

Protocol for Wildlife Rehabilitator Response to
Hibernating Bats Affected with White-Nose Syndrome

An Evolving Document

2011

Protocol for Wildlife Rehabilitator Response to
White-Nose Syndrome-Affected Bats in the Northeastern United States

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for

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Includes information provided by SCDNR

Purpose:

This protocol was written in template format to assist state and federal agencies to effectively utilize wildlife rehabilitation in response to emerging White-nose Syndrome in North American cave-dwelling bats. **This protocol is subject to change as new information regarding WNS distribution, cause of infection, treatment and/or containment is discovered. These protocols do not reflect state-specific requirements for wildlife rehabilitation and may vary from state to state.**

Supporting Documentation:

Appendix A: References

Reference A: List of State Contacts

Reference B: Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats

Reference C: The Project: Realities and Recommendations; Presentation for Manager's Session, WNS Strategy Meeting, Albany NY, June 2008

Reference D: AVMA Guideline for Humane Euthanasia

Reference E: NWRA Code of Rehabilitator Ethics

Reference F: Wing Scoring Protocol

Reference G: IWRC-NWRA Minimum Standards of Care

Reference H: Bat World Sanctuary Wing Banding Position Statement

Appendix B: WNS Bat Intake

Appendix C: WNS Bat Care Record

Appendix D: Recommended Equipment List

Appendix E: Waiver sheet

Appendix F: Map of Affected Counties

Introduction:

Decision to Rehabilitate WNS-Affected Bats

It is the responsibility of agencies to carefully consider all possible impacts of rehabilitation and weigh the long term risks with the benefits before deciding if rehabilitation should occur.

Varying circumstances may lead different states to different conclusions. Wildlife rehabilitators can assist agencies in collecting useful information on the status of bats whether bats are taken into rehabilitation or not. Wildlife rehabilitators are often well-known to the local community, are trained in critical care and triage, and are keen observers of normal vs. abnormal animal behavior. They may be a valuable resource in observing disease progression and changes in local wild populations.

This document provides protocols for safely and humanely rehabilitating bats if states decide it is in the best interest of their bat populations. Some states may decide to allow rehabilitation for research purposes only – with no intent to allow release of bats. If this is the case, in fairness to the rehabilitators, the state WNS coordinator must inform them in advance of their participation.

Due to the difficulty in detecting the disease in the field (outside of hibernacula) without laboratory confirmation, its highly contagious nature and the gaps in knowledge regarding how and when the disease is transmitted, rehabilitation of bats in affected zones requires careful consideration and many precautions. For the most current information on the distribution and latest scientific findings regarding WNS, visