

1.0 Kirtland's warbler - *Dendroica kirtlandii*

1.1 Background Information

Kirtland's warblers are present on the Hiawatha National Forest (HNF), breeding and foraging in stands of young jack pine. The HNF provides breeding habitat for the Kirtland's warbler (KW) in Michigan. The Kirtland's warbler was first listed as federally endangered on March 11, 1967. No critical habitat has been designated for this species. However, approximately 150,000 acres of essential habitat has been identified on public land in the northern Lower Peninsula of Michigan. Essential habitat is defined as "*that land identified as biologically appropriate and necessary for the development of nesting habitat for the Kirtland's warbler*" (Huber et al. 2001). No essential habitat has been identified for management on the HNF.

Key documents guiding Kirtland's warbler (KW) conservation on the HNF. On the HNF, KW conservation and management is conducted in consultation with the U.S. Fish and Wildlife Service (USFWS) and the KW Recovery Team and is guided by several documents:

- **The Kirtland's Warbler Recovery Plan** (KWRP) (Byelich et al. 1985). The *Kirtland's Warbler Recovery Plan* was completed in 1976 and revised in 1985.
- **Strategy for Kirtland's Warbler Habitat Management** (Strategy) (Huber et al. 2001). The *Strategy for Kirtland's Warbler Habitat Management* replaced the *Kirtland's Warbler Management Plan for Habitat in Michigan* (Management Plan) (USFS & MDNR 1981). The Strategy provides specific direction for land managers in the USDA Forest Service (USFS), Michigan Department of Natural Resources (MDNR), and USDI Fish and Wildlife Service (USFWS) on how to manage summer range for the Kirtland's warbler, and protecting individuals and their nesting habitat.
- **Correspondence letters between Kirtland's Warbler Recovery Team and U.S. Fish and Wildlife Service** (correspondence letters). Letter of January 12, 2002 from Kenneth Ennis, leader KW Recovery Team to William Hartwig, Regional Director, USFWS, outlining Recovery Team recommended updates to the existing KW Recovery Plan. Letter of June 21, 2005 from Robyn Thorson, Regional Director, USFWS, to Kenneth Ennis, leader KW Recovery Team, affirming the need to revise the current KW Recovery Plan and providing specific response's to the recommendations in the January 12, 2002 Recovery Team letter. The Recovery Team recommendations were based on the best available science for the species and address the need for more KW habitat based primarily on new information that shows a shorter duration of stand occupancy by KW. The correspondences also address the need to manage jack pine habitat in the Upper Peninsula of Michigan (U.P.) for KW Recovery and provide interim direction until the Recovery Plan can be updated.

- **1986 Hiawatha National Forest Land and Resource Management Plan (Forest Plan).** The Plan does not provide specific management guidelines for KW, but it does provide direction to: “Identify threatened, endangered, or proposed sensitive species habitat that require protection prior to implementing resource management activities (IV-41).” In addition, the Plan also directs that the Forest, “Identify habitat needs to meet population objectives and carry out National Forest responsibilities in recovery plans for threatened and endangered species (IV-41).”

1.2 Species Biology and Ecology

Kirtland's warblers migrate from their winter habitat in The Bahamas to their breeding habitat in Michigan in early to mid May. Their average arrival date in Michigan is May 12; the earliest known arrival is May 3.

Kirtland's warblers typically occupy jack pine stands greater than 80 acres in size, with several scattered small openings and a stocking density of 1089 or more trees per acre. Stands of 1,000 acres and larger have been found to improve nesting density and duration of stand use (Huber *et al.* 2001). Initial use may start when tree height reaches 5 to 7 feet or at an age of 6 to 10 years old, varying according to site conditions. Optimal breeding habitat structure begins to decline by the time the trees attain a height of 12 to 20 feet, or at an age of 16 to 21 years old, depending on the site. Kirtland's warbler populations begin to decrease when tree heights reach about 13.4 feet and the lower height of live foliage reaches about 3.2 feet (Probst and Weinrich 1993). Some evidence suggests that tree height and percent cover (i.e., stocking density) are the primary factors controlling habitat suitability for KW and that nest site habitat is not a limiting factor (Probst and Weinrich 1993). Warblers typically occupy a new nesting area in small numbers at first, gradually increasing for a few years until a peak or plateau is reached, and then decline for a few more years until the area becomes unsuitable and no warblers remain. Kirtland's warbler nesting habitat is dynamic and ephemeral. Warbler nesting locations move across the landscape through time as new jack pine stands become suitable and other stands age and become unsuitable. Kirtland's warblers are adapted to finding and using new breeding habitat. Their survival depends on continuous, uninterrupted regeneration of new breeding habitat throughout the northern Michigan jack pine forests.

The required habitat type is uncommon in Michigan and is restricted to poor, sandy soils of glacial origin. Areas of suitable nesting habitat are scattered and separated by areas of unsuitable habitat. Males occupy breeding territories which they appear to delineate by loud, persistent singing. Nests are constructed on the ground and by late May or early June clutches of 4 to 5 eggs are complete. Incubation requires about 14 days, and nestlings fledge in about 9 days (Walkinshaw 1983). Some KW pairs nest a second time.

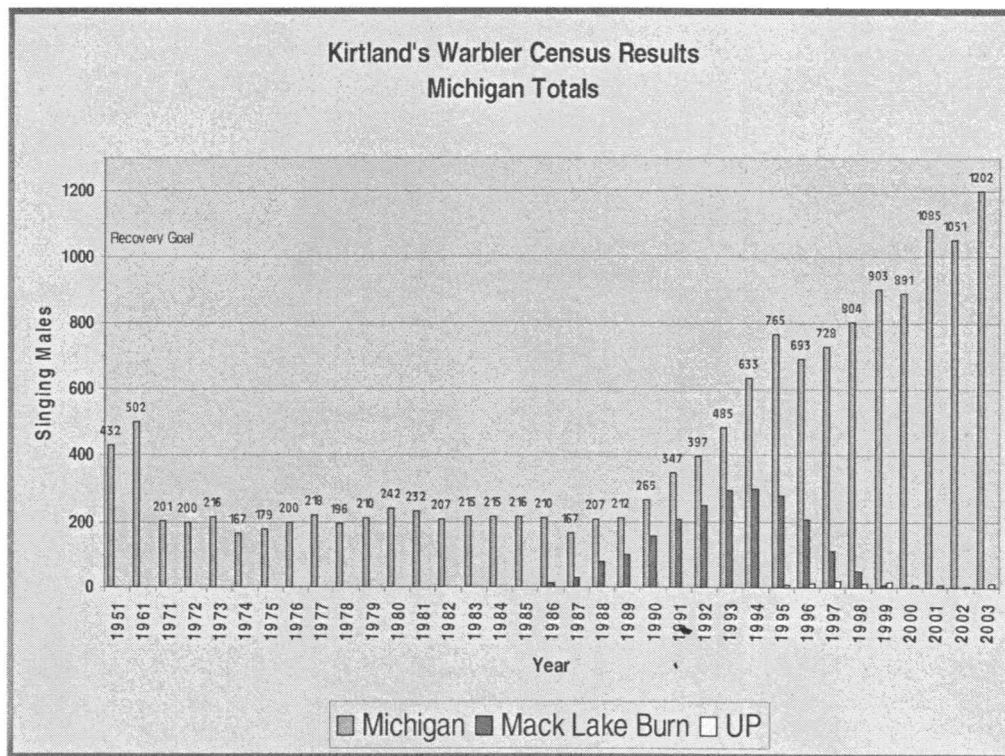
Kirtland's warblers begin leaving the breeding areas for the migration south in mid August. They depart over a lengthy period, with the last birds leaving Michigan as late as early October (Sykes *et al.* 1989). Their migration path, based on sightings (Mayfield 1960), seems direct between Michigan and the Bahamas. USFWS research biologists visited several islands of the Bahamas

and Turks and Caicos in 1984 and 1985 in an attempt to study the birds' behavior and identify any adverse factors affecting their survival there (Mike DeCapita, pers. comm. with Paul Sykes). Sufficient warblers for a scientifically valid sample could not be located. Based on two individual warblers that were observed, as well as observations of availability of and likely threats to winter habitat, led the biologists to conclude that this species does not face significant adverse effects during winter (Mike DeCapita, pers. comm. with Paul Sykes). Research is currently ongoing in the Bahamas to identify preferred winter habitat, quantify habitat use and diet, identify factors affecting distribution, and quantify site fidelity and winter site persistence.

