

FINAL REPORT
SECTION 6
ENDANGERED SPECIES ACT



FEDERAL AID PROJECT E-36

AMERICAN BURYING BEETLE SURVEY

SEPTEMBER 26, 1994 - SEPTEMBER 25, 1995

FINAL REPORT

State: Oklahoma Grant Number E-36

GRANT TYPE: Research

GRANT TITLE: Survey of the American Burying Beetle on Public Land in Eastern Oklahoma.

SEGMENT DATES: September 26, 1994 - September 25, 1995

STUDY TITLE: Survey of the American Burying Beetle on Public Land in Eastern Oklahoma.

I. Objectives

1) Provide a training workshop for agency biologists to educate them about American burying beetle natural history, identification and trapping techniques. 2) Conduct burying beetle surveys on public lands managed by ODWC with the aid of trained agency biologists.

II. Abstract

A two-day training workshop was held for 15 Wildlife Biologists and Technicians in the Oklahoma Department of Wildlife Conservation's (ODWC) Game Division. Workshop participants included the regional biologists for the Northeastern and Southeastern Districts, as well as the area biologists on each of ODWC's Wildlife Management Areas within the known range of the American burying beetle (Nicrophorus americanus). Topics covered during the training workshops included the life history of N. americanus, theories regarding the species' decline and techniques for surveying and identifying burying beetles. The workshop participants also constructed burying beetle traplines and conducted surveys on portions of the Yourman and James Collins Wildlife Management Areas.

III. Procedures

A two-day training workshop was organized for the biologists in the Oklahoma Department of Wildlife Conservation's Game Division who work within the known range of the American burying beetle (Nicrophorus americanus) in Oklahoma as described by Lomolino et.al. (1994). The workshop was offered twice, June 21st/22nd and again June 29th/30th to give participants to opportunity to decide which session best fit their schedule and all ODWC wildlife biologists working within the geographic range of Nicrophorus

americanus attended one of these sessions. Prior to submitting the proposal for this project, the principal investigator had attended an endangered species workshop held by the Tulsa District of the Army Corps of Engineers. The mechanics of how to conduct an American burying beetle survey was covered in detail during the ACOE workshop, however, there was almost no discussion of the natural history of Nicrophorus americanus nor why it had declined. These two topics were emphasized in the ODFW workshop.

During the first day of the workshop, presentations were made on the Endangered Species Act, endangered species in Oklahoma, the ESA Section 7 consultation process with state wildlife agencies, the current and historical range of the American burying beetle nationwide, the history leading up to the listing of Nicrophorus americanus, American burying beetle life history, identification of Oklahoma's Nicrophorus species and pit-fall trapping methods for locating burying beetles. Each presentation was followed by a short group discussion session.

Following the presentations and group discussions, each workshop participant was provided with a Rubbermaid storage box containing survey equipment and reference materials related to the American burying beetle. The group then traveled to an ODFW wildlife management area and worked in teams to prepare and bait pitfall traplines. The equipment provided to each biologist included a "sharp-shooter" shovel, hand trowel, compass, hand-held magnifying lens, flagging tape, 10" forceps, data sheets, 24 oz. hard plastic cups, hard plastic bowls and a container for bait. Reference materials provided at the workshops included copies of the Endangered Species Act, an American burying beetle fact sheet prepared by the Nebraska Game and Parks Commission, a Peterson Field Guide to Insects, a key to the identification of Nicrophorus species in Oklahoma, and "Endangered and Threatened Species of Oklahoma."

The survey methods and protocol used to determine the presence of Nicrophorus americanus were identical to those recommended in Creighton et.al. (1993) except that each trapline was only operated for one night instead of the three nights which they recommend. Traplines consisted of eight pitfall traps spaced 20 meters apart. Each pitfall trap was made by excavating a hole in the ground just deep enough to contain a 24 oz. cup placed upright with the lip of the cup flush with the surface of the ground. A second 24 oz. cup was placed within the first cup and used as the bait cup. A small piece of rancid turkey liver was placed in the bottom of the cup to serve as a bait/scent attractant for burying beetles. A plastic bowl with three half-circle holes cut along the rim, was placed over each pitfall trap to prevent rainwater and direct sunlight from reaching the trap. Traplines were checked the following morning and all beetles were identified and released on site. On June 21st, three traplines were prepared on the Yourman WMA approximately 10 miles south of Wilburton in Latimer County. One

line was placed in an unmown native-grass hay meadow, one line in an old-field with high grass and scattered deciduous saplings and the final line in an oak-hickory woodland (Figure 1). During the June 29th workshop, four traplines were established on the James Collins WMA four miles south of Featherston near the Pittsburgh/Latimer County line. All four lines were placed in native grass fields with scattered saplings and blackberry thickets. Each line lay within 200 yards of oak/hickory woodland habitat (Figure 2).

