Southern Iowa Northern Saw-whet Owl Survey
October16-November 8, 2015

Purpose of Study

Very little is known about the migratory movements of northern saw whets (NSWO) in the state of Iowa. At Hitchcock Nature Area, located in the central Loess Hills of western Iowa, a long-term fall migration monitoring project was initiated in 2007 to begin to advance the knowledge of this elusive but common wintering species of owl. However, distribution of this species throughout the state continued to rely on incidental sightings during overwintering. This project's intent is to systematically detect the presence of NSWO at state-owned sites in 7 of the 10 southern tier counties across the width of the state from river to river to further understand the extent of their winter range. This project is also looking into whether availability of migratory habitat, more abundant in the eastern half of the state, translates into increased detection on a west to east axis.

Location Selection

It was determined that seven years of monitoring NSWO fall migration at Hitchcock Nature Center has demonstrated that there is a three week period in which the majority of migration occurs. Thus, if surveying occurs for a three evening period at each location then, allowing for variables in weather and logistics, six sites would be optimal. State lands seemed the simplest for access. Those available were identified within the study area. Using Google Earth software, we looked at forested public lands with associated possible forested migratory corridors, particularly but not singularly on or near river systems.
Eight location were chosen to be visited for closer scrutiny from which six were chosen:

Site	**County**
Lake of Three Fires State Park	Taylor County
Mount Ayr Wildlife Management Area*	Ringgold County
Stephens State Forest-Whitebreast Unit	Lucas County
Wapello State Park	Davis County
Lacey-Keosauqua State Park	Van Buren County (west)
Shimek State Forest-Farmington Unit	Van Buren County (east)

*Veronica Mecko, lead surveyor, had a site at Mount Ayr Wildlife Management Area in Ringgold County where she had captured and banded NSWOs since 2011 and it was decided to use this same site for the present survey.

Training and Preparation for Study

Veronica Mecko and her assistant Emily Wilmoth set up nets on October 16 at a site in Harrison County, Missouri, about 6 miles south of Lamoni, Iowa. This was part of the training for Emily and also a test of all the equipment for the project. Nets were open for two nights at this site and captured 2 NSWOs the first night. On October 19 they traveled to Hitchcock Nature Center to train for 1 night at this banding station, however, no owls were captured that night.

Protocol for Capturing and Banding Owls

At each site, four mist nets were set up: 1 – 3 x 18 meter, 1 – 3 x 12 meter and 2 – 3 x 9 meter for a total of 144 square meters of net. 60 mm is the size of the mesh of the nets, which is considered the safest and has the highest capture rate for birds of this size. Net arrays varied at the different sites depending on conditions and terrain. An optimal array would be one in which at least one of the four nets is perpendicular to the others since NSWO are known to circle the lure.

The nets were opened at each of the 6 areas for 3 consecutive nights as long as weather allowed. A recording of the NSWO male calling during breeding season is played continuously to attract NSWO to the nets for capture. Nets were opened no earlier than ½ hour after sunset and were left open for five hours unless conditions required that nets be closed earlier. The nets were checked every 45 minutes. The audiolure was turned off during extraction of owls from the net and then taken to the banding station (no more than 7 minutes walking distance from the nets) to be banded, measured, and the age and sex determined. Measurements included weight, wing chord (length from the wrist to the tip of the longest flight feather), tail length, nares (nostril) to bill tip, and fat and muscle, which are measures of the health of the owl. Sex was determined using a Wing Chord / Weight discriminate function. Age was determined using a black light to show molt limits within the primary and secondary flight feathers. Owls were confined and kept in the dark for 5 to 10 minutes before being released to allow their eyes to readjust to darkness.

Time of net opening and closing and capture of owls was recorded in Central Standard Time to be consistent since the time changed from Daylight Savings to Standard Time during the project.

Details of Banding at Each Location

At some of the largest locations, it was decided that using multiple sites within the perimeter of the location was acceptable to encourage increased sampling size.

Stephens State Forest

Whitebreast Unit Equestrian Campground Site

Nets were set up on the afternoon of Oct. 20. The net site was predominantly deciduous trees with many of the trees still having leaves, and one of the nets was underneath a small grove of mid-sized pine trees. Since the moon was waxing and the phase was one night before the first quarter, the thick canopy was preferred for keeping the nets dark. The wind had been from the south during the day. Nets weren't opened until 6:50 CST because several Barred Owls were near the nets and we waited until we didn't hear the Barred Owls. On opening nets the wind was not detectable and temperature was about 18˚C. At net closing the wind had picked up and was from the south. The sky was partly cloudy throughout the evening. No NSWO were captured that night. On Oct. 21 the wind had shifted to be out of the northwest at opening and was straight out of the north with some rain drizzle beginning at closing. Temperature was about 18˚C at opening and 13˚C at closing. The sky was partly cloudy all evening. Two owls were captured that evening, both at 10:30 CST.

