DNR

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

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SUBJECT: Kirtland's Warbler Survey Methods

With the intention of presenting a proposal to the Kirtland's Warbler Recovery Team at its next meeting on July 17–18, we have been working to develop alternatives to the traditional Kirtland's warbler census. We have focused on developing a sampling survey design with a detection probability function, wherein a subset of jack-pine stands would be surveyed annually. We initially identified three main arguments to support a shift to such a design:

1. Use of a detection probability function would improve the accuracy of Kirtland's warbler population estimates.

2. A sampling design would reduce survey costs.

3. A sampling design would provide the information needed to continue effective habitat management.

After much discussion on these topics, we have concluded the preceding arguments are not as strong as we previously believed and, in some cases, do not necessarily support a shift away from the current census method. The arguments and their weaknesses are described under the following headings.

Argument 1: Use of a detection probability function would improve the accuracy of Kirtland's warbler population estimates.

The accuracy of population estimates derived through the current census method can be questioned because counts can be biased by many variables (e.g., observer experience, auditory acuity, population density, stand characteristics, time of day, duration of survey, distance of birds from a transect, pacing accuracy, call frequency, wind speed and direction, temperature). Development of a detection probability function could account for those sources of measurement error and thus improve the accuracy of population estimates.

We could apply a probability detection function to both census and sample data, and the estimates derived from each method could be improved equally. The benefits associated with use of such a function are unrelated to the question of whether a sampling design is preferable to a census.

Regardless of the type of survey design we use, a probability detection function would be necessary to maximize the accuracy of population estimates. However, quantification and analyses of the sources of error required for development of such a function would require a complex and potentially expensive research project.

Argument 2: A sampling design would reduce survey costs.

The current census method is labor intensive and expensive because it requires extensive preparation and coordination and all potential habitats must be surveyed. A sampling design is appealing because it could reduce the time and costs associated with deriving a population estimate. However, the savings associated with a design that would provide precision acceptable to the Recovery Team would not be as great as we initially anticipated.

The variability inherent within the Kirtland's warbler breeding habitat poses a challenge to deriving a precise population estimate from a random sample. Kirtland's warbler population density can be affected by stand age, stand size, jack-pine density, soil type, proximity to other occupied habitats, and relative densities of Kirtland's warblers in adjacent areas. To account for most of the environmental variability and achieve high precision, we would probably need to survey a large proportion of available habitat, and the cost savings associated with a sample versus a census could be minimal.

In addition, if we adopt a sampling design, most of the effort that would be saved would be from volunteers and relatively inexperienced staff. The most-experienced staff would continue to devote large amounts of time to preparation, coordination and surveys. The most-experienced staff also tends to receive higher salaries. As a result, a reduction in survey cost by a certain percentage would result in a disproportionately greater reduction in the annual survey area. In other words, a sample would result in the loss of a greater amount of data relative to the amount of funds that are saved.

Argument 3: A sampling design would provide the information needed to continue effective habitat management.

Under a sampling design, we would estimate population size based on Kirltand's warbler densities within a subset of available habitats. This method could produce scientifically defensible population estimates that we could use to track population trends and continue our habitat-development program.

Although we would obtain the information we need to develop habitat, a sampling design would result in the loss of some important site-specific data that are used in other habitat-management activities. Information on warbler presence in specific habitats is commonly used during review

of oil and gas leases, routing of timber sales, planning of off-road vehicle routes, placement of cowbird traps, area closures, and review of other potential land uses. In many cases, confirmation of warbler presence is important to justify modifications to specific land uses.

Presence/absence data could be sufficient to provide the information managers need to make recommendations on land use in particular habitats. Presence/absence surveys are less intensive than the transect surveys conducted during the census. However, the need to conduct presence/absence surveys in addition to surveys designed to derive a population estimate could further reduce the cost savings associated with a shift away from a complete census.

Conclusion

We expect the Kirtland's Warbler Recovery Team to resist any proposal to shift away from the traditional census. Some team members have expressed the opinion that a sample would not provide a reliable population estimate, and they object to a loss of direct observation data. They have also explained that the cost of the census is an extremely small (roughly 5%) portion of the expenditures for the entire Kirtland's warbler program. Recovery Team members have stated that this relatively small investment in data collection is important to demonstrate the success and justify the expense of the rest of the program.

To present a proposal that is favorably received by the Recovery Team, we would need to demonstrate the benefits of a sample relative to a census outweigh the liabilities at the program level. By incorporating a probability detection function, we could design a sample that could increase the accuracy of the population estimates. However, such an effort would be expensive initially and would probably yield only meager savings through time. In addition, the use of a detection probability function does not preclude continuation of a census.

A sampling design that conserved funds in any meaningful amount would result in a significant loss of information about the warbler population. With the Kirtland's warbler population at roughly 1.5 times the abundance goal, we could argue that a precise population estimate is no longer necessary, and that increasingly limited funds could be better used by addressing higher priorities. We would need to indicate we are willing to accept the loss of information at current population levels. This argument is not likely to persuade the Recovery Team to endorse a sampling design.

We do not recommend submitting a proposal to the Recovery Team that is based on weak arguments. Also, in the interest of continuing cooperative relationships with our management partners, we do not recommend adopting a sampling design without the approval of the Recovery Team. However, we do intend to discuss these issues at the upcoming Recovery Team meeting. Such a discussion could help clarify data needs and appropriate data-collection techniques at different population levels. We intend to describe the need for research on the detectability of Kirtland's warbler within the context of alternative survey methods.