Multiple Species Inventory & Monitoring Program
Report covering 2007 & 2008
Grant number T-6-R-1

The Iowa Multiple Species Inventory and Monitoring (MSIM) program began in 2007 on public lands with one crew responsible for 16 properties in central Iowa. In 2008, the program expanded to 2 crews, covering 29 new properties divided between southeastern Iowa and south-central Iowa. In addition, 2 properties first surveyed in 2007 have been chosen as properties to be visited annually & were re-surveyed in 2008. All properties were randomly chosen with a random number generator after being classified into habitat classes listed in the Iowa Wildlife Action Plan (IWAP) by property managers. The table below lists each property, the year(s) it was surveyed, which of the 19 habitat types it represented, county in which it is located, and property owner.

Table of properties surveyed in 2007 & 2008:

Property	County	Owner	Years	Habitat
Beaver Lake	Dallas	State	2007	Impoundment
Big Creek	Polk	State	2007	Lake
Camp Dodge	Polk	Federal	2007	River
Colo Bog	Story	State	2007	Warm grass
Errington Marsh	Polk	State	2007	Cool grass
Hanging Rock	Dallas	State	2007	Crop
Harrier Marsh	Boone	State	2007 & 2008	Warm grass
Hendrickson Marsh	Story	State	2007	Pond
Hickory Grove Park	Story	County	2007	Cool grass
Holst Forest	Boone	State	2007	Forest
McCoy WA	Boone	State	2007 & 2008	Pond
Middle Raccoon River	Dallas	State	2007	Creek
Saylorville #1 - Madrid Pits	Boone	Federal	2007	Herb wetland
Saylorville #2 - E57	Boone	Federal	2007	Backwater
Walnut Woods	Polk	State	2007	River
Yellow Banks	Polk	County	2007	Pond
Chariton River Greenbelt	Lucas	County	2008	Herb wetland
Colyn WA	Lucas	State	2008	Wet shrubland
Coyote Canyon WA	Clark	County	2008	Woodland
Dekalb WMA	Decatur	State	2008	Creek
Elk Rock State Park	Marion	State	2008	Woodland
Lake Ahquabi SP / Hooper Area	Warren	State	2008	Lake
Little River Rec Area	Decatur	State	2008	Warm grass
Red Haw WMA	Lucas	State	2008	Pond
Slab Castle WA	Lucas	County	2008	Crop
Slip Bluff Park	Decatur	County	2008	Savanna
Stephens State Forest - Cedar Creek Unit	Lucas	State	2008	Shrubland
Stephens State Forest - Chariton Unit	Lucas	State	2008	Wet forest / woodland
Stephens State Forest - Lucas Unit	Lucas	State	2008	Shallow lake
Stephens State Forest - Woodburn Unit	Clark	State	2008	Wet forest / woodland
Cairo Woods WA	Louisa	County	2008	Cool grass

Table (continued) of properties surveyed in 2007 & 2008:

Property	County	Owner	Years	Habitat
Cedar Bottoms WMA	Muscatine	State	2008	Herb wetland
Cedar Valley Park	Cedar	County	2008	Lake
Cone Marsh	Louisa	State	2008	Shallow lake
Indian Slough WA	Louisa	County	2008	Savanna
Klum Lake	Louisa	State	2008	Lake
Millrace Flats	Louisa	State	2008	Warm grass
Odessa WMA	Louisa	State	2008	Cool grass
Port Louisa NWR - Horseshoe Bend	Louisa	Federal	2008	Savanna
Port Louisa NWR - Louisa Division	Louisa	Federal	2008	Wet Shurbland
Red Cedar WA	Muscatine	State	2008	Forest
Redbird Farms WA	Johnson	State	2008	Herb wetland
Turtle Bend	Louisa	State	2008	Shallow lake
Weise Slough	Muscatine	State	2008	Wet forest / woodland
West Lake Park	Scott	County	2008	Impoundment