Between 0730 and 0800 the following morning, the workshop attendees checked each trapline as a group. All burying beetles captured were identified to species and all other beetles captured were identified to family. All trapped insects were released at their site of capture. Data were recorded on standard data sheets (Figure 3) with the other beetles encountered written in the margin of the sheet. The traplines were then dismantled and cleaned. A short follow-up discussion and question/answer session concluded the workshop.

IV. Results and Discussion

All fifteen ODWC wildlife biologists working within the known range of Nicrophorus americanus completed the training offered at the workshop. The names and working area of the workshop attendees is summarized in Table 1. These biologists are now familiar with the life history of N. americanus, capable of distinguishing all species of Nicrophorus present in eastern Oklahoma and have experience in the mechanics of constructing and monitoring a burying beetle trapline using a standard protocol.

During the workshops, I made several observations of the attendees' attitudes toward the American Burying Beetle and endangered species in general. Each of the workshop participants showed an interest in endangered species and seemed to consider that the conservation of endangered species was important. Most of the biologists had some experience working with one or more endangered species including the Red-cockaded Woodpecker, Bald Eagle, Gray Bat and Ozark Big-eared Bat. However, at the beginning of the workshop discussions, most, though not all, of the participants did not hold the same appreciation for Nicrophorus americanus as they did for other endangered and threatened species. Based on the group discussions, the biologists' negative or neutral opinions toward N. americanus appeared to be influenced by their lack of understanding of the species' unique biology and the history behind its decline and subsequent listing.

Most of the biologists did not realize how complex the American burying beetle's reproductive biology is and how distinct it is from other insect species. Most seemed surprised by the low fecundity of the species and how specific its needs are for carrion

Figure 1. Locations of Burying Beetle Traplines on Yourman Wildlife Management Area.