1.3 Species Status

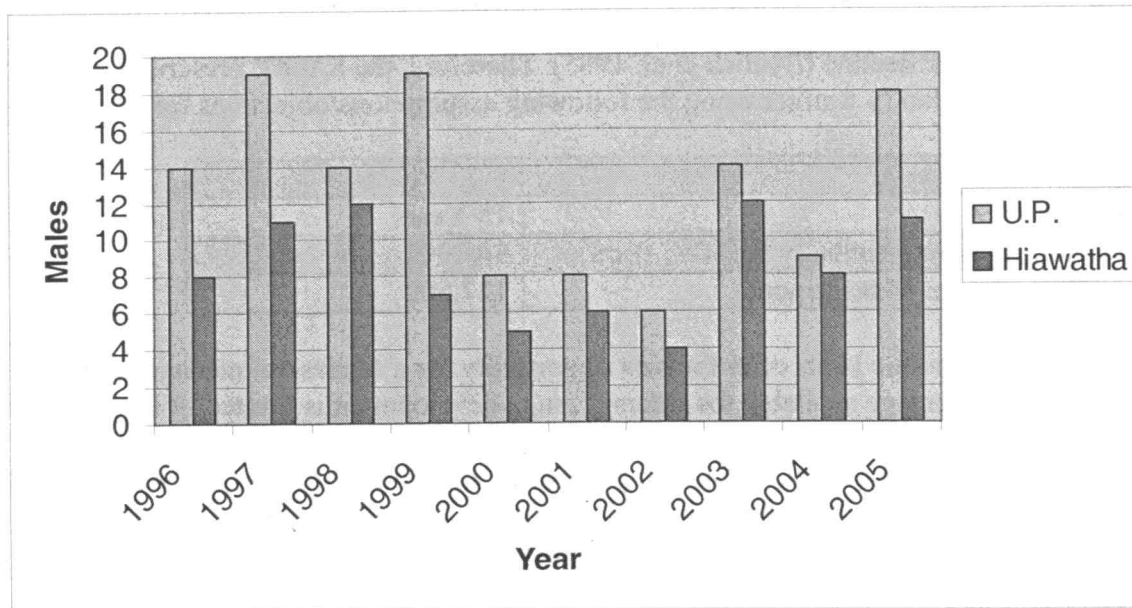
The Kirtland's warbler population was first censused in 1951 by counting singing males (432 males). Total breeding adult population is assumed to be double the number of singing males counted. The next count in 1961 was 502 males, but the third count in 1971 declined 60% to 201 males. Between 1972 and 1989, the population remained somewhat stable, ranging from 167 to 214 males. Since 1989, the population has increased annually, exceeding 1000 pairs every year since 2001 (Figure 1). The recent population increase is a result of habitat and cowbird population management by the MDNR, USFWS and Forest Service, as well as the creation of a large block of natural habitat by the 1980 Mack Lake Fire in northern lower Michigan.

Figure 1. Kirtland's warbler census result for Michigan.



Since 1996 the number of KW in the Upper Peninsula has ranged from 6 to 19 singing males (Figure 2). Kirtland's warbler numbers in the U.P. were high in the late 1990's due to several wildfires that occurred in the 1980's (Indian Lake Fire, 8-Mile fire, wildfires near Gwinn, MI). Management efforts on the Hiawatha National Forest (HNF), designed to create KW habitat, began in the mid 1990's and have resulted in KW occupancy of some managed jack pine stands. From 1996 – 2005 the majority of KW nesting activity in the U.P. has occurred on the HNF, ranging from a low of 4 breeding pairs in 2002 to a high of 12 in 1998 and 2003.

Figure 2. KW population changes on the Hiawatha National Forest and in the Upper Peninsula of Michigan (1996-2005)



1.4 Factors Essential to the Conservation and Recovery of the Species

This section summarizes the key factors affecting Kirtland's warblers on the HNF. These factors are used to analyze the effects of the Revised Forest Plan on the species.

The Kirtland's Warbler Recovery Plan (KWRP) identifies objectives (factors) needed to achieve a viable KW population. The following factors are relevant to the HNF's Kirtland's warbler population, and can be summarized into three main categories:

Factor 1. Availability of breeding habitat.

Factor 2. Human activity and disturbance.

Factor 3. Nest parasitism by the brown-headed cowbird (*Molothrus ater*).

1.4.1 Factor 1. Availability of breeding habitat

Kirtland's warblers evolved in the jack pine ecosystem where large wildfires occurred frequently. Prior to modern fire suppression, natural wildfires burned thousands of acres of jack pine forest on the dry sand plains in the Upper Peninsula (U.P.) of Michigan. Jack pines are adapted to regenerate after fire. Heat from fire opens cones which then release thousands of seeds. The seeds germinate on ground cleared of vegetative competition by the fire. Most jack pine wildfires burned vast areas and created very diverse vegetative conditions. In just a few years, these burned areas were covered with young jack pine intermixed with small sedge and grass openings. These new stands of young jack pine provided habitat for the Kirtland's warbler (Mayfield 1960). However, modern fire control, beginning in the early 20th century, substantially reduced the natural disturbance factor that sustained KW for thousands of years and helped lead to the species' decline (Byelich et al. 1985). Therefore, the KWRP prescribes active management for the Kirtland's warbler using the following assumptions/objectives for Michigan;

Age of Occupied Habitat	8-22 Years
Duration of Use	15 Years
Acres of Habitat Required Annually for 1000 Pairs	38,000
Total Acres Required for Management	127,500

The KWRP states that “public lands offer the best opportunity for a successful management program. Even though acreage available for summer range development is limited, it is quite adequate to support the goal of 1,000 pairs...each agency is responsible for developing habitat on the land with which it is entrusted.”. Emerging scientific information (correspondence letters) on territory size, age of occupied habitat and duration of stand use has recently updated these KWRP habitat assumptions (see section 1.6.2; Proposed Changes in KW Habitat Management).

The KWRP provides direction for protecting existing nesting habitat from destruction and degradation. It calls for suppression of wildfires that threaten breeding habitat, and controlling insects and diseases if it can be accomplished without directly or indirectly adversely affecting the breeding population. The KWRP calls for improving habitat by creating small openings where necessary (Byelich et al. 1985).

On the HNF, loss of habitat from wildfire occurs infrequently. The Strategy calls for distributing habitat across landscapes to minimize the risk of catastrophic losses due to wildfire and other causes (Huber et al. 2001).

The Strategy for Kirtland's Warbler Habitat Management recommends that “all dead trees should be left in the sale area. An overall objective of 15-25 dead trees per acre is desirable. In those cases where fewer than 10 standing dead trees per acre are present, live trees greater than 6 inches DBH may be used to recruit snags”.

Treatment blocks of 300 acres or larger are recommended. Given the limits of existing stand conditions, visual considerations, and land ownership patterns, some blocks will be smaller.

However, treatment blocks of 1000 acres or larger are desirable to optimize Kirtland's warbler productivity (Probst 1987).

Jack pine stocking density is an important aspect of KW breeding requirements. Kirtland's Warbler habitat standards suggest an average stocking density of 1,089 trees per acre including small non-forest inclusions (approximately 25% open per acre). Ideal tree spacing is approximately 6'X 6' or less, with one to five well dispersed openings per acre. Due to the openings, the actual tree density (outside the opening) is about 1450 trees/ac. This can be accomplished with planting or natural regeneration (chop/chain/seed).

1.4.2 Factor 2. Human activity and disturbance

This factor addresses the human activities that may adversely affect reproduction and survival of Kirtland's warblers. One objective of the KWRP is to reduce human factors that adversely affect reproduction and survival of Kirtland's warblers. Activities with the potential to disturb KW include unauthorized entry into occupied breeding habitat, the annual census, research, special uses (photography, recording, etc.), recreational trails, and special events. These activities can disturb KW and disrupt normal behavior patterns. When people move about in breeding habitat, nests and eggs and young can be crushed. Adults may abandon nests. The separation of young and adults interrupts feeding and brooding activities, increasing opportunities for predators to kill young birds.

Cowbird control is an activity that could pose risks to KW. People setting and checking cowbird traps by vehicle or on foot may disturb nesting warblers. The traps also occupy a very small area that could otherwise provide habitat for Kirtland's warbler. The cowbird traps could also presumably capture a KW and cause stress, injury or mortality. However, this has never been known to have occurred in the Lower Peninsula of Michigan where cowbird trapping is utilized.

The Strategy provides direction for controlling certain human activities, the types of activities that may be detrimental to the Kirtland's warbler. For example, State and Federal land management agencies have additional guidelines and direction for controlling human activities, which could be implemented on the HNF in the future. These guidelines provide direction on habitat closures and posting, roads, recreational trails, mineral development, fire prevention and control, insect and disease control, timber harvest, reforestation and other activities. Human activities and disturbances that impact KW in the U.P. are not significant at this time. As KW population increases, or if human activity increases in the U.P. in proximity to occupied habitat, there could be an increase in potential conflicts between human activities and KW.

1.4.3 Factor 3. Nest parasitism by the brown-headed cowbird

The brown-headed cowbird was not native to northern Michigan prior to logging and settlement which began in the late 19th century. Unlike other North American passerine birds that have long been parasitized by the cowbird, the Kirtland's warbler did not evolve defenses against cowbird nest parasitism. Cowbird parasitism was recognized as a threat to the warbler by the 1920's (Mayfield 1960) and by 1972 nearly 70% of all warbler nests were affected, with production suppressed to less than one young per pair per year (Walkinshaw 1983).