Results: 1 Hatch year and 1 After hatch year-Females

Lucas Unit Campground Site

On Oct. 22 nets were moved to a site along a narrow gravel road west of a small campground in the Lucas Unit on the ridge above the Coal Mine Hollow area. The road ran through and had a turn-around in an area of large oak trees that still had thick leaf coverage. The wind was from the east at opening with a temperature at about 16˚C. The sky was partly cloudy to overcast throughout the evening. Two owls were captured, one at 8:15 CST and the second at 10:10 CST.
Results: 2 Hatch year-Sex unknown

Mount Ayr Wildlife Management Area
Nets were set up on Oct. 23 in a similar array as in previous years, but because of the moon now in the second quarter and waxing, nets were placed as close to the tall cedar trees to the east and south in order that the trees would "shade" the nets from the bright moon. Because this site has no canopy cover, in past years very few owls have been captured on bright moonlit nights. Nets were opened with a steady southwest wind, about 18˚C and under partly cloudy sky. One owl was captured at 7:45 CST. By closing the wind had shifted and increased to be out of the west-northwest and temperature dropped to 13˚C. On Oct. 24 nets opened with a northwest wind, temperature of about 11˚C and clear sky with some haze. Two owls were captured, the first at 9:25 CST and the second at 10:10 CST. By closing the wind had died down to imperceptible and temperature was about 7˚C. On Oct. 25 nets were opened with a southwest wind, 17˚C and clear skies. One owl was captured at 8:20 CST. By closing the wind had shifted to come from the east and temperature had dropped to about 4˚C.
Results: 3 Hatch year (1 Female, 1 Male, 1 Unknown), 1 After second year-Female

Lake Wapello State Park
West Site
Oct. 26 was scheduled as a rain date, but with 70% rain scheduled for the 27th, we traveled to Lake Wapello SP on the 26th and set up nets in the afternoon along a trail with thick deciduous vegetation and leaf cover, with a few pine and cedar trees nearby. Nets were opened that evening under a clear sky with a near full moon, temperature at about 17˚C and no wind detected. Three owls were captured at 7:20 CST and a fourth at 10:20 CST. Nets were closed under a hazy sky with wind out of the north. Oct. 27th had rain all day and into the night and most of the day on the 28th. Nets were opened on the 28th although the northwest winds were very strong because the net site was located in a low area and was protected from most of the wind. The sky was partly cloudy on opening with temperature of about 8˚C. No owls were captured. Nets were closed under a clear sky with wind still out of the northwest but not as strong.
Results: 2 Second year, 1 After hatch year and 1 After second year-Females
East Site
On Oct. 29 the nets were relocated to a site about 500 to 600 meters east of the first site, along a trail that followed a ridge and that was lined with large oaks thick with leaves and scattered eastern red cedar trees. Wind was undetectable, temperature was at about 5˚C and the sky was clear for opening nets. One owl was captured at 7:40, two at 8:45 and two more at 10:15 CST. At closing temperature was at 1˚C with a clear sky and slight northwest wind.

Results: 2 Hatch year, 1 Second year, 1 After hatch year and 1 After second year-Females

Shimek State Forest, Farmington Unit

Black Oak Lake Road Site

Nets were set up on Oct. 30 at a site about ¼ mile from the main office of the state forest. The site had tall pines and deciduous trees along a narrow trail off of a service road. Nets were opened under an overcast sky with wind from the southeast and temperature at 8˚C. After not even two hours the nets were closed because of drizzle that continued for the night. Oct. 31 nets were opened under an overcast sky with temperature at 6˚C and a west wind. One owl was captured at 8:30 CST. By closing the wind had shifted to be from the southwest. On Nov. 1 conditions were a clear sky, temperature of 12˚C and a southwest wind at opening. No owls were captured. At closing winds were variable and the sky was hazy.

Results: 1 Hatch year-Female

White Oak Lake Trail Site

To make up for the rain day on Oct. 30 nets were set up on Nov. 4 along a wide trail under pine and tall deciduous trees, nearly directly south of the site off of Black Oak Lake Road. Jerry Toll operated this station while Veronica and Emily operated at Lacey-Keosauqua. Nets were opened with a southwest wind, temperature of 15˚C and cloudy sky. One owl was captured at 8:45 and a second at 10:00 CST. The sky was clear and wind had shifted to be from the southeast at closing.

