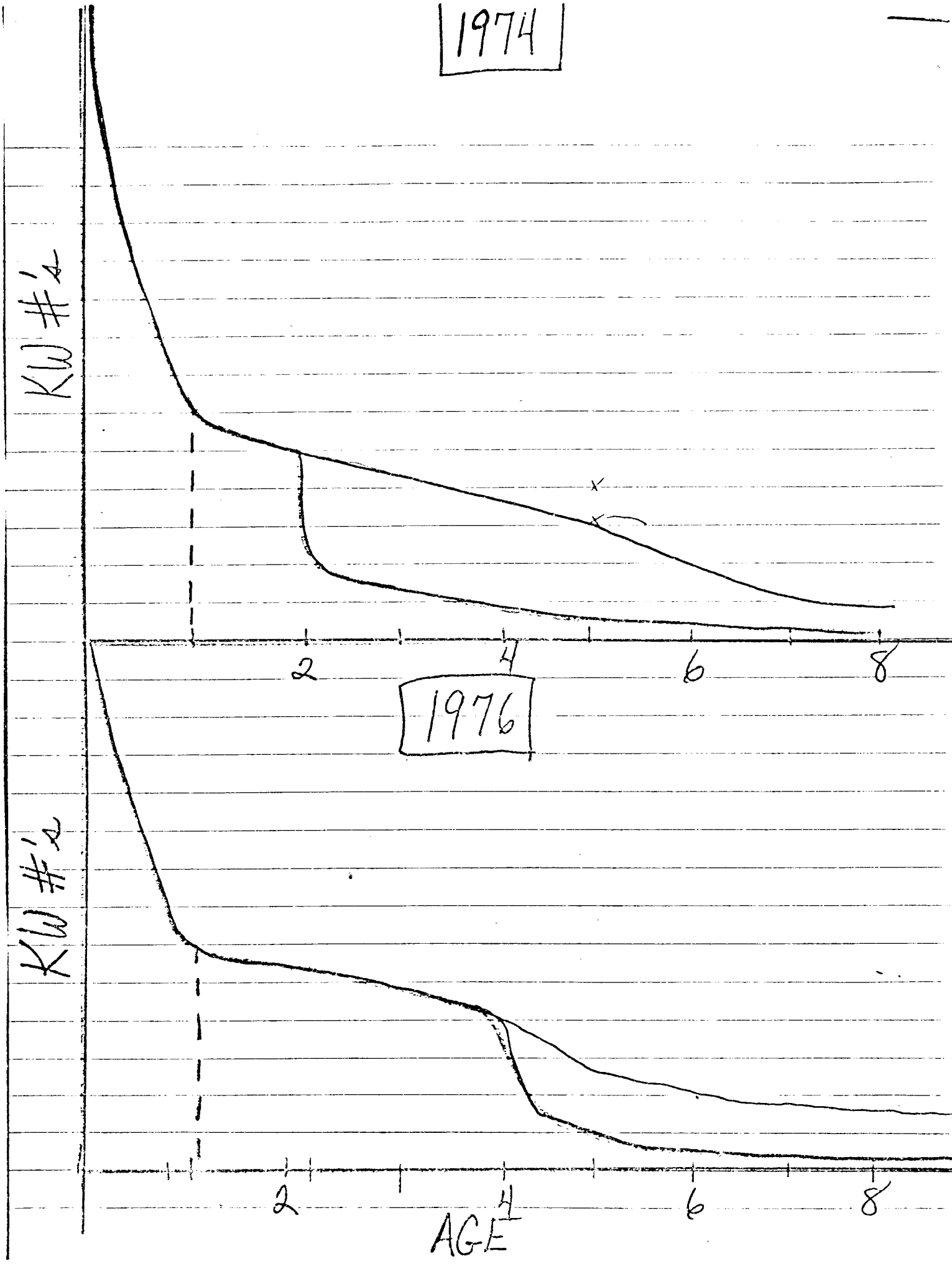
1. Significant advance regeneration
2. Less slash, smaller residual trees
3. Poorer sites
4. Low to moderate hardwood competition
5. Good potential for "V-plow" planting or other
6. Recent history of fire

Normal



1971




1974
KW #'s
2
4
6
8
1976
KW #'s
2
4
6
8
AGE