

## Kirtland Warbler Transmitter Development/Tracking Studies

### PHASE I. Radio Transmitter Development - FY 1982-FY 1983

Considerable progress was made in FY 1982 under funding provided by the Endangered Species Program for the development and improvement of electronic components necessary to reduce the size and weight of wildlife transmitters. A 1.1-gram transmitter has now been fabricated, and field tests are being planned to test this hardware in FY 1983.

#### 1. Electronic Component Selection

The newest miniature transmitter design uses a quartz crystal which measures 3 mm in diameter and 8 mm in length. This new component is approximately one-half the size of our previous crystals. We are now trying to procure an even smaller crystal, but to date, the manufacturer has been unable to deliver the units. At this time, we do not know what the electrical characteristics will be for these small crystals.

The battery division of Gould Inc. has manufactured a special 500 mg, 50 ma-hr battery for our use. This cell meets the power requirements for the bird transmitter, but may not perform satisfactorily under humid field conditions. Battery experts from Duracell International Inc. have expressed pessimism with this cell application even though they could not suggest a better alternative.

New specifications have been developed for a selected transistor for the Kirtland's transmitters. These new transistors have better amplification at VHF frequencies than those previously used. This increased performance should help to compensate for certain electrical degradations anticipated with the smaller quartz crystals.

Smaller passive electrical components will be used with the Kirtland transmitters, and this will require an increase in assembly time. Also, extra caution must be taken to accurately position and solder the components and not degrade the circuit reliability.

## 2. Transmitter-Biological Interface

A preliminary weight-lifting study was conducted during August and September 1982, using pine siskins as a surrogate species. Four individuals averaging about 16.5 grams in weight were housed in a large, outdoor flight cage and instrumented with dummy transmitters weighing between 1.1 and 1.3 grams. Transmitters were attached to either the center four or center six tail feathers near the body using hot-melt glue as an attachment method. Each bird carried its transmitter seemingly effortlessly for about 3 - 4 weeks at which time this phase of the study was terminated.

Efforts are being made to acquire more pine siskins along with black-capped chickadees to continue this test in a more definitive manner. In March, 1983, active transmitters will be attached to free-ranging birds of these species in Colorado to determine their capacity to handle them in the wild.

Also, during the Kirtland's Warbler breeding season in 1983, but contingent on travel restrictions, a preliminary trip will be made to Michigan for an on-ground problematic inspection of Kirtland's Warbler habitat relative to the feasibility of radio-tracking first surrogate species, and later, Kirtland's Warblers.

(CONTINUED EFFORT DEPENDENT ON FUNDING).

### PHASE II. Studies with Surrogate Species - FY 1984

#### 1. Post-breeding season

Information is lacking about the behavior, movements, and mortality of post-fledglings and post-breeding adults up to the migratory period. Post-fledgling mortality is reported to be high in other avian species, and may represent a significant portion of total mortality in Kirtland's populations.

In 1984, during the post-breeding period in Michigan, both fledgling and adult birds of surrogate species will be trapped and instrumented with radio-transmitters developed for the Kirtland's Warbler. The purpose is to determine any problems that might be associated with the use of the new transmitters and to refine tracking techniques. Attempts will be made to determine any mortality that occurs with the surrogate species, and their movements up to the migratory period. Depending on the outcome of the 1983 transmitter work with surrogate species in Colorado, much of this work in Michigan may be initiated in 1983.

#### 2. Fall migratory season

Little is known about where Kirtland's populations overwinter, winter mortality, and the cause of this mortality. One possible method that can be used to answer these questions is to instrument birds on their breeding grounds and track the birds along their southward migration route to locate their wintering areas.

In 1984, surrogate species in Michigan will be trapped and instrumented with the new radio-transmitters at the appropriate time just prior to migration. Tracking techniques will be refined and other problems associated with tracking migratory birds will also be determined. Timing of migration, migratory paths, effects of weather, mortality, and wintering grounds will be determined for the surrogate species.

3. Wintering season

Should unforeseen problems occur in tracking migratory birds in the winter of 1984-1985, surrogate species will be transported to their known or suspected wintering areas, instrumented with transmitters and released. The assumption is that the released birds will find their own kind. Surrogate species will be tracked during the winter period to locate other individuals of the same species and to determine movements and mortality.

PHASE III. Studies with Kirtland's Warblers - FY 1985

Anticipating that results from work with surrogate species will be positive, and no insurmountable problems develop (high mortality or unusual behavior due to carrying transmitters), Steps 1, 2, and 3 under Phase II will be repeated with Kirtland's Warblers.