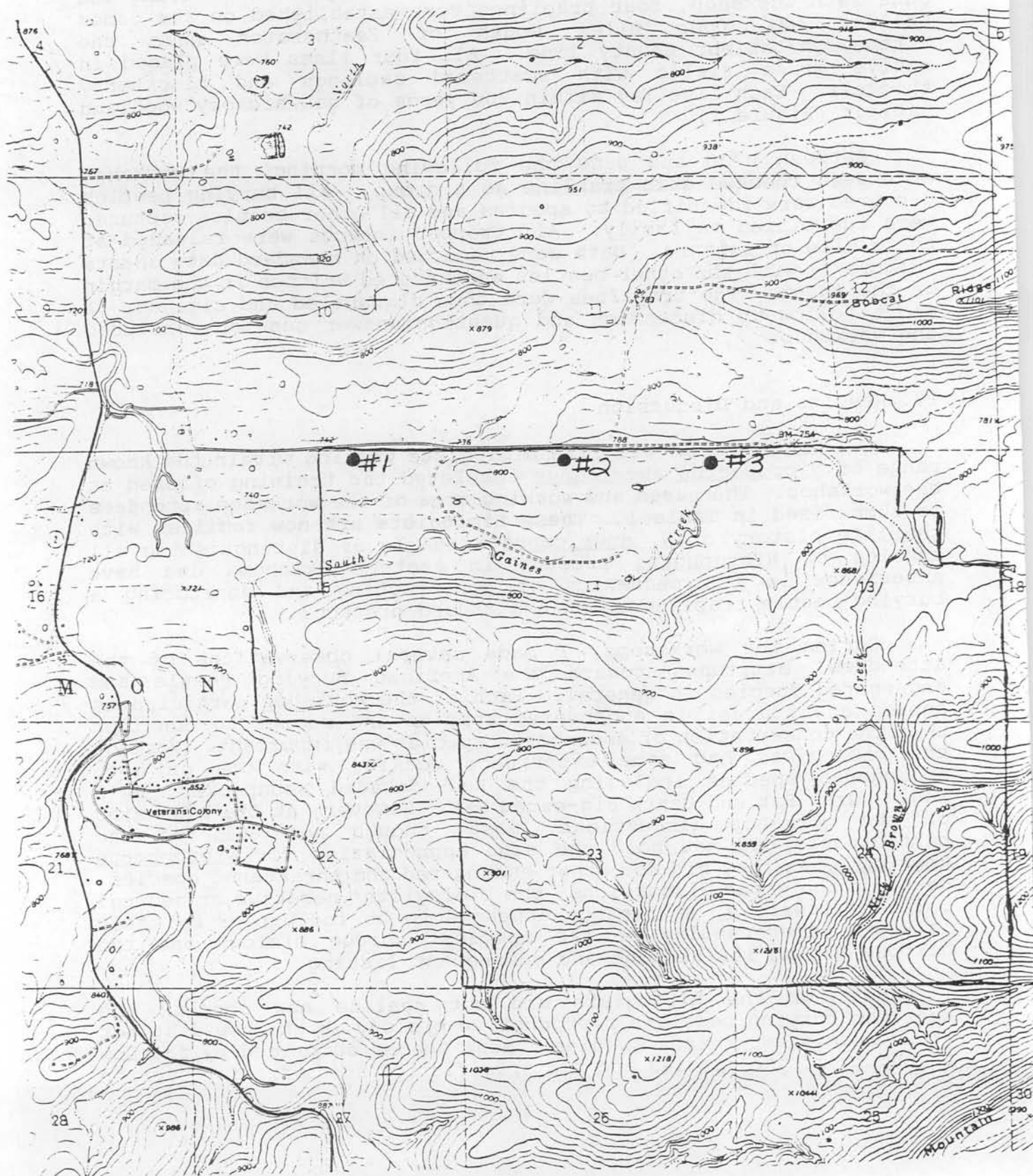


Figure 2. Locations of Burying Beetle Traplines on James Collins Wildlife Management Area.

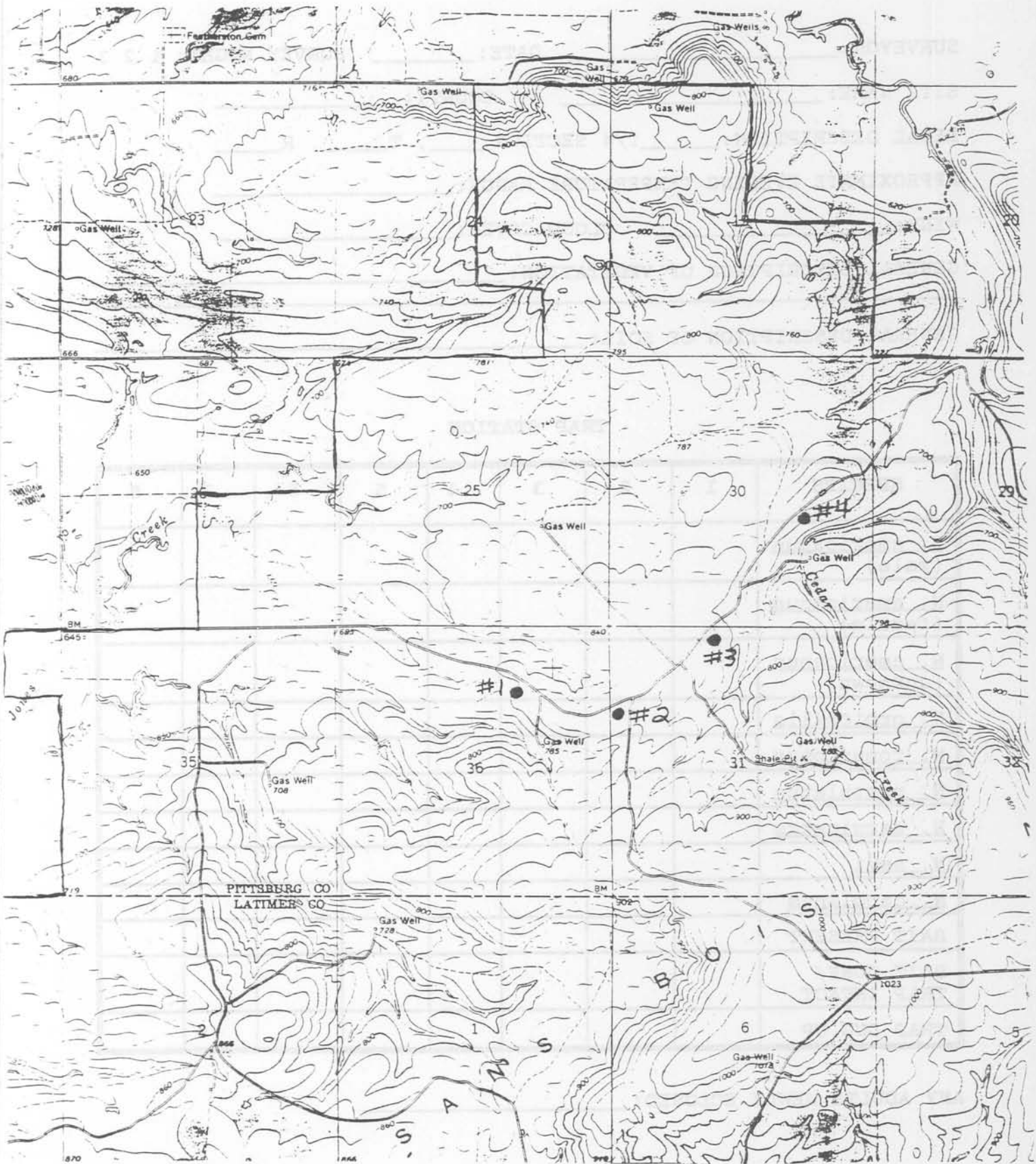


Figure 3. Sample Data Sheet Used in Nicrophorus americanus Surveys.

SURVEYOR: _____ DATE: _____ SURVEY NIGHT: 1 2 3

SITE NAME: _____ COUNTY: _____

LEGAL DESCRIPTION: _____ 1/4 SECTION _____, T _____, R _____

APPROXIMATE EVENING TEMPERATURE RANGE: _____

WIND: _____ CLOUD COVER: _____

GENERAL DESCRIPTION OF VEGETATION: _____

GENERAL DESCRIPTION OF SOIL: _____

TRAP STATION

SPECIES	1	2	3	4	5	6	7	8
<u>N. americanus</u> (male)								
<u>N. americanus</u> (female)								
<u>N. americanus</u> (unknown)								
<u>N. orbicollis</u>								
<u>N. tomentosus</u>								
<u>N. pustulatus</u>								
<u>N. marginatus</u>								
<u>N. sayi</u>								
<u>N. carolinus</u>								
BAIT PRESENT								
BAIT GONE/ TRAP INTACT								
TRAP DUG UP								

ANY ADULTS NEWLY ECLOSED: _____

Table 1. Biologists Trained During the Burying Beetle Workshops and the Area(s) on Which They Work.

Name	Area
Bill Ashley, Area Biologist	Collins WMA Yourman WMA Robbers Cave WMA
Bill Dinkines, Regional Biologist	McAlester AAP S.E. Oklahoma
Craig Endicott, Area Biologist	Eufaula WMA McClellan-Kerr WMA
Benny Farrar, Wildlife Technician	McAlester AAP
Joe Hemphill, Area Biologist	Ouachita N.F.
Dick Hoar, Regional Biologist	Northeastern Oklahoma
Curtis Howze, Regional Supervisor	Southeastern Oklahoma
Ron Justice, Area Biologist	Cherokee/Gruber WMA Cookson Hills WMA Sparrowhawk WMA
Buddy Prather, Wildlife Technician	Ouachita N.F. Wister WMA
David Robertson, Area Biologist	Wister WMA
Bill Scherman, Regional Supervisor	N.E. Oklahoma
John Skeen, Area Biologist	McCurtain County Wilderness Tiak Ranger District, ONF
Bob Smith, Area Biologist	Spavinaw Hills, WMA Oologah WMA
Jack Waymire, Area Biologist	Hugo WMA Pine Creek WMA
Jim Whitehead, Regional Biologist	Tiak Ranger District, ONF Southeastern Oklahoma