Properties were surveyed for birds, mammals, amphibians, reptiles, odonates, and butterflies. The tables in the appendix at the end of this report list the species seen at each property during each year of the survey. The number of bird species seen on each property ranged from 43 at Harrier Marsh in 2008 (although there were 66 species seen there in 2007) to 101 at Cone Marsh in 2008. Cone Marsh also had the highest number of bird SGCN with 21. Some of the SGCN seen at Cone Marsh include: Greater Yellowlegs, Solitary Sandpiper, Sandhill Crane, Black Tern, and American Bittern to name a few. The number of mammal species ranged from 1 at Cedar Bottoms WMA (which was not small mammal trapped until after the flooding in 2008) and 2 other properties with similar water conditions to 13 species at both Hendrickson Marsh in 2007 and the Woodburn Unit of Stephen's State Forest in 2008 – both records include sightings of house cats. Mammal SGCN seen during the surveys include: least shrew, southern flying squirrel, river otter, bobcat, and still unconfirmed captures of a few prairie voles. Cedar Bottoms WMA had the most documented species of amphibians and reptiles with 22, this site and Odessa WMA both had the highest number of amphibian and reptile SGCN with 4 species each. Harrier Marsh, Holst Forest, and Dekalb WMA each had the fewest number of amphibian and reptile species with 6 species each, while many properties had only 1 SGCN, the northern cricket frog. The other notable amphibian SGCN include smallmouth salamander at 9 properties. Other notable reptile SGCN include Northern prairie skink, smooth green snake, slender glass lizard, prairie kingsnake, bullsnake, Ornate box turtle, Blandings turtle, diamondback water snake, and copperbelly watersnake. The fewest number of butterflies were documented at Cedar Valley Park with 1 species (Spring Azure), even though the property was visited multiple times specifically for the butterfly surveys. The largest number of butterflies were seen at McCoy WMA with 28 species in 2008 (in 2007 this site had 20 species). McCoy WMA had no butterfly SGCN in either year. Several properties had 2 butterfly SGCN (Slip Bluff Park, the Cedar Creek Unit and the Woodburn Unit of Stephens State Forest). These species included the Regal Fritillary, Wild Indigo Duskywing, and Edwards' Hairstreak. The number of odonate species seen ranged from 8 at Holst Forest to 35 at Slip Bluff Park. Slip Bluff Park had 5 odonate SGCN including the Sulpher-tipped clubtail, Royal river cruiser, Spangled skimmer, and Slaty skimmer.

As with any large-scale research project, we have had some problems during the first 2 years that we are working on resolving. We have made changes to the data sheets to aid in the data collection and data entry process. We have made minor changes to some of the protocols, including dropping the nocturnal frog calling surveys as we were not finding any additional species not already seen during the daytime surveys; and we have added short visual encounter surveys (VES) to both the bird and butterfly protocols to assist in getting a more complete list of species found on the property but not necessarily associated with the representative habitat. These VES data are not used in every analysis, but do provide a more complete summary of the properties. In 2009, we will be formally comparing timed VES for mammal tracks to the track diversity we see on our trackplates. We had anecdotally noticed that we can find may additional species tracks by surveying water body banks than we get with the trackplates (which record primarily raccoon and possum tracks).

Additional issues included the purchase of large-ticket equipment such as backpack electroshockers and ANABATS. We completed the purchase of these items late in 2008, but the weather prevented the use of the backpack electroshockers. We did complete a limited deployment of the ANABAT protocol at a handful of properties but have yet to analyze the recorded bat calls.

Finally, our largest challenge has been data management. We began the project with a MS Office Access database which allowed only 1 person to enter data at a time. This database was split in 2007 into 2 separate databases to allow both the Central Iowa crew (part of this grant) and a private lands crew (funded through the FWS LIP program and stationed on private sites in south central Iowa) to enter data at the same time. Merging the 2 databases back together proved to be problematic. In 2008, the Iowa DNR Information Technology Bureau tackled the problem and created an on-line database that allows multiple people to enter data around the state simultaneously. However, this database was not ready until September 2008, so none of the 2008 data could be entered until after this time. We are still working on entering the 2008 habitat data into the database. Currently our biggest challenge is to double check data entry. There are simply too many records to check line by line so we are relying on several spot check methods, including a weekly random survey check where each data enterer (each field technician) will receive a printout of one of the surveys they entered that week and will be asked to check that survey line by line. Our other primary data check will be to ask each IWAP taxonomic working group to review the list of species and flag any records they feel needs additional confirmation – this is most prevalent with the bird species. Any records that I or the committees notice as unusual are first double checked against the paper data sheets to ensure there has not been a data entry error and then we look for additional confirmation in the form of a voucher specimen, voucher photos, or with the bird surveys a documentation form. While the above paragraphs illustrate that the Iowa MSIM Program is not yet at peak performance, we feel that we are making great progress and resolving issues as they arise.