4. Aircraft time	
Certification (antenna antenna test)	
Fixed wing	2,000
Rotary wing	2,000
Parking	
Fixed-wing	1,200
Rotary-wing	1,200
5. Aircraft instrumentation	
hardware	1,000
6. Tracking-vehicle instrumentation	1,200 (A)
Antennae installation	
7. Local-tracking travel	500 (B)
8. Contingency 2.10%	2,250
Administrative overhead	1,400
	5,700

APPENDIX

Kirtland Warbler Budget Proposal

FY-83, 84, 85

- a) \$700/man weeks
- b) \$500/mw travel expenses

FY-1983

January 12 to June 1 - Colorado Surrogate Species Studies:

	<u>Man-weeks</u>	<u>Cost</u>
1. Flight-cage studies	8	5,600 (a)
Weight-lifting, battery/transmitter tests Pine siskins & black-capped chickadees		
2. Wild-bird tracking studies	12	8,400 (a)
3. Transmitter assembly	6	4,200 (a)
48 Radios		
4. Aircraft time		
Certification (antennae attachments)		
Fixed wing		2,000
Rotary wing		2,000
Tracking		
Fixed-wing 20 hrs @ \$ 75/hr		1,500
Rotary-wing 5 hrs @ \$250/hr		1,250
5. Aircraft instrumentation	1	700 (a)
Hardware		1,000
6. Tracking-vehicle instrumentation	2	1,400 (a)
Antennae installation		
7. Local-tracking travel		500 (b)
8. Contingency @ 10%		<u>2,850</u>
		31,400
Administrative overhead		<u>4,300</u>
		35,700

June 1 - September 30 - Michigan Surrogate Species Studies:

(Involves post-fledgling movement/mortality studies)

1. Ground-tracking time	18	12,600 (a)
2. Per diem		9,000 (b)
Travel, lodging, vehicles, etc.		
3. Aircraft-tracking time (if needed)		
Fixed-wing	24 hrs	1,800
Rotary-wing	10 hrs	2,500
4. Administrative costs		
Planning, reporting, secretarial, etc.	10	7,000 (a)
5. Contingency @ 10%		<u>3,290</u>
		36,200
Administrative overhead		<u>4,900</u>
		41,100
		76,800
Total for FY-83:		
Carry-over FY-82 funds		<u>32,000</u>
Net FY-83:		44,800

June - July - Kirtland's Warbler Post-fledgling Movement/Migration Study - Michigan

Duplicate procedures as used in Michigan surrogate post-fledgling studies		37,200
Administrative overhead		<u>4,900</u>
		41,100

August - September (into October) - Kirtland's Warbler Migration Study

Duplicate surrogate migration study procedures		11,700
		270,000

FY-1984

October - December - Surrogate Species Migration Study:  
(e.g. palm warbler, chipping sparrow, field sparrow)

1. Telemetry hardware		
Transmitter construction 24 Units	6	4,200 (a)
2. Ground-tracking time	40	28,000 (a)
3. Aircraft-tracking time 200 hrs @ \$80/hr		16,000
Contract/charter pilot down-time 5 wks @ \$1000/wk When pilot is not immediately needed or weather-grounding		5,000
4. Vehicle expenses		5,000
Replacement of tracking vehicles Via GSA rentals		
5. Per diem	40	20,000 (b)
6. Vehicle purchase		6,500
7. Administrative costs (Planning, reporting, etc)	10	7,000 (a)
8. Contingency @ 10%		<u>9,200</u>
		100,900
Administrative overhead		<u>13,800</u>
		114,700

June - July - Kirtland's Warbler Post-fledgling  
Movement/Migration Study - Michigan:

Duplicate procedures as used in Michigan surrogate post-fledgling studies		36,200
Administrative overhead		<u>4,900</u>
		41,100

August - September (into October) - Kirtland's Warbler  
Migration Study:

Duplicate surrogate migration study procedures		<u>114,700</u>
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Total FY-84: 270,500

FY-1985

October - December - Kirtland's Warbler Arrival and  
Movement Studies on Wintering Grounds - Bahamas (?) 30,000

Total FY-85: 30,000

PROPOSED BUDGET SUMMARY BY FISCAL YEAR

FY-83	Colorado Surrogate Studies	31,400
	Michigan " (post-fledglings)	36,200
		67,600
	Overhead	9,200
	FY-82 Carry-over	-32,000
	<u>Net FY-83:</u>	44,800
FY-84	Surrogate Migration Study	114,700
	Kirtland's (Michigan) Post-fledgling Studies	41,100
	Kirtland's Migration Study	114,700
	<u>Net FY-84:</u>	270,500
FY-85	Kirtland's Wintering Ground Location & Movement Studies	30,000
	<u>Net FY-85:</u>	30,000
	<b>GRAND TOTAL:</b>	<b>345,300</b>