of a certain size range for successful reproduction. In general, the insects that receive the greatest public attention are pest species which demonstrate a high reproductive potential and are tolerant of a wide range of habitat types or a high degree of human disturbance to their habitat. Apparently, this mental image is often applied to N. americanus as well. All of the biologists that I asked knew that the burying beetle was a carrion feeder, but prior to the workshop, most were not aware that individual American burying beetles reproduced only once or twice a year, raised on average only about 15-16 young from each brood and showed some parental care for the young including defending the brood from potential predators and competitors (Lomolino et. al. 1994, Raithel 1991). They also were not aware that recent studies of the American burying beetle in Rhode Island, Oklahoma and Arkansas indicate that a significant, positive relationship exists between carcass weight and brood size (Kozol et. al. 1988). Beetles are most likely to reproduce successfully on carcasses with a mass between 60 - 140 grams (Lomolino et. al. 1994) and habitat and soil type also tend to influence reproductive success. N. americanus are more likely to successfully bury and lay eggs on carcasses in loose soil and/or leaf litter than in clay or gravelly soils. While N. americanus may feed on a wide range of carcass sizes and in a variety of habitat types, they may be capable of reproduction only on a relatively select set of carcasses in a few habitat types. These factors were explained in the workshop and had an influence on the participants' understanding of why burying beetles could be found in a wide range of sites, but still be relatively rare.

Most of the biologists were not aware of how mobile burying beetles are. They had heard stories about burying beetles being trapped in mature forest, pastures, roadsides and thickets in most of the counties in eastern Oklahoma as well as parts of western Arkansas. In the workshop, we discussed how burying beetle trap records had demonstrated that beetles could move at least 6 km in three days or less and that movements of 1.5 to 2 km per night appeared to be common. Because burying beetles forage widely each night, it is possible to trap beetles in habitats where they normally would not be able to reproduce and it is possible to attract beetles to traps even where they occur in low densities. Trapping records alone can produce an erroneous impression of burying beetle habitat affinities and make them appear to be more widespread and/or common than they really might be.

The proposed listing of the prairie mole cricket in the early 1990's also appears to have influenced the attitudes of some of the workshop participants. All of the biologist were familiar with the prairie mole cricket and some had assisted in cricket surveys. In the case of the prairie mole cricket, more intensive surveying effort in the early 1990's determined that the species was more widespread and less restricted to undisturbed tallgrass prairie than was earlier thought. With the additional survey data, the

listing petition was withdrawn in 1992. Several of the biologists at the workshops thought the American burying beetle was another case similar to the mole cricket and that a few more years of surveying would show that the species is more widespread and that listing it as endangered was premature. I believe the life history information provided at the workshop helped dispelled this belief to some extent, however, it may be more difficult to convince the general public than the workshop participants.

Trapping Results

Three traplines, with eight stations each, were placed on Yourman Wildlife Management Area and four traplines were placed on James Collins WMA. No American burying beetles were captured in any of the traps. A summary of the legal description of each site is listed in Table 2. The trapping results for each trapline is summarized in Table 3. As mentioned in the Methods section of this report, each trapline was only baited and monitored for one night; therefore, a complete survey was not conducted on either WMA. Based on the survey data collected by Lomolino et. al. (1994), it appears that N. americanus should be present at low densities on both WMA's. Two factors may have influenced why N. americanus was not detected during these surveys. Since the traplines were not monitored the recommended three nights, the number of trap nights was only one third of that for a standard survey. Also, during the survey on James Collins WMA, relatively few fly larvae were encountered on the bait the following morning, indicating that the turkey liver used was not aged long enough and was not as strong an attractant to burying beetles as it could have been. In addition, the traplines on James Collins WMA were placed in the grassland dominated northern portion of the WMA where soil disturbing activities were more likely to occur. Had the traplines been placed in the more wooded southern portion of the area, they would have been closer to habitat which is generally considered more suitable for N. americanus.