In 1972, the USFWS began annual removal of cowbirds from warbler nesting areas. Cowbird removal essentially has eliminated warbler nest parasitism, but the removal program must be maintained annually for the foreseeable future. Walkinshaw (1983) documented a parasitism rate below 6% from 1972 to 1978, along with increased warbler clutch sizes and fledging rates. The USFWS has successfully trapped cowbirds in the Lower Peninsula since 1972. The Kirtland's warbler population increase of recent years indicates that warbler reproduction and survival is healthy and that cowbird parasitism is under control. There are currently relatively low cowbird populations in the U.P. This could change over time if cowbirds continue to expand north.

1.4.4 Other factors not addressed in detail

This section describes additional factors and associated Hiawatha National Forest programs that are not analyzed in detail because they are not applicable, were determined to be discountable or could not be analyzed at the programmatic level.

1.4.4.1 General Disturbance

The revised Forest Plan proposes certain practices or activities that may have general effects on Kirtland's warbler (KW) that would possibly influence its behavior and habitat. National Forest management, including aspects of human activity from equipment operation for timber removal, access for dispersed recreation, and road and trail construction, are proposed activities that could result in risk to KW. Disturbances would include felling of trees, equipment operation, increased vehicle traffic, and associated noise and movement. Depending on the timing, frequency, intensity, amount, or other conditions, the impacts can be variable among similar projects.

Overall, the location of KW nesting activity is identified during the annual census or through incidental observations. Buffers and seasonal restrictions are utilized to help ensure there are no adverse impacts to KW. Closure orders could be used to protect areas as needed to protect the species on the HNF.

Given the extensive acreage on the Hiawatha, the scattered spatial pattern of human activities associated with the subject programs, potential stress from disruption of use patterns would likely be of a low magnitude and temporary in duration.

The revised Forest Plan continues to emphasize management direction that addresses effects pertinent to this section:

Guideline 2600-5 (Federal Threatened and Endangered Species): For all threatened and endangered species, special closure orders may be used to protect known breeding areas, nests and denning sites.

1.4.4.2 Highways (vehicle collisions)

Direct mortality from vehicular collisions is not known to be a significant factor for Kirtland's warbler. Generally, vehicle mortality may be associated with highways or higher standard roads where traffic volumes and speed may be factors. Direct mortality to KW from National Forest management activities and programs may occur on both high and low standard roads, but we

assume that most would occur on the higher standard roads, due to the capabilities for travel at higher speeds. The revised Forest Plan does not propose any change to miles of high standard roads from current conditions. For these reasons, the effects of highway collisions cannot be anticipated and this Biological Assessment does not provide additional analysis.

1.4.4.3 Mines, Highways, Railroad, Utility Corridors, and Other Large Developments

Major developments such as mines, highways, railroads, utility corridors, ski area and other large resorts can alter or interrupt existing habitat by removing potentially suitable habitat from the landscape.

The Revised Forest Plan does not propose the construction or reconstruction of these developments or anything comparable during the planning period. However, it does not prohibit them and it is possible that these projects may be proposed. If this were to occur, projects would undergo appropriate environmental planning and analysis and coordination with FWS and others. Revised Forest Plan management direction and Federal laws would ensure that KW and its habitat are fully considered. For these reasons, the effects of these developments cannot be anticipated and this Biological Assessment does not provide additional analysis.

1.4.4.4 Watershed management

This resource program has not had and will have no direct or indirect effects on Kirtland's warbler or its habitat in the Revised Forest Plan. Watershed programs goals and objectives for riparian areas to maintain the physical and hydrologic integrity will not have any direct or indirect effects on Kirtland's warblers or its habitat. This is because none of the potential KW habitat on the Hiawatha National Forest is located within riparian corridors. Kirtland's warbler inhabits sandy outwash plains and utilizes jack pine almost exclusively for breeding on the HNF. Therefore, watershed management will have no effect on Kirtland's warbler or habitat for this species on the HNF.

1.4.4.5 Range management

Browsing or grazing can also have a direct effect on KW if it alters the structure or composition of native plant communities or if cattle can move across the landscape unimpeded. If this were to occur, nests could potentially be trampled. This risk factor is not addressed in the Biological Assessment because there are no grazing permits on the Hiawatha National Forest.

The Revised Plan would include management direction so that livestock grazing would not occur on the HNF:

Guideline 2200-1: Grazing should not occur.

For these reasons, effects from livestock grazing cannot be anticipated and this Biological Assessment does not provide additional analysis.

1.4.4.6 Other human development: oil and gas leasing and agriculture

Most of these activities affect KW habitat by changing or eliminating native vegetation. The revised Forest Plan does not propose these activities. Oil and gas leasing or conversions to agricultural uses are not historical land uses on National Forest Service land, but mineral

prospecting and extraction occur to a limited extent. The Forests do not own the mineral rights over a significant portion of the National Forests. If mining is proposed, projects would undergo appropriate environmental planning and analysis and coordination with FWS, other agencies, and would be subject to public comment and review.

The revised Forest Plan's management direction would ensure that KW and its habitat are fully considered. For these reasons, effects from other human developments cannot be anticipated and this Biological Assessment does not provide additional analysis.

1.4.4.7 Non-winter dispersed recreation

Non-winter dispersed recreation consists of a variety of activities, such as camping, canoeing, biking, hiking, picnicking, use of OHVs, etc. Given the extensive acreage on the Forest and the anticipated low intensity of use, the number of KW that may be subject to any added stress, displacement, mortality, or other harm is likely to be low. Stress from displacement or disruption of use patterns would likely be temporary. Where Kirtland's warbler breeding habitat is threatened by dispersed recreation, closure orders can be used to ameliorate the threat. Locations where dispersed recreation is identified as a risk to KW can be protected with closure orders (see Section 1.4.4.1). Therefore, adverse effects from non-winter dispersed recreation are judged to be insignificant.

1.4.4.8 Forest pest management

The use of pesticides on the HNF was halted during the early 1980's, but may be re-initiated in the future. Pesticides are unlikely to affect KW through direct contact. Broad-scale aerial application for a variety of forest pests could directly affect KW or indirectly by reducing insects. Herbicides may be used in the future to control non-native invasive species. However, all of these pesticides are likely to be permitted only on a very limited basis under restrictive guidelines on the HNF.

Jack pine is the primary forest type used by KW. Insect and disease problems in jack pine on the HNF have been documented. The primary insect pest is jack pine budworm (*Choristoneura pinus*). Insect infestations have been limited to primarily older trees, although in some areas dense stands of young trees (<20 years) can be affected. Budworm usually selects slow growing, large crowned "wolf trees" that are large producers of staminate flowers. Defoliation with 20-40 percent mortality is usually the result. Since this insect has not, and likely will not be treated with pesticides, no effects to potential Kirtland's warbler habitat are expected under the Revised Forest Plan. Similarly other diseases and insect pests have not been treated historically and no changes in these practices are anticipated in the future.

Furthermore, the HNF is required to perform an environmental analysis, including Section 7 consultation to address any potential effects on listed species, before the application of any pesticide, including herbicides. Therefore, forest pest management activities are not likely to adversely affect the KW.

1.4.4.9 Habitat degradation by non-native invasive plant species

The level to which non-native invasive species (NNIS) have affected KW habitat in the United States has not been documented to date. However, NNIS has not been identified as a risk to KW

breeding habitat. The potential for non-native invasive plants increases with greater access to the Forest. Human activities are a major factor in spreading these plants.

Although the Revised Forest Plan does not specifically address the management of NNIS in relationship to Kirtland's warbler habitat, it provides guidance for reducing the spread of non-native invasive plants for various resource areas, including certain wildlife (piping plover).

Regarding NNIS, any benefit to KW from the control of non-native species in breeding habitat would likely be small because of the limited acreage affected by current labor intensive hand removal of NNIS. Likewise should herbicide application be permitted in the future to control NNIS, the effect on KW habitat would be small relative to the quantity of habitat available. Any benefits would therefore be insignificant.

Objective 3400-1: In this planning period, identify and map areas of non-native invasive species concentration on the forest.

Objective 3400-2: Annually treat 40 acres of identified non-native invasive species.

The Draft EIS provides analysis of impacts of non-native invasive species in Chapter 3. No further analysis is provided in this Biological Assessment because of the uncertainties associated with any specific impacts to KW breeding habitat on the HNF. Project-level analysis would address this factor if applicable.

1.4.4.10 Global climate change

The potential impacts of global climate change are not specified as risk factors to KW in the recovery plan or the KW Strategy. It is unknown what impacts increasing temperatures would have on Kirtland's warbler in the Upper Peninsula.

For analysis purposes in the KW Biological Assessment we assumed that current conditions would persist and that the revised Forest Plan itself would not influence global climate changes. Therefore, while this is of crucial importance to the long-term survival of KW, impacts of global climate change were not analyzed.