Since we have visited only 45 properties funded by this State Wildlife Grant, we do not have the amount of data needed to compute most of the occupancy models using SWG funded properties alone. We do use the same techniques and methodologies on additional projects, including the LIP project, a FWS Prairie Pothole Joint Venture Flex Fund funded project

examining bird use on WRP sites in Iowa, and a few internally funded bird and butterfly response-to-management-techniques projects. The LIP project gives us an additional 28 properties with data for all species, whereas the WRP project gives an additional 82 properties for the bird information. Therefore, we have included all data available in the occupancy and detection probability estimations presented below. As you can see, even with the additional 28 properties, some species of SGCN are still too rare to be accurately estimated. Specifically, the flying squirrel models had convergence problems. We had only 3 flying squirrels captured in the last 2 years. An additional 25 species of SGCN have this same issue. Other models will converge but the estimates are still too imprecise. For example, the spangled skimmer data models converged, but 5 of the 9 parameters had confidence intervals from 0 to 1. In another example, the best model for the Regal Fritillary gives the following parameters (each parameter is followed by the confidence interval for the estimate in parentheses): Ψ (occupancy) = 0.999 (0-1.0), γ (colonization between 2007 & 2008) = 0.002 (0-1.0), E (extinction between 2007 & 2008) = 0.763 (0.597-0.880), p_1 (detection probability in 2007) = 0.012 (0.012-0.013), and p_2 (detection probability in 2008) = 0.418 (0.244-0.615). A 0 to 1 confidence interval is not a good estimate of the parameter as it means a 0 to 100% probability of occurrence or detection. Almost all of the other SGCN species have these issues. For these models to work well, many sites must be visited multiple years. As of December 2008, only 2 properties used for species other than birds had been visited in both years. Nineteen properties overlapped for birds between the 2 years, which helps explain the better estimates for several bird species. We believe that the future years of data collection and the use of covariates in the models will allow better parameter estimates in time. One SGCN, the cricket frog, does have adequate data to compute the occupancy models with most parameters being estimable. The best model for these data gives the following estimates: Ψ (occupancy) =0.808 (0.687-0.890), γ (colonization between 2007 & 2008) = 1.0 (0-1.0, i.e. not estimable), E (extinction between 2007 & 2008) = 0.156 (0.074-0.300), p_1 (spring 2007 detection probability) = 0.513 (0.411-0.615), p_2 (summer 2007) = 0.545 (0.464-0.624), p_3 (fall 2007) = 0.701 (0.607-0.781), p_4 (spring 2008) = 0.536 (0.444-0.627), p_5 (summer 2008) = 0.519 (0.438-0.599), and p_6 (fall 2008) = 0.632 (0.543-0.712). The cricket frog model suggests that this species of SGCN is still fairly common in Iowa, at least in the areas we have surveyed, and that if the species is present, an observer has a greater than 50% probability of detecting it in any given visit.

Table of parameter estimates for representative bird species. Ψ_{2007} and Ψ_{2008} represent the annual occupancy estimates, E is the extinction probability, and for some species the 6 p values are the seasonal detection probabilities (spring, summer, and fall) within each year.

Species	Ψ_{2007}	Ψ_{2008}	E	2007 p_{spring}	2007 p_{summer}	2007 p_{fall}	2008 p_{spring}	2008 p_{summer}	2008 p_{fall}
Bobolink	0.325 (0.282-0.372)	0.418 (0.378-0.478)	0.069 (0.010-0.350)	0.278 (0.226-0.338)	0.314 (0.269-0.362)	0.003 (0-0.012)	0.275 (0.245-0.306)	0.260 (0.232-0.291)	0.047 (0.036-0.061)
Wood Thrush	0.111 (0.087-0.141)	0.152 (0.129-0.177)	0 (0-1.0)	0.237 (0.171-0.319)	0.410 (0.327-0.499)	0.028 (0.010-0.073)	0.275 (0.222-0.336)	0.393 (0.337-0.453)	0.008 (0.002-0.032)
American Bittern	No valid estimate	No valid estimate	No valid estimate	0.011 (0.006-0.020)	0.003 (0.001-0.007)	0	0.100 (0.065-0.014)	0.045 (0.027-0.075)	0.009 (0.003-0.029)

Table (continued) of parameter estimates for representative bird species. Ψ_{2007} and Ψ_{2008} represent the annual occupancy estimates, E is the extinction probability, and for some species the 6 p values are the seasonal detection probabilities (spring, summer, and fall) within each year.

