

American Burying Beetle Nebraska Trapping Protocol

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Trapping methods are used for both Presence/Absence surveys and Capture and Relocation. Trapping for the American burying beetle (*Nicorphorus americanus*) (ABB) will be conducted with a modified version of the U.S. Fish and Wildlife Service's (1991) protocol, as described by Bedick et al. (2004). Trapping for the ABB may be conducted during two periods in the year. The first period in early summer (approximately June 7th to July 1st) is after beetles have emerged from hibernation and prior to beetles going underground during the larvae rearing cycle. The second trapping period is in late summer (approximately August 7th to September 1st), after the larval cycle when both senescent and teneral beetles are present. For the early summer period, trapping will be conducted when the average temperature at midnight is 60 degrees Fahrenheit or greater. It is recommended that trapping be conducted when the average temperature at midnight is 60 degrees Fahrenheit or greater. Trapping of ABB may be conducted during this period when the average temperature at midnight is 55 degrees Fahrenheit or greater, however, false negative presence data may be obtained under these conditions.

A positive control should be used in association with trapping. A positive control establishes that conditions were correct in a given geographic area and that ABB were active during the timeframe of the trapping. Only one ABB capture is necessary to establish a positive control. The positive control window may be up to seven days prior to trapping, or during, but not after the trapping timeframe. There are several locations within Nebraska with a recent history of dense populations and that have been documented through regular research.

Coordination with USFWS and the Commission may provide existing projects with positive controls. When trapping south of the Platte River, Lincoln County may be used and for trapping north of the Platte River, an area near the town of Chambers can be used.

Adult ABBs will be captured by use of baited pitfall traps consisting of a five-gallon (18.92 Liter) plastic bucket (diameter 28.5cm). Bedick (1997) found a five-gallon bucket to be the most appropriate pitfall trap when sampling for the ABB because they provide a larger surface area for each beetle to escape from other carrion beetles. Alternatively, a one-gallon bucket may be used as a pitfall trap in those instances where burial of the five-gallon bucket would be difficult.

All buckets will be washed using bleach and thoroughly rinsed prior to being used as traps. All buckets will be buried in the ground, with approximately 4-5 cm of the bucket above ground level. Soil will then be built up around the bucket, creating a gradient from ground level upwards to the bucket rim. This will be done to limit the amount of water entering the buckets through runoff and splashing of water during rainfall events. Buckets will be located on the terrain so as to prevent inundation during rainfall events as beetles can drown very easily in even a small amount of water. Traps should not be placed within 10 feet of ant colonies, as they can kill the beetles that have been captured. Approximately 5-8 cm of moist soil will be placed in the bottom of the bucket, in order to give trapped carrion beetles room to burrow into the soil to avoid competitors, high temperatures and low moisture levels above the soil. To prevent rainfall and debris from directly entering the bucket, a square piece of plywood (37 cm by 37 cm) will be placed on top of the trap, supported by two or more sticks/narrow boards ranging from 1.5-2.5 cm in thickness. Additional weight (soil, rocks, etc.) will then be placed on top of the trap cover

to reduce bait loss to vertebrate scavengers and to prevent the cover from being moved by wind or small animals.

It is recommended that all traps be baited with previously-frozen, 275-374 g laboratory rats (*Rattus norvegicus* – available from online dealers such as RodentPro.com). If rats are not available, bait items of comparable size and structure may be used. The bait will be aged in airtight containers for 3 to 7 days, depending on the temperature and other weather conditions. In contrast to the previous protocol, the bait will not be placed into containers within the traps. What is critical is that the bait be ripe and emit a powerful odor as beetles key in on odor to locate food. With larger numbers of traps spread across a relatively large area, it is better to allow carrion beetles to feed on the bait, which also helps maintain moisture levels in the soil within the trap and reduces stress. This will also prevent loss of beetles to inter-beetle predation and desiccation, which has been determined to be a potential mortality factor for Silphidae on hot mornings by Bedick (1997). Traps will be spaced no farther than 1 mile (1.6 km) apart to ensure that the entire survey area will be covered by the predicted radius of the trap (0.5-mile (800 m)). Traps will be set on the first trap day before 1800 hours and checked every subsequent morning by 1100 hours.

Trapping will be conducted for a minimum of five consecutive days. When trapping for ABB, if weather conditions are unsuitable for trapping during the 5 consecutive days, it is not necessary to begin the 5 day session again, but rather add one night of trapping for each night of unsuitable conditions. Unsuitable weather conditions include nights when the temperature drops below 55°F or raining. It is assumed that on nights with unsuitable conditions, the beetles will not be active.

At each trap site, a GPS location and digital photograph will be taken to document the location of the trap and the general habitat characteristics of the trap site. All carrion beetles captured will be identified to species whenever there is available time and resources, and the ABB will be sexed by use of Ratcliffe (1996). If the goals and objectives of the survey effort are to assess population status and requires marking beetles, all ABB captured will be recorded and marked using a drop of model paint (such as Testors) placed on the pronotum or the posterior portion of one or both elytra. Paint will be applied in a manner that will not cause damage to the elytra. If the purpose of the trapping effort is to clear an area, marking beetles is not necessary. All ABB captured during the second trapping period (August 7th through September 1) will be evaluated for being either teneral or senescent, if the surveyor(s) have been properly trained. Captured ABB will be released as quickly as possible. For research purposes, the ABB may be released at the point of capture or at locations away from the capture point if such release methods are identified in an approved research design and the release sites have been evaluated as providing suitable habitat for the beetle. For the purpose of clearing a site of ABB prior to disturbance activities, captured beetles will be released in suitable habitat at a minimum distance of two miles away from the capture site. The release sites should be included in proposed conservation measures by the project proponent for concurrence on the project. All captures of ABB will be recorded in the format of the Natural Heritage's Database housed by the Nebraska Game and Parks Commission, including recording captures in a Geographic Information System Database, as applicable, for future reference and analysis. Results of surveys will be sent to the Nebraska Game and Parks Commission and the US Fish and Wildlife Service.

References

Bedick, J. C., B. C. Ratcliffe and L. G. Higley. 2004. A new sampling protocol for the endangered American burying beetle, *Nicrophorus americanus* Oliver (Coleoptera: Silphidae). *The Coleopterists Bulletin*. 58(1): 57-70.

Ratcliffe B. 1996. [The carrion beetles \(Coleoptera: Silphidae\) of Nebraska](#). *Bulletin of the University of Nebraska State Museum* 13:1-100.

U.S. Fish and Wildlife Service. 1991. American Burying Beetle (*Nicrophorus americanus*) Recovery Plan. Newton Corner, Massachusetts. 80 pp.