1.5 Current Conditions (Affected Environment)

1.5.1 Factor 1. Availability of breeding habitat. At present, nesting habitat is found almost entirely on State and Federal public forest land. The US Forest Service and the Michigan Department of Natural Resources began habitat management in the 1960s and together have dedicated 24 management areas on about 150,000 acres for the Kirtland's warbler in the Lower Peninsula. Typically, habitat management in the Lower Peninsula consists of clearcutting 200 acres or larger stands of jack pine on a 50-year rotation followed by mechanical or hand planting of two year old jack pine seedlings. In the Lower Peninsula, approximately 2,760 acres must be managed annually to provide about 38,000 acres of nesting habitat in any year. Habitat management has been extremely successful. The Kirtland's warbler population in Michigan has increased in response to the increase in availability of nesting habitat and cowbird control.

In 2004, the entire known breeding range of the Kirtland's warbler was found in 12 counties in Northern Lower Michigan and 6 Upper Michigan counties (Figure 3). In the U.P. on the Hiawatha National Forest there are four primary sand-outwash ecosystem landtype associations (LTA); Whitefish Delta, Indian River Uplands/Steuben Outwash/Mint farm, Raco Plains, and Wetmore Outwash. There are approximately 46,000 acres of jack pine in these 4 LTAs. These 4 LTAs, which contain most of the 10/20 ecological landtype on the Forest, are allocated to MA 4.2 and 4.4, and would be the most likely areas for KW occupancy (Table 1). There is also likely suitable KW habitat outside of the 4 outwash LTAs (i.e., Interior Wetland LTA).

Figure 3. Potential Kirtland's warbler nesting habitat in the Upper Peninsula of Michigan.

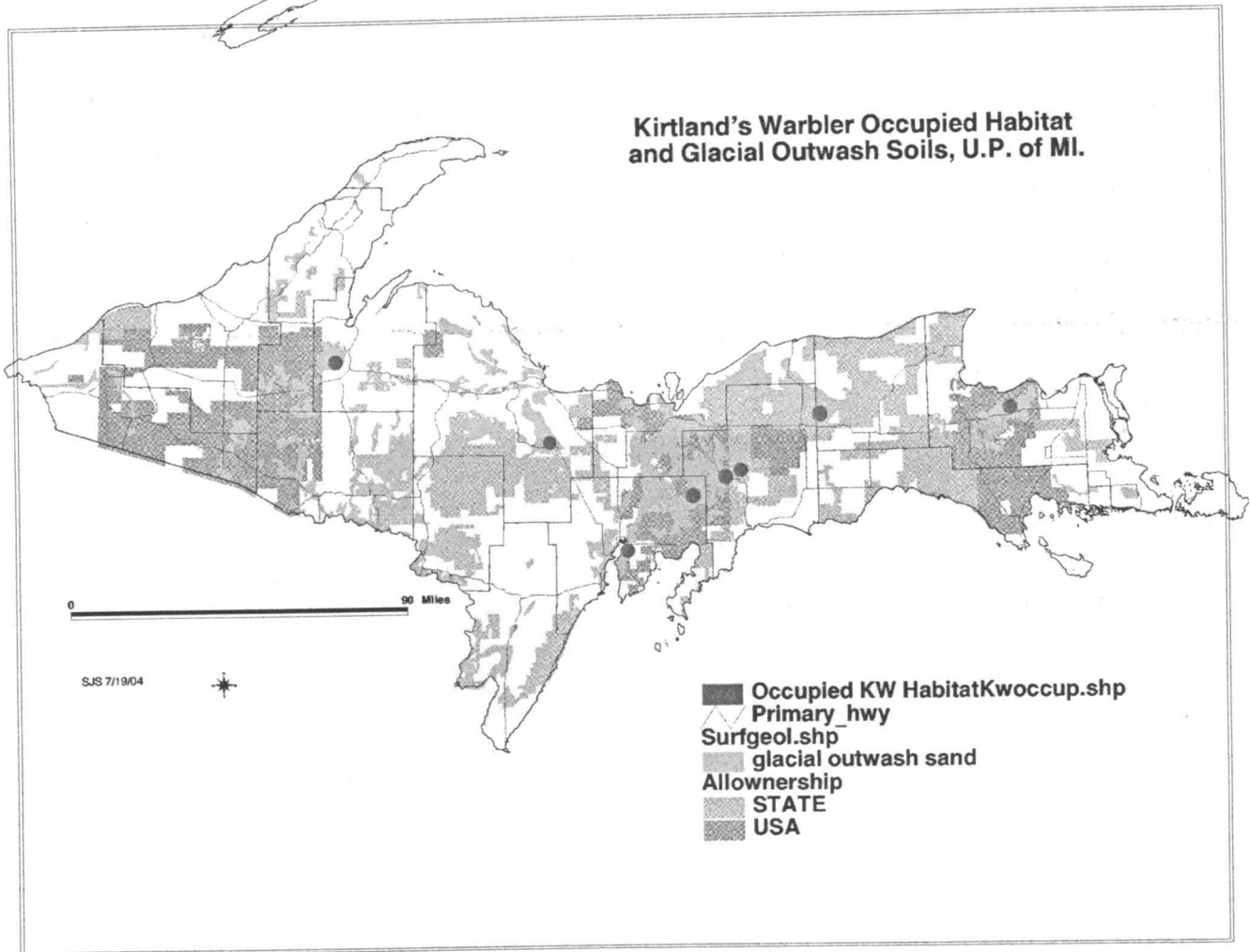
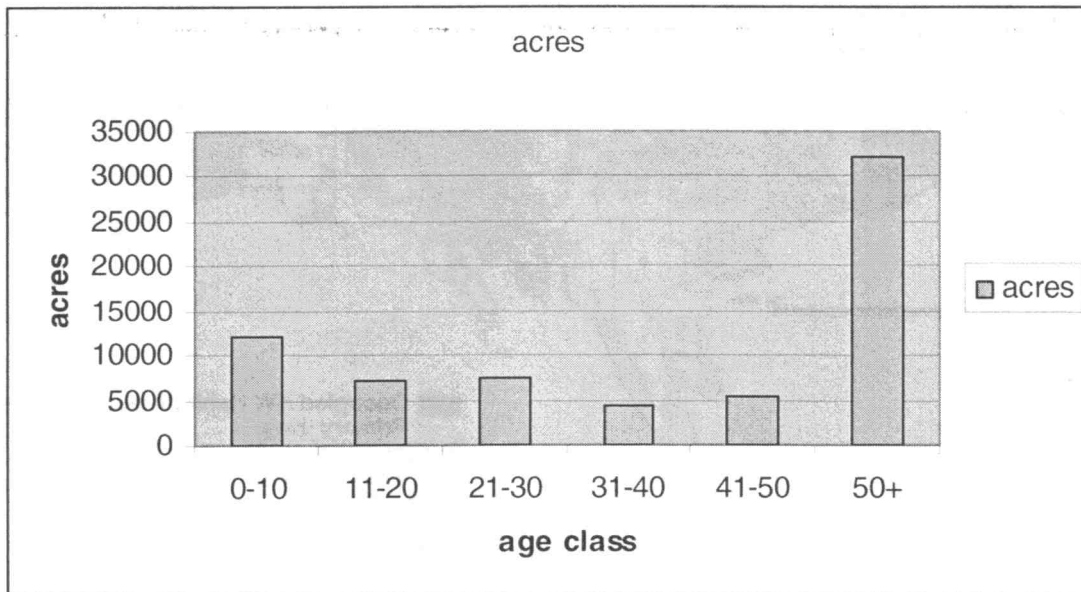


Table 1. Approximate distribution of jack pine acres on the Hiawatha National Forest

Age Class	Approximate distribution of jack pine acres					
	Forest Wide	Raco Plains	Wetmore Outwash Plain	Indian River Uplands/Steuben Outwash	Mint Farm (adjacent to Indian River)	Whitefish Delta
0 - 10	12,040	6,964	1,225	1,224	113	1,178
11 - 20.	7,173	1,225	1,436	1,563	361	1,333
21 - 30	7,361	2,229	1,409	697	364	651
31 - 40	4,257	1,113	291	894	62	110
41 - 50	5,312	2,613	588	378	11	72
Over 50	32,123	9,836	3,186	2,450	2,033	375
Total	68,266	23,980	8,135	7,206	2,944	3,719

There are currently about 68,000 acres (7.2%) of jack pine on the HNF in a variety of age-classes (Figure 4). At a coarse scale, early land surveyors noted that there were at least 28,000 acres of pure jack pine classified on the Forest in 1850, prior to settlement (Hiawatha NF data). However, the pre-settlement landscape would have also included additional areas of jack pine within the pine barrens (44,000 acres) and red pine/jack pine (18,000 acres) ecosystems. The total land area of native jack pine fluctuates over time because this tree species is fire-dependent and linked to fire regimes, drought cycles and jack pine budworm population dynamics.

Figure 4. Current age class distribution of jack pine on the Hiawatha National Forest.