Species	Ψ_{2007}	Ψ_{2008}	E	2007 p_{spring}	2007 p_{summer}	2007 p_{fall}	2008 p_{spring}	2008 p_{summer}	2008 p_{fall}
Red Winged Blackbird	0.883 (0.854-0.908)	0.852 (0.825-0.875)	0.088 (0.054-0.141)	0.797 (0.770-0.822)	0.643 (0.619-0.667)	0.392 (0.369-0.417)	0.759 (0.740-0.777)	0.624 (0.603-0.645)	0.353 (0.334-0.373)

The Bobolink model has fairly strong confidence intervals and suggests that while the birds are detectable in spring and summer, they are very difficult to detect in the fall migration. These estimates match the natural history of the bobolink which are more nondescript in plumage during the fall and are much more likely to be silent in the fall. The Wood Thrush model suggests this SGCN is more rare than the Bobolink, occurring in only 15% or so properties in Iowa (provided we have already covered a representative sample of Iowa properties), with slightly larger detection probabilities in the summer than spring, but again, being difficult to find during fall migration. The American Bittern model had the most problems with 4 of the 9 parameters being invalid. These 3 SGCN compare nicely to the Red-winged Blackbird model which presented large estimates (highly visible birds occurring on many properties) with small confidence intervals. Additional data collection should assist in producing valid parameter estimates for other SGCN.

While we do not have a graphic mapping system using GIS to show which properties have (or lack) SGCN, visually comparing the printed prediction maps available in Iowa GAP to known documentations of SGCN in 2007 & 2008 shows a few species with range expansions (i.e. the pickerel frog and southern leopard frog into Muscatine county), and suggested properties that lacked SGCN within the species range (again this is just based upon geographic location with no consideration for habitat; i.e. meadow jumping mouse and meadow voles on properties statewide). As butterflies and dragonflies were not represented in Iowa GAP, we are also examining historic records for range expansions. We have had several new county records for dragonflies (i.e. the slaty skimmer and spangled skimmer) as well as butterflies (i.e. the Melissa Blue (which is not a SGCN)).

We have used the GIS landcover classification layer from 2002 to compute the amount of habitat in each class for the properties. We also collect habitat measurements in the field (water depth, litter depth, canopy cover, plant species, etc). These habitat measurements have yet to be entered into the database. As an example of the GIS classification, the following table lists the percent of habitats within the property boundaries surveyed in 2007 but based upon the Landcover GIS classifications from 2002.

Table of percent of habitat on each property as computed by the Landcover 2002 GIS layer for properties surveyed in 2007:

Property	Open Water	Wetland	Wet forest	Forest	Ungrazed grass	CRP	Grazed Grass	Crop	Roads/ Structure
Beaver Lake	12.1	5.2	0	1.7	14.2	24.9	15.8	21.7	4.4
Big Creek	23.2	1.9	0.4	21.0	10.2	11.8	17.1	9.1	5.2
Camp Dodge	0.1	0.9	0.6	13.6	16.9	16.8	18.1	20.8	12.1
Colo Bogs	3.6	5.5	0	1.8	30.6	39.6	7.7	6.4	4.8
Hanging Rock	2.7	4.3	0.9	30.1	16.2	3.6	9.5	30.4	2.3
Hendrickson Marsh	28.0	1.9	0.3	13.7	12.8	8.8	15.2	17.5	1.7
Hickory Grove Park	23.2	4.3	1.2	23.1	16.0	9.8	11.7	4.0	6.8
Holst Forest	0	0.1	0	95.2	0.4	0.1	2.1	1.4	0.6
McCoy WMA	3.1	2.4	1.7	65.8	11.6	1.1	5.0	9.2	1.5
Middle Raccoon River	4.4	0.9	4.1	25.9	20.8	28.7	1.8	11.2	2.4
Errington Marsh	3.9	9.8	0	6.6	24.4	16.1	5.9	30.9	2.4
Walnut Woods SP	40.4	5.9	0.4	35.8	3.7	4.1	3.7	0.9	3.5
Yellow Banks Park	1.2	1.0	0.4	76.1	5.8	1.0	7.2	1.5	4.8
Both Saylorville Areas together (Madrid Pits & E-57)	4.4	2.0	0	47.7	13.1	3.4	9.4	17.8	2.1
Harrier Marsh	2.8	8.6	0	2.3	28.4	21.6	12.7	17.8	5.8

Between 2007 & 2008 a total of 452 species, including 98 SGCN, of birds, mammals, amphibians, reptiles, butterflies, and odonates have been documented in 14 counties located in central, south-central, and south-eastern Iowa as part of the SWG funded program. The MSIM program will continue into the future. In 2009, we will expand to include roughly an additional 45 properties located in western, south-western, and east-central Iowa. In 2010, we will survey an additional 60 public properties in other reaches of the state. We also plan on deploying the as yet underutilized protocols for fish in wadeable streams and mussels during these next 2 years.