Results: 1 Hatch year-Female, 1 Second year-Sex unknown

Lacey-Keosauqua State Park

Campground Site

On Nov. 2 nets were set up on a small trail that led to a lake at the east end of the campground. The trail went through large deciduous trees including oaks but by this time of the year most of the leaves had fallen. There were a few pine and eastern red cedar trees nearby. Nets were opened under a clear sky and with a southwest wind and temperature of 14˚C. One owl was captured at 8:35 and a second at 9:30 CST. Nets were closed with a clear sky and south wind. On Nov. 3 conditions were similar with clear skies and a south wind. One owl was captured at 7:30, a second at 8:30 and a third at 9:20 CST. Conditions were the same at closing.

Results: 2 Second year, 2 After hatch year and 1 After second year-Females

River Bluff Site

On Nov. 4 nets were set up along the River Trail at the base of the hill that leads to the river from Shelter 1. The trail ran through large oak and other deciduous trees and there were some scattered eastern red cedars. At opening winds were from the southeast, the temperature was 13˚C and the sky was partly cloudy. An owl was captured at 7:45, then an owl that had been banded the previous night was recaptured at 8:30 and a third owl that had been banded on Nov. 2 was recaptured at 9:50 CST. Conditions on closing were about the same.

Result: 1 Second year-Female, 2 recaptures (from November 2)

Lake of 3 Fires State Park

Nets were set up on Nov. 6 in an area at the southernmost part of the park, in a clearing with a horse trail at the southern edge and a grove of pine trees on the northern edge. Tall oak and other deciduous trees grew south of the horse trail and there were scattered eastern red cedar trees and small deciduous trees within and on either side of the clearing but there was no canopy at the site, except for the tall pines to the north. Nets were opened under a clear sky, temperature of 7˚C and northwest wind. Three owls were captured at 7:45 and a fourth at 10:00 CST. It was cloudy at closing time and the temperature had dropped to 1˚C. On Nov. 7 the wind was from the west, the temperature was at about 3˚C and the sky was clear on opening. One owl was captured at 7:30 CST. At closing the temperature had dropped to 0˚C and the wind had shifted to be from the south. On Nov. 8 the wind was from the south, the temperature was 9˚C and the sky was clear at opening. One owl was captured at 8:00 CST.
Results: 4 Hatch year-Females, 1 Hatch year-Male and 1 After second year-Sex unknown

Table 1. Northern Saw-whet Owls Banded

For the table below, HY=Hatch Year, SY=Second Year, AHY=After Hatch Year and ASY=After Second Year

Date	Site	Time Captured (CST)	Age	Sex	Mass (grams)	Fat	Wing (mm)	Net #
10-21	STSF-WBEQ	21:30	AHY	Female	98	0	138	3
10-21	STSF-WBEQ	21:30	HY	Female	101	0	130	1
10-22	STSF-LUCAS	20:15	HY	Unknown	83	1	130	2
10-22	STSF-LUCAS	22:10	HY	Unknown	83	0	136	3
10-23	MAWMA	19:45	ASY	Female	111	3	139	3
10-24	MAWMA	21:25	HY	Unknown	82	1	132	2
10-24	MAWMA	22:10	HY	Male	85	1	123	3
10-25	MAWMA	20:20	HY	Female	91	1	135	1
10-26	LWSP-WEST	19:20	SY	Female	93	1	130	4
10-26	LWSP-WEST	19:20	ASY	Female	92	3	131	2
10-26	LWSP-WEST	19:20	AHY	Female	100	2	139	3
10-26	LWSP-WEST	22:20	SY	Female	96	1	137	1
10-29	LWSP-EAST	19:10	HY	Female	94	1	132	1
10-29	LWSP-EAST	20:45	HY	Female	92	3	134	2
10-29	LWSP-EAST	20:45	AHY	Female	92	2	140	2
10-29	LWSP-EAST	22:15	ASY	Female	95	3	136	1
10-29	LWSP-EAST	22:15	SY	Female	97	3	135	2
10-31	SHSF-BOAK	20:30	HY	Female	92	2	128	2
11-4	SHSF-WOAK	20:45	HY	Female	97	2	138	3
11-4	SHSF-WOAK	22:00	SY	Unknown	81	1	135	5