In 2005 there were 11 male KW's counted on the HNF. Research has shown that KW's in the U.P. successfully breed and interact with populations in the Lower Peninsula (Probst *et al.* 2003). Figure 4 shows that there are about 16,000 acres of jack pine in the 0-20 age-classes and in suitable outwash-sand ecosystems. Figures 5 and 6 show the size and spatial attributes of potential and occupied KW habitat on the HNF at the present time. However, the precise extent of currently suitable KW habitat on HNF is unknown due to a lack of spatially-linked tree-stocking data tied to KW habitat requirements. General observations would indicate there may be 1,000-4,000 acres of suitable KW habitat (6-24 years old, in blocks larger than 100 acres and at least 1,089 trees/ac) on the Forest at this time.

Figure 5. Jack pine and potential KW habitat on the west unit of the HNF

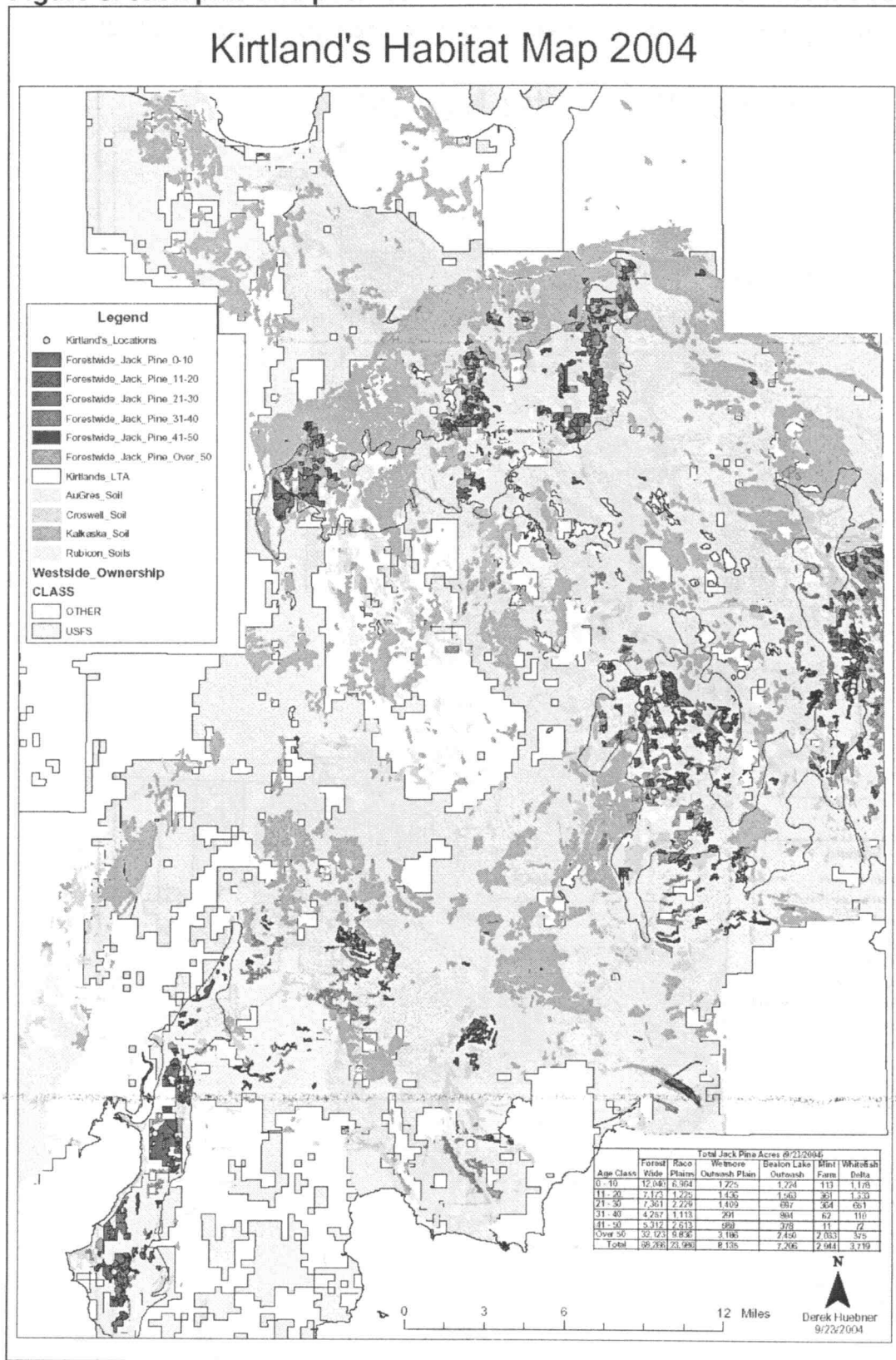
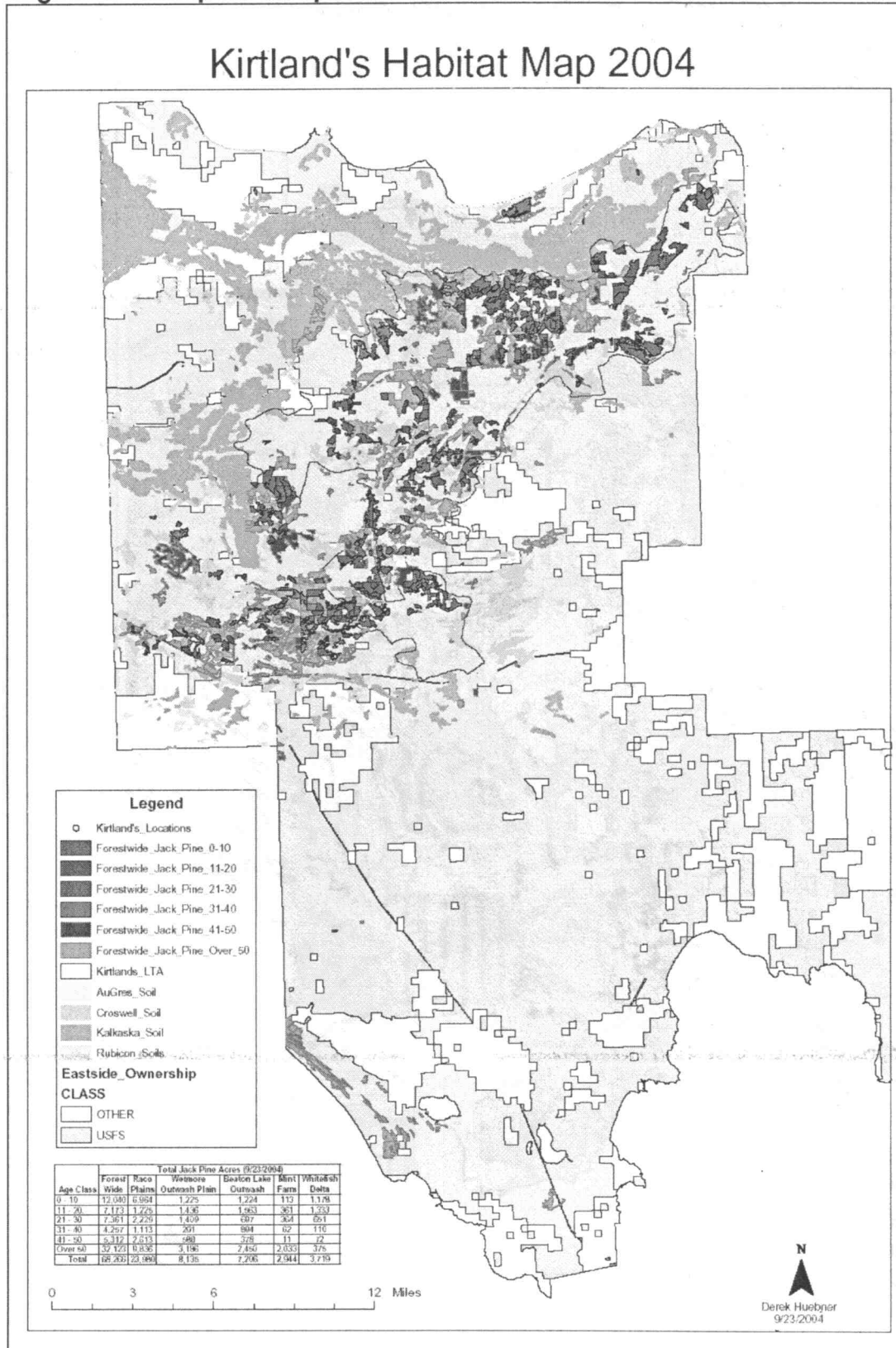


Figure 6. Jack pine and potential KW habitat on the east unit of the HNF.



The KW Management Strategy direction suggests that treatment blocks are scheduled for regeneration close to other blocks in space and time. An examination of Kirtland's warbler biogeography (Probst and Donnerwright 1995) suggests that the birds prefer to nest in large stands (1000+ acres) of young jack pine. Kirtland's warblers nest in higher densities in larger stands, and these large stands are used for a longer period of time than smaller stands.

There is currently no program direction on the HNF to provide a sustained flow of breeding habitat for Kirtland's warblers. The HNF does not maintain a schedule of habitat treatments by year and there are currently uncoordinated attempts to distribute the treatments across the landscape. The jack pine management guidelines in the 1986 Forest Plan are primarily those that are relevant to other, non KW resource concerns. For instance, the Forest Plan allows temporary opening treatment blocks up to 300 acres in sharp-tailed grouse management areas.

