

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
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JRP

REPLY TO 4200 Range and Wildlife Habitat Ecology
and Management Research

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SUBJECT Kirtland's Warbler Habitat Management



TO Bill Irvine
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I'll try to summarize some discussions I've had with a number of people about factors which could be important to Kirtland's Warblers when comparing burned and unburned jack pine stands in Critical Habitat. I should emphasize that these do not constitute actual management recommendations at this time, but should form the basis for subsequent discussions.

In order to devise an appropriate silvicultural system for Kirtland's Warbler habitat, it will be necessary to broaden the consideration to factors other than suitable ground cover for warbler nest sites. I doubt very much that the birds are keying in on such a specific location within such a large territory. The range of acceptable habitats used by the Kirtland's Warbler is more logically explained as the optimal foraging strategy the bird uses to exploit the resources of the larger territory. Briefly, the Kirtland's Warbler is restricted to the dense stands in incipient habitat because more open stands lack sufficient tree foliage volume to maximize foraging time/flight time, and to make ground foraging practical. Jack Pine stands become too old for warbler occupancy when the live lower limbs become so high (4') that the female's foraging space becomes too compressed vertically, and ground foraging once again becomes impractical or sub-optimal.

There are a number of differences between burned and unburned stands within critical habitat, but only some of them may be important to the warbler's breeding biology. The most obvious feature of habitats regenerated by wildfire is their greater tree density relative to unburned stands, and this is also the attribute which is most closely related to the foraging ecology of the bird. The unburned stands can also be characterized by fewer dead trees, more hardwoods, greater jack pine age-diversity, a higher tree growth rate, a different tree growth form and somewhat different ground covers.

Although snags can be heavily used for singing, their use appears to be purely opportunistic, and Kirtland's Warblers appear to be able to achieve very high densities in the total absence of snags, as at Lovells.

The problem of oak, aspen or cherry competition is as much related to site characteristics as to fire and only late summer or fall burns appear to be effective in controlling broadleaf sprout growth. In fact, moderate amounts of oak are actively used for foraging and should not be sprayed. It appears that hardwood coppice is not detrimental unless it is dense enough to crowd out the jack pine. In marginally stocked jack pine stands sprout-growth may actually be beneficial by providing minimal foliage volume for Kirtland's Warbler foraging. The problem of greater tree age-diversity in unburned stands is difficult to separate from the tree density requirement, but I suspect that it would not be disadvantageous in stands of adequate tree density. The higher growth rates of jack pine in unburned or better sites should shorten the usable life of the stand for warbler occupancy. Suppression of tree growth due to competition appears to be significant in 10-20 yr stands only in high density situations and is probably not as important a factor as site. Damon Burn, Military and Mack Lake all show dramatic effects of site quality on vegetation composition, Jack pine growth rate and amount or duration of warbler occupancy on areas of higher elevation. The spreading growth-form of the jack pine in more open stands can probably be accommodated for foraging by the bird.

The question of ground cover differences in burned and unburned stands is more complex. It is necessary to determine which characteristics, if any, are actually important to the Kirtland's Warbler's breeding biology. Once again, I suspect that ground cover is more important to foraging ecology than to nest site selection, and probably would become limiting when the ground cover becomes too high and lush. Within critical habitat this limitation probably does not occur in stands unburned for one rotation, though there are obvious differences between burned and unburned stands. However, it is important to appreciate the factors other than fire that influence ground cover characteristics, such as shade, site quality and stand history, i.e. disturbance, management practices (including burning), etc. For example Dick Buech's recent paper in Jack Pine Warbler shows that there is more grass and mosses in the open areas of the Muskrat Lake Burn and more bare ground in thickets. The trend with the low shrubs is less clear, and I suspect that this is because the different species have different shade tolerances. Light shade is probably optimal for the low shrubs as a group. Buech has used relative cover or proportions in presenting results from Muskrat Lake and Lovells (1976). I'm including ~~my~~ categories taken from two of his tables.

	Lovells (nest sites)	Muskrat (open) (Transect)	Muskrat (dense) (Transect)
Low Shrub	25%	52%	55%
Grass	70%	15%	10%
Bare ground	--	6%	8%
Lichens & mosses	9%	12%	1%

NCFES has done some recent work at Mack Lake comparing burned and unburned stands. To control for the greater shade in the dense burn area, we have selected only those transects with less tree cover than the average in unburned area. These values are for absolute coverage and cannot be directly compared with the Buech data.

	Unburn (1979) (18% tree cover)	Burn (1977) (aver.=18% tree cover)
Low shrub	15%	8%
Grass	8%	3%
Bare ground, litter, lichens, mosses	9%	9%

Buech's results suggest a greater proportion of grasses in the unburned or open areas, and the Mack Lake results indicate that the absolute amount of shrubs and grasses is greater in unburned stands. The high Kirtland's Warbler densities at Lovells and the more recent moderate use at McKinley suggest the bird's ground cover requirements for foraging and nesting may be no more particular than for a low shrub, grass-sedge cover less than 12-15 in. in height. There are mechanical methods of scarification that could set back plant succession in much the same way that burning does. The use of a Vee-plow for planting in unburned areas should be beneficial in this respect.

In summary, the most obvious, gross difference between burned and unburned jack pine stands is the stem density of the trees, and this critical difference can be related to the foraging ecology of the Kirtland's Warbler during the breeding season. Few young, unburned stands possess the necessary tree cover greater than 20% and stem densities exceeding 900-1000 stems per acre. Warbler occupancy of the Lovells plantation, McKinley KWMA and parts of the Ogemaw KWMA show that acceptable ground cover can be present without recent fire. The other features of jack pine in unburned areas are probably not limiting. I understand that there were warblers nesting in the parts of Ogemaw KWMA that did not have uniform age distribution, and Lovells plantation has a spreading growth form of jack pine similar to that of other unburned stands. A greater growth rate of jack pine could shorten the useful life of the stand for Kirtland's Warblers somewhat, but this is also a problem on better sites with a recent history of fire. The problem of hardwood sprout-growth may be the greatest long-range problem in the absence of burning. Elaine (Smith) Carlson's study has indicated that birds may occupy areas with 20% oak present. When higher levels are anticipated it may be necessary to inject or spray herbicides.

Page 4

I'll postpone discussion of management alternatives as outlined on the flow chart until a later time, but most of the advantages and disadvantages should be apparent from the previous discussions. I look forward to your comments, criticisms, and corrections either orally or by letter.

Sincerely,

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Wildlife Ecologist

Enclosure

cc: Jerry Weinrich, Mich DNR
Elaine Carlson, Mich DNR
John Byelich, Mio, Mich
Dave Sorenson, Marcell RD, Chippewa NF
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KW JACK PINE SILVICULTURE

CONVENTIONAL

FULL-TREE
(Tree-length)

Harvest: Leave non-merchantable trees

Leave sufficient vol. for adequate shade & seed

Leave 125-150 trees/acre or 40 ft²-BA

Treatment: Scarify

Roller-chop and/or disc

Burn

1) roller-chop

Scarify

2) disc

Regeneration:

Non-serotinous seeding: Monitor regeneration, fill in plant as necessary

Serotinous seeding: (fill in plant as necessary)

Shelterwood: Monitor regeneration, fill in plant as necessary (dense patches)
Plant: 1200-1800 stems/acre or 1000-1200 w denser patches

Plant: 1200-1800 stems per acre or 1000-1200 w denser patches

Commercial Overstory Removal