V. Recommendations

In 1995, the U.S. Fish and Wildlife Service considered a method other than trapping and relocating burying beetles as a means of removing burying beetles from areas of construction activities. One alternative that appears fruitful is the placing of appropriately sized carcasses in sites that appear to be suitable for carcass burial which are adjacent to the area of disturbance. New carcasses are placed in a random pattern at one week intervals. This was tried in 1995 on Hugo WMA, Choctaw County. Nicrophorus americanus were known to inhabit this site and vegetation clearing through brush-hogging and disking was planned in places to create openings in the dense second-growth thickets that had developed there in recent years. Dead turkey chicks weighing roughly 75-150 grams were obtained from a local poultry

Table 2. Trapline Locations and Habitat Description

<u>Trapline Name</u>	<u>Legal Description</u>	<u>Habitat Description</u>
Yourman #1	NE/4 Sect. 15, T4N, R19E	Native Prairie Hay Meadow
Yourman #2	NW/4 Sect. 14, T4N, R19E	Old-field with Saplings and Thickets
Yourman #3	NE/4 Sect. 14, T4N, R19E	Mature Oak/Hickory Woodland
Collins #1	NE/4 Sect. 36, T7N, R17E	Native Prairie Hay Meadow
Collins #2	NW/4 Sect. 31, T7N, R18E	Native Prairie Hay Meadow Adjacent to Oak Woodland
Collins #3	NW/4 Sect. 31, T7N, R18E	Old-field Adjacent to Oak Woodland
Collins #4	SE/4 Sect. 30, T7N, R18E	Old-field Adjacent to Oak Woodland

Table 3. Trapping Results

<u>Trapline Name</u>	<u>Nicrophorus americanus</u>	<u>N. orbicollis</u>	<u>Other Beetles</u>
Yourman #1	0	0	4 Carabidae, 1 Scarabaeidae 1 Histeridae
Yourman #2	0	0	2 Carabidae, 2 Histeridae
Yourman #3	0	1	2 Staphylinidae, 4 Carabidae
Collins #1	0	0	1 Scarabaeidae 1 Carabidae
Collins #2	0	0	2 Carabidae
Collins #3	0	0	3 Carabidae 1 Histeridae
Collins #4	0	0	1 Carabidae

operation and scattered 100 yards apart through the mature woodlands surrounding the sites of disturbance each week from mid-May through July. We would recommend continuing this practice in instances where it is known prior to the summer that soil-disturbing activities are going to take place.

The current use of baited pitfall traps to capture and relocate beetles has several disadvantages. Because American burying beetles are very mobile, it is possible that setting baited traps may draw beetles into areas where they would not normally occur. Also, trapped and relocated beetles may readily return to their site of capture if it represents suitable habitat. The alternative practice of providing appropriately sized carcasses in habitats with suitable substrate for burial, may lure beetles away from areas of disturbance as well as provide them with additional reproductive opportunities.

A further recommendation is to place an emphasis on conveying information on the reproductive biology and life history of the American burying beetle where similar types of training workshops for personnel from other agencies, businesses or the general public are planned. Based on the misconceptions of the biologists at these workshops, it is probable that most people have an inaccurate mental-picture of this species. Providing information on the life history and reproductive biology can yield a better understanding of why the species has declined, what factors limit its population size and why it may seem more common and widespread than it probably is in reality. A fact sheet similar to the one prepared by the Nebraska Game and Parks Commission (1995), is very useful in conveying this type of information to the general public and could help raise public appreciation for the species.

VI. Significant Departures

Less effort was placed into field surveys than had originally been intended. The proposal for this project was submitted one month prior to the submittal of the final report for Federal Aid Project E-13 which was a four year assessment of the habitat affinities and distribution of the American Burying Beetle in Oklahoma. As part of E-13-4, all ODWC Wildlife Management Areas in eastern Oklahoma were surveyed except for Collins WMA, Pittsburgh County; Robbers Cave WMA, Latimer County; Wister WMA, LeFlore County; Pine Creek WMA and the McCurtain County Wilderness Area, both in McCurtain County.

Another reason that effort was withdrawn from conducting field surveys this year is that it appears discovering new populations in other states or USFWS regions is more important in assessing the species' national status than finding additional beetles in Oklahoma. In March of 1995, a national workshop on N. americanus conservation was held in Oklahoma. At this meeting, the lead USFWS

Region for N. americanus indicated that stable populations must be found in at least four USFWS regions of historic occurrence before a downlisting could be considered. Since the species has been found in 11 eastern Oklahoma counties already, finding additional locations or populations would not improve the species' status nationally. It appears to be more important to demonstrate that the population(s) in Oklahoma are stable over time and an effort should be made to resurvey those WMAs known to contain N. americanus in three to five years. With this in mind, it was determined that training and providing survey equipment that biologists could use in the future was more important than surveying new sites this year.

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IX. Date: December 21, 1995

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