1.5.2 Factor 2. Human Activities and Disturbance. Human activities including research, monitoring, fire suppression and recreational activities have the potential to impact KW on the Hiawatha. Cowbird trapping is not occurring on the Forest at this time. Conflicts between human activity and KW populations in the U.P. are not known to be significant at this time. Area closures are not used as they are in other parts of the breeding range. Relatively low human population and relatively low KW populations have minimized opportunities for conflict in the past. As KW populations increase and as more people move into the U.P. the potential for conflict will increase.

1.5.3 Factor 3. Nest parasitism by the brown-headed cowbird. Cowbird trapping was tried on the HNF in the mid 1990's with little success since there were too few birds to justify maintaining the traps. Cowbirds in the U.P. tend to be concentrated near agricultural and urban areas and few are observed in more remote forested areas. It is possible that their range is expanding to the north. Cowbird parasitism is not considered a significant factor for conservation of KW in the U.P. at this time, but that could change in the future.

1.6 Resource Protections

This section describes the proposed Forest Plan Objectives, Standards and Guidelines that are relevant to the Kirtland's warbler. This section also describes proposed changes in Kirtland's warbler habitat management as a result of new information on the species. This new information is the result of a working session of the Kirtland's Warbler Recovery Team (July 2001), and is presented in a paper called *Kirtland's Warbler Essential Habitat Update* (Bocetti *et al.* 2001) and is summarized in the correspondence letters between the KW Recovery Team (2002) and USFWS (2005).

1.6.1 Revised Forest Plan. The revised plan takes an interdisciplinary approach to protect threatened, endangered and sensitive species. The desired conditions, goals, objectives, standards and guidelines provided below reflect direction for various resource areas relative to KW conservation.

Kirtland's Warbler

Goals:

- Provide for Kirtland's warbler management within forest-wide vegetation goals.
- Provide a minimum of 6,700 acres of jack pine in the appropriate size class, as determined in consultation with the U. S. Fish and Wildlife Service (FWS), striving to achieve desired Kirtland's warbler stocking levels on ELT 10/20 in Management Areas 4.4 or 4.2.

Objectives:

- Regenerate an average of 670 acres of jack pine per year in Management Areas 4.4 or 4.2 on ELT 10/20 to provide Kirtland's warbler habitat.

Guidelines:

- For Kirtland's warbler management, strive to regenerate jack pine stands with the appropriate stem density and non-forested openings, as determined in consultation with the FWS.
- Pre-commercial thinning or release of jack pine should not occur in areas managed for Kirtland's warbler prior to vegetation achieving the suitable size criterion or until vegetation exceeds the suitable size criterion for Kirtland's warbler breeding, unless such activity maintains or enhances Kirtland's warbler habitat on the forest, as determined in consultation with the FWS.

Wildlife Management

Goals:

- Provide diverse, healthy, productive and resilient habitats for aquatic and terrestrial wildlife.
- Provide ecological conditions to sustain viable populations of native and desired non-native species and to achieve objectives for management indicator species.
- Enhance habitat for resident and migratory wildlife species.
- Project implementation will emphasize the need to protect TES and include indirect wildlife habitat improvements that occur as a result of the timber sale program.

Objectives:

- Implement vegetation management and aquatic and riparian objectives to move terrestrial and aquatic habitats toward desired conditions.

Standards:

- Vegetation will be managed within the ecological capabilities of the forest.

Guidelines:

- The maximum size of temporary openings for sharp-tailed grouse and Kirtland's warbler management should not exceed 1,100 acres. In KW management areas the 1,100-acre temporary opening guideline may be exceeded by harvesting adjacent blocks after the

appropriate stocking density (determined in consultation with the FWS) is achieved, and after the third-year stocking review.

- Deeryards and adjacent uplands should be managed to provide winter thermal cover and browse.
- Vegetation management activities should encourage intra-stand diversity and mast producing species.

Structural Guidelines:

- When determining reserves for even-aged managed stands on: ELTs 10/20, method A and/or B, or a combination of both should be used. For all other ELTs, either method A or method B should be used.
 - Two to four live trees with diameters greater than or equal to the average stand diameter per acre should be reserved. Preference should be given to live den trees.
 - Variable size reserve islands/clumps that total up to a half-acre for every 10 acres should be reserved.
- For reserve snag and down logs in managed stands:
 - Two to ten snags per acre should be reserved, except where additional snags would be beneficial to rare species or unless they present a safety concern or interfere with mechanical site preparation. Additional snags should be recruited from live trees where there are fewer than two snags per acre.
 - Snags felled for safety reasons should be left as coarse woody debris.
 - Two or more down logs per acre that are equal to or greater than 10 inches in diameter and 8 feet long, should be maintained. In stands where tree diameters are less than 10 inches, down log diameters equal to or greater than the average stand diameter should be provided.

Threatened and Endangered Species Management

Goals:

- Contribute to the conservation and recovery of federal threatened and endangered species.
- Work cooperatively with U.S. Fish and Wildlife Service, other state and federal agencies and recovery teams to update and implement threatened and endangered species recovery plans.

Standards:

- Signed federal recovery plans for threatened and endangered species will be implemented. Deviations specific to the Hiawatha National Forest may be allowed after consultation with the U.S. Fish and Wildlife Service.
- All known populations of threatened and endangered plant species and wildlife nest and denning sites will be protected.

Guidelines:

- Conservation approaches for regional forester sensitive species should be implemented.
- Non-native invasive plants within element occurrences of threatened and endangered and Regional Forester Sensitive Species should be eliminated or controlled.
- Adverse impacts to known occurrences of Regional Forester Sensitive Species should be avoided, minimized or mitigated.
- Prior to implementing management activities, surveys should be conducted for federally listed species and Regional Forester Sensitive Species where suitable habitat exists.
- For all threatened and endangered species, special closure orders may be used to protect known breeding areas, nests and denning sites.
- Deference should be afforded to implementing conservation measures for federal threatened and endangered species when and where they conflict with conservation measures for unlisted species.

Vegetation Management

Goals:

- Native vegetation communities are diverse, productive, healthy and resilient.
- Vegetation conditions contribute toward ecosystem sustainability and biological diversity.
- Vegetative conditions represent native species in age, size and successional states that support native wildlife and fish species and other uses of the forest.

Guidelines:

- An ecological classification system, soil resource inventory or on-site soil investigation information should be used prior to prescribing species conversion.
- Reforestation of harvest areas through natural regeneration or seeding should be emphasized. Inter-planting to restore components of the ecosystem which are in decline or absent should be allowed.
- 40-60 year rotation in Jack pine MA 4.4; 40-70 [years in] MA 4.2
- A temporary opening should be considered forested when the re-established stand has reached a height that is greater than 20 percent of the height of the surrounding trees. (*note; except when applying wildlife guidelines for areas managed for KW where up to 1,100 acre or larger temporary openings are encouraged*)
- Openings should be separated by a stand of at least the minimum stand size, normally 10 acres.

Soil Resources Management

Objectives:

- In this planning period, on a project level basis, identify areas of ELT 10, 20 where soil organic matter has been lost due to past land use and wildfire. Where practicable and not in conflict with other management objectives, seek to restore organic matter on these sites through long-term vegetation management objectives.

Guidelines:

- In areas managed for timber production, whole-tree timber harvest methods should not be used on sites with inherently low fertility and low organic matter reserves (ELT 10/20, phase 0, 1 and 2; Grayling and Rubicon soil series). Slash will be left evenly distributed across the site.

Pest Management

Goal;

- Maintain or restore missing ecosystem components to improve ecosystem resiliency.

Fuel management

Goals:

- Establish, maintain or improve vegetative conditions using prescribed fire, mechanical treatments and other tools.
- In this planning period, vegetation is treated in high fire hazard areas within the wildland/urban interface areas to reduce the risk from wildland fire.

Objectives:

- In this planning period, reduce wildfire risks by fuel management of an average of 1,000 acres per year.

Fire Suppression

Goals:

- Manage fires in a safe and economically efficient manner. Consideration will be given to the effects on resource values and risks to life and property.

Specific Management Area Direction

Management Area 4.4

Suited Uses: To provide wildlife habitat for Kirtland's warbler and other upland species

Desired Conditions: Jack pine is most common tree species of this management area...Habitat for Kirtland's warbler will be developed and maintained by incorporating large areas of densely stocked young jack pine across the landscape. Sharp-tailed grouse, upland sandpiper, northern harrier, sand hill crane, American kestrel, bluebird, and black-backed woodpecker habitat will be provided through large openings/ savanna complexes. Pockets of densely stocked aspen or jack pine will also be found throughout the complex. Mature trees will be left to provide snags and coarse woody debris or could be commercially harvested to maintain the desired stocking densities and opening characteristics of the complex. The large adjacent temporary openings from jack pine harvest will provide additional openland habitat. As these stands regenerate and mature, the jack pine will provide habitat for Kirtland's warbler and spruce grouse.