11-2	LKSP-CAMP	20:35	ASY*	Female	94*	3	133	3
11-2	LKSP-CAMP	21:30	AHY	Female	90	1	142	3
11-3	LKSP-CAMP	19:00	SY**	Female	102**	3	139	2
11-3	LKSP-CAMP	20:30	SY	Female	94	1	138	2
11-3	LKSP-CAMP	21:20	AHY	Female	89	2	135	3
11-4	LKSP-BLUFF	19:45	SY	Female	96	3	133	3
11-4	LKSP-BLUFF	20:30	Rec**	SY F	104**			2
11-4	KLSP-BLUFF	21:50	Rec*	ASY F	96*			1
11-6	L3FSP	19:45	HY	Female	101	2	138	1
11-6	L3FSP	19:45	HY	Male	83	2	126	1
11-6	L3FSP	19:45	HY	Female	100	1	130	1
11-6	L3FSP	22:00	HY	Female	94	2	134	3
11-7	L3FSP	21:30	ASY	Unknown	87	1	134	2
11-8	L3FSP	20:00	HY	Female	93	3	135	2

*&** indicate both captured and recaptured owls

Results

Of 32 new captures of NSWOs, two owls were male (6%), 4 were unknown sex (12%) and 26 (82%) were female. Compare this ratio to what was captured at Hitchcock NA during the same time period: out of 40 owls, 8 were male (20%), 6 were unknown (15%) and 26 were female (65%).

Ages of NSWO banded in Southern Iowa and Hitchcock NA (control) in 2015

Age	Southern tier counties	Hitchcock
Hatch year	46.5%	70%
Second year	21.5%	17.5%
After second year	16%	5%
After Hatch year	16%	7.5%
Ratio of Hatch year to adults*	53.5%	30%

*A higher ratio of HY to adults suggests a more successful breeding season. NSWO begin breeding in their second year.

The largest weight of an owl was 111 grams at MAWMA. This is a relatively large mass for NSWOs captured in southern Iowa during migration. In 2012 of 41 owls captured at MAWMA only one was more than 100 grams weighing in at 102 g. and in 2013 of 12 owls banded the largest weighed 103 grams. Five other owls this year weighed 100 grams or more and they were scattered among the locations.

All but 3 of the owls had some measurable fat and 11 owls had a score of 3 for fat which is the highest score.

The two owls that were recaptured at Lacey-Keosauqua SP both had gained 2 grams in weight since the one or two days they were originally banded.

The timing of the project was during a three-week period when Northern Saw-whet Owl movement has been at its peak in past years. In 2012 at MAWMA the highest number of owls captured in a single night occurred on Oct. 26 (4), Nov. 1 (6), Nov. 3 (6), Nov. 8 (6) and Nov. 9 (5). In 2013 the dates were Nov. 6 (3) and Nov. 7 (4).

For this project the dates with highest capture rates were Oct. 26 (4), Oct. 29 (5) and Nov. 6 (4).

Discussion

Weather systems and their effect on capture rates. The weather for the three week period saw unseasonably warm temperatures and a wind direction predominantly from the south, southeast or southwest. Ten out of the 18 nights that nets were open had winds from the south, southeast or southwest. Six nights had winds from the north or northwest and two had winds out of the west. The nights when more than two owls were captured corresponded with the nights when the wind was out of the north or northwest. Our experience at Hitchcock NA shows that migrating NSWO prefer windless or near windless nights for migration. They are more likely to migrate with northerly winds (tail wind), tolerate light west wind, and are least likely to migrate into strong southerly winds.

The primary goal of this project was achieved-to detect and document that this elusive species is widely distributed throughout the state of Iowa and that its wintering range reliably extends south of the border. NSWO were detected and banded at each of the six locations and that given that a minimum of three owls were banded at each location, that it was not an unusual occurrence. The variable effects of weather systems, annual changes in nesting success, untested banding sites, with the exception of Mount Ayr WMA, played a role in detection of NSWO. It was anticipated that more NSWO would be captured but by using the comparable banding efforts of Hitchcock NA, which ran concurrently, as a control to compare numbers, the effects of variables were kept in perspective. As a technique, the use of actively luring and capturing an elusive species, such as the saw whet owl, can arguably be an effective method to better understand population distribution and density with minimum impact on individuals. An added bonus is that by banding the owls and possibly receiving recapture information on them, the knowledge base can expand beyond the borders of Iowa.

The secondary goal of gaining a perspective on the effects of more available habitat in the southeastern portion of the state compared to the southwestern portion was not born out by the project. The project's scope was too small both in number of sampling locations and length of time spent at each location and should be annually repeated at least twice.

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John Byrd-Shimek State Forest

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Manager and staff of Lake of Three Fires State Park

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