Management Area 4.2

Suited Uses: To provide conifer timber products to the regional economy and to manage conifer for wildlife habitat for species such as red squirrel, American marten, Kirtland's warbler and pine warbler.

Desired Conditions: Red pine is the most common species in this management area, although jack pine, oak, aspen, white pine and northern hardwoods are also found. A mixture of conifers and hardwoods are evident along lakes and streams. The area is managed for conifer production, which are favored by wildlife species such as red squirrel, Kirtland's warbler, American marten and pine warbler.

1.6.2 Kirtland's Warbler Recovery Plan (KWRP) and Proposed Changes in Kirtland's Warbler Habitat Management (Based on correspondence letters between Kirtland's Warbler Recovery Team and U.S. Fish and Wildlife Service)¹

In 2001, The Kirtland's Warbler Recovery Team reviewed the KWRP, particularly the assumptions used at the time to determine the amount of essential habitat needed to meet the recovery goal of 1000 pairs. This data was based on the best information available at that time. The goal stated in the KWRP was to develop and maintain 38,000 acres of breeding habitat at all times by managing approximately 127,500 acres on Federal and State lands on a 45- to 50-year rotation: 53,488 acres (42%) on Federal lands and 74,143 (58%) acres on State lands. This would require regenerating 2,550 acres of jack pine annually. It also assumed approximately 1 breeding pair per 30 acres during a jack pine stand's optimum stage, and 15 years total occupancy (KWRP, pp. 20-23).

More recent data suggests that some of these numbers may need to be updated (correspondence letters). The average territory size is estimated to be 38 acres, not 30 acres. This estimate is based on the annual singing male census from 1980 to 1995. The average length of time (duration) a stand is used by Kirtland's warblers is estimated to be approximately 10 years, not 15 years. This estimate is based on duration analysis of stands on the Huron NF.

The number of acres of habitat required annually to establish and sustain a Kirtland's warbler (KW) population at a minimum level of 1000 pairs is the same as it was in the KWRP (38 acres/pair x 1000 pairs = 38,000 acres). However, the total acreage required to be managed as essential habitat would be higher, due to the shorter duration of occupancy, if jack pine is managed on a 50-year rotation:

$$\text{Total KW habitat required for management} = \\ 38,000 \text{ acres} \times (50\text{-year rotation}/10\text{-year duration}) = 190,000 \text{ acres}$$

At present, approximately 151,000 acres of essential habitat has been identified in the Lower Peninsula for KW breeding habitat management. Based on the information presented above, this

¹ These letters (cited as "correspondence letters") are referenced in this BA in Section 1.1 (Key documents guiding Kirtland's warbler (KW) conservation on the HNF), and are part of the Revised Forest Plan record.

represents a shortfall of approximately 39,000 acres of habitat required to sustain the breeding population of Kirtland's warblers at 1000 pairs. The UFWS (2005) response to the KW Recovery Team (2002) correspondence indicated that some of the projected habitat shortfall should be identified in the U.P.

Even with the substantial changes noted above, the KWRP remains a pertinent and mandated document for the HNF. The Revised Forest Plan would implement measures applicable to the HNF that were not updated or changed by actions of the KW Recovery Team KWRP and the USFWS. The KWRP provides suggestions for providing information and education services to the public, meeting research needs, and evaluating and monitoring habitat management objectives.

1.7 Environmental Consequences

Direct and Indirect Effects: The proposed goals and guidelines under the proposed revised plan would provide direction for producing quality breeding habitat and protective measures for the Kirtland's warbler. However other factors within the proposed revised plan are likely to adversely affect the Kirtland's warbler.

Factor 1. Availability of Breeding Habitat: Kirtland's warbler habitat is constrained by proposed revised Plan vegetation goals that identify the minimum and maximum amount of jack pine on the HNF in the future. The vegetative goals would allow for jack pine to be managed below, above or at current levels which could have a corresponding impact on the trend for KW habitat.

In 1980 there were approximately 110,000 acres of jack pine on the Hiawatha National Forest (Monitoring and Evaluation Report, HNF, 1995). There are currently about 68,000 acres of jack pine on the HNF, representing a 42,000 acre reduction in jack pine on the HNF since 1980. Analysis completed for the Revised Plan, using established vegetation composition goals, projected a maximum 14,000 acre (23%) jack pine decline for the HNF². This potential jack pine decline, combined with the previous planning period, would result in a downward trend for KW habitat.

The Revised Forest Plan would allocate 33,500 acres of the Forest's jack pine to be managed for KW habitat, in order to improve the current KW viability rating on the Forest. There are approximately 46,000 acres on the five major outwash plains on the HNF (Table 1). Therefore, the Forest has the ecological capability to exceed the minimum habitat goal of 33,500 acres.

Using the updated habitat information, 33,500 acres of jack pine habitat on the HNF would translate to;

$$6,700 \text{ acres} \times 5 \text{ decades (50-year rotation)} = 33,500 \text{ acres of jack pine managed as suitable habitat}$$

²Refer to the EIS, Forest Plan Revision, Chapter 3 (Wildlife Resources) for additional information.

6,700 acres in habitat at any time divided by 38 acres/pair = 173 KW pair
(suitable for approximately 10 years)³

The Revised Forest Plan would have a benefit to the Kirtland's warbler over the short term and long term because it would provide direction for managing a minimum 33,500 acres of jack pine for KW habitat and timber production. It would create an average of approximately 670 acres of breeding habitat annually. Approximately 6,700 acres of habitat would be available to an average of 173 nesting pairs of Kirtland's warblers annually.

The Revised Plan would increase the maximum treatment block size to 1,100 acres or more. Larger blocks would be possible since adjacent blocks can be harvested and reforested once third-year stocking is achieved. This change would be beneficial to the Kirtland's warblers because warblers nest in higher densities in larger blocks, and large blocks are used for a longer period of time than smaller blocks.

The Revised Plan could have an adverse effect on the Kirtland's warbler because the HNF would continue to suppress wildfires. However, the Revised Plan would provide managed habitat for the species over the short and long terms which would mitigate some of the effects of fire suppression.

The guideline for reserve snag and down logs in managed stands states that "two to ten snags per acre should be reserved, except where additional snags would be beneficial to rare species" would improve habitat suitability for KW. The KW Strategy suggests (page 15) that "all dead trees should be left in the sale area. ...an overall objective of 15-25 dead trees per acre is desirable". Based on this, it is expected that all dead trees and/or at least 10-15 per acre would be retained in KW management stands. The added structural diversity would likely benefit KW and other species native to the jack pine ecosystem.

The average of 1000 acres per year fuel treatment objective could reduce KW habitat if jack pine areas are permanently cleared to provide non-forested fire breaks. Alternatively, fuel breaks could be created via commercial timber sale of over-mature jack pine that would be designed to create both KW habitat (healthy young jack pine) and functional fuel breaks. Young, healthy green jack pine presents a lower fire hazard compared to over-mature and dying jack pine. Depending on how this objective is implemented there could be a negative, positive or neutral impact on KW habitat resulting from the fuels management program.

Factor 2. Human Activity and Disturbance: Under the Revised Plan, the HNF would continue to allow certain activities in occupied habitat such as Kirtland's warbler tours, the annual Kirtland's warbler census, research, monitoring, cowbird trapping, professional photography and recording of the Kirtland's warbler vocalizations. While these activities have substantial benefits to the Kirtland's warbler information and education program, a small direct risk to individual Kirtland's warblers exists. A small risk also exists as a result of cowbird control should the Forest opt to implement a program. These activities collectively could cause the direct

³ The 38-acre territory and 10-year suitability is from information presented in Bocetti et al. (2001) and KW Recovery Team (2002) correspondence.

loss of Kirtland's warbler eggs or young, nest abandonment, stress to individual birds, short-term behavioral changes or increased risk of nest predation. Therefore, these activities may adversely affect the Kirtland's warbler over the short and long terms.

Factor 3. Nest Parasitism by the Brown-Headed Cowbird: The Revised Forest Plan would allow trapping of cowbirds in KW habitat. Since the Revised Plan would permit cowbird trapping if needed, we predict that cowbirds would pose a low risk to KW on the HNF from nest parasitism. Cowbird trapping does provide direct benefits to the Kirtland's warbler by substantially reducing nest parasitism within 1 mile of the traps. The risks associated with human disturbance related to cowbird trapping were discussed in Factor 2, above.

Cumulative Effects: Cumulative effects are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation. The scope of the analysis is the action area or the Forest's proclamation boundary. Future federal actions that are unrelated to the proposed action are not considered in this section because they will require separate consultation pursuant to section 7 of the Endangered Species Act.

Factor 1. Availability of Breeding Habitat: Based on past land management, the MDNR and others are expected to continue to suppress wildfires on State and private lands. This is expected to continue to have a negative effect on Kirtland's warbler because insufficient natural breeding habitat would be created over the short and long terms. There is know recognized Kirtland's warbler habitat management effort occurring on commercial or non-commercial forest lands within the proclamation boundary of the Hiawatha National Forest. In the reasonably foreseeable future we don't expect a change in this condition. The KW management included in the Revised Forest Plan for FS lands will likely constitute the entire management program for the species.

Factor 2. Human Activity and Disturbance: Although few specific non-Federal actions are reasonably certain to occur within the action area, it may be expected that some activities, particularly on private lands, could have a progressive negative effect on Kirtland's warblers in the action area. Human populations in the counties with Kirtland's warbler habitat have been generally increasing in recent years.

Population growth is expected to occur in the future with projected growth at approximately 7.7 percent for the eastern U.P., and 6.8 percent for Michigan. In the eastern U.P. some counties have much higher growth projections. For example, Chippewa County is expected to experience a 29.6 percent increase in population between the present and 2020 (EIS, Revised Forest Plan, Chapter 3, Social Environment). This county encompasses a large portion of the jack pine within the proclamation boundary on the east side of the Forest that could be managed for KW.

Human population growth is accompanied by increased urbanization, including road construction and land subdivision and development. These activities could result in the permanent loss of potential Kirtland's warbler habitat. Additional actions performed on private lands that may adversely affect the Kirtland's warbler in the future are fire suppression, application of pesticides, mineral extraction, and non-Kirtland's warbler focused timber harvest.

Increasing urbanization is likely to result in the construction of fuel breaks on adjacent federal lands, potentially reducing Kirtland's warbler habitat.

Factor 3. Nest Parasitism by the Brown-Headed Cowbird: Increasing human populations and growth of urban and agricultural areas near barrens and jack pine habitat could lead to an increase in cowbird habitat and an increase in bird feeders which would facilitate a general increase in cowbird numbers. Increasing cowbird populations could have an impact on KW by nest parasitism.

Summary of Effects

The proposed revised plan would benefit the Kirtland's warbler over the short and long terms because:

1. It would provide direction for managing a minimum of 33,500 acres of jack pine for KW habitat.
2. It would create an average of 670 acres of breeding habitat annually, thus habitat would be available to an average of 173 nesting pairs of Kirtland's warblers annually.
3. It would allow all or at least 15-25 snags per acre to be reserved in KW habitat.
4. It would increase the treatment block size to 1,100 acres, or more.
5. It would suppress wildfires, protecting existing and potential breeding habitat.
6. It would permit cowbird trapping, reducing nest parasitism.
7. Would allow for area closures if needed.

However, the proposed revised plan would likely adversely impact the species over the short and long terms because the taking of 1 individual can lead to an adverse impact call and:

1. Wildfires would continue to be suppressed and wildfire suppression in KW habitat could harm or kill individual KW.
2. It would permit firewood gathering in KW habitat
3. It would permit cowbird trapping, which could potentially disturb nesting Kirtland's warblers.
4. The proposed revised plan would permit activities such as Kirtland's warbler tours, the annual Kirtland's warbler census, research, monitoring, professional photography and recording of the Kirtland's warbler, which can impact individual KW or nesting.

1.8 Determination of Effects

1.8.1 Determination

Determination of Effects for the Revised Forest Plan
LAA: May affect, likely to adversely affect, the Kirtland's warbler

1.8.2 Rationale for the Determination of Effect

These adverse effect determinations are made because the potential for take or harassment exists for the existing population. This take could take the form of nest abandonment or direct destruction of eggs from research, monitoring, recreational activities, fire suppression and other human activities. While there are also beneficial aspects of Revised Plan for KW, the risk of potential loss of individuals also exists.

1.9 Monitoring

The KWRP requires managing agencies to "monitor breeding populations...in order to evaluate responses to management practices and environmental changes." There are two phases to this monitoring program: (1) year-round inventory of potential breeding habitat, and (2) counting singing males during a short period in June. Coordination of this monitoring program has been delegated by the Recovery Team to the Michigan Department of Natural Resources. The Forest Plan prescribes monitoring Kirtland's warblers on the HNF annually to determine progress in meeting specified management direction.

Potential Breeding Habitat

Potential breeding habitat is monitored throughout the year, with field checks occurring in the spring, just prior to the annual census. Habitat will be tracked using a geographic information system (GIS). Timber sale and reforestation information will be tracked using a local database. This information will be presented to the Kirtland's Warbler Recovery Team annually in the form of summary tables and a graph.

Kirtland's Warbler Census

Since 1971, the Kirtland's warbler population has been monitored each year by professional resource managers and trained volunteers during the Kirtland's Warbler Census. Census procedures make use of the behavior of male Kirtland's warblers to locate and count all the territorial males during a 12 day period in June. The field work consists primarily of using the mornings to traverse known colonies on foot and to map the location of singing male Kirtland's warblers. Habitat that is just developing and maturing nesting habitat are also included in the field survey.

Kirtland's warblers tend to occur in loose assemblages, which are referred to as "colonies". It has generally been assumed that there is a breeding female for each singing male. Although this may not be true in some cases, an approximation of the total breeding population may be obtained by doubling the count of singing males.

The census is conducted according to specific instructions, distributed annual by the MDNR. The HNF Kirtland's warbler census is conducted by employees and volunteers walking or driving transects through occupied and potential habitat, listening for singing males, and mapping their locations. Singing males are counted, the data is assembled by the MDNR, and general information by county is made public only after authorization by the Recovery Team.

Conduct evaluations of the structure of occupied (and unoccupied) KW breeding habitat on the HNF.

1.10 References

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10/07/05

Hiawatha National Forest
Changes to Kirtland's warbler section of Biological Assessment for Plan Revision
due to adoption of Modified Alternative 2.

Change to Proposed Alternative

Since the Programmatic Biological Assessment (BA) for the Hiawatha National Forest (HNF) Revised Forest Plan was sent to U.S. Fish and Wildlife Service (USFWS), the preferred alternative identified in that document has been modified (hereinafter referred to as Modified Alternative 2). Alternative 2 was referred to as the Revised Forest Plan in the BA. All changes remain within the range of alternatives originally considered in the Proposed Land and Resource Management Plan – 2005, Draft Environmental Impact Statement (DEIS). The changes pertinent to Kirtland's warbler are related to vegetation management composition goals and Spectrum linear program inputs:

- On MA 4.2 the jack pine minimum goal was raised from 10% to 18%.
- On MA 4.4 the jack pine minimum goal was raised from 39% to 43%.
- On ELT 60s, the successional pathway was redefined from 72% aspen and 28% jack pine to 50% aspen, 30% jack pine and 20% perpetual openings.

Result of Change in Proposed Alternative

Upward revisions of the minimum goals for jack pine resulted in changes to the total amount of this type to be managed on the HNF over the next 100 years. While the increases in jack pine resulted primarily from the higher minimums, redefining the successional pathway in the Spectrum model also contributed to the higher jack pine acreages under Alternative 2.

Environmental Consequences (Section 1.7 of the BA)

Previous text:

Section 1.7 Environmental Consequences (page 24)

“Analysis completed for the Revised Plan, using established vegetation composition goals, projected a maximum 14,000 acre (23%) jack pine decline for the HNF. This potential jack pine decline, combined with the previous planning period, would result in a downward trend for KW habitat.”

Updated text:

Section 1.7 Environmental Consequences (page 24)

Analysis completed for the Revised Plan, using established vegetation composition goals, projected a maximum 4,000 acre (6%) jack pine decline for the HNF. This potential jack pine decline, combined with the previous planning period, could result in a downward trend for KW habitat.

Current Conditions (Affected Environment) (Section 1.5 of the BA)

Previous text:

(page 14); A table summarizing the general habitat conditions of the occupied 2005 KW habitat was not included in original BA but is added below.

Updated text:

(page 14); The following table summarizes the general habitat condition of occupied 2005 KW habitat on the Hiawatha NF. Three (3) KW were located in stands of wildfire origin, 3 were in stands typed as red pine but with a large jack pine component, 1 was in a jack pine bog, and 4 were found in jack pine stands created specifically for KW.

KWMA Name	Habitat or Site Name	County	Number Male KW	Stand Size (ac)	Block Size (ac)	Stand Year of Origin	Forest Type (CDS)	Reforestation Method	Remarks
Raco	Raco Guard	Chippewa	1	41	Several hundred in section	1997	Red Pine	Plant RP	Many inclusions of JP natural regeneration
Interior Wetlands	Trout Lake Bog	Chippewa	1	90	n/a	1981	Jack Pine	Uncertain probably nat regen	Unusual wetland habitat
Indian River uplands/Steuben outwash	Highbridge	Delta	2	49	350	1992	Red Pine	Plant RP	Significant density of JP natural regeneration
Indian River uplands/Steuben outwash	Highbridge	Delta	1	31	350	1995	Jack Pine	Nat regen of JP	Same block as above
Indian River uplands/Steuben outwash	8-mile	Schoolcraft	1	43	150	1993	Jack Pine	Nat regen of JP	
Indian River uplands/Steuben outwash	8-mile	Schoolcraft	2	40	150	1993	Jack Pine	Nat regen of JP	Same block as above
Whitefish Delta	Stonington	Delta	3	35	n/a	1989	Jack Pine	Wildfire 1988	Much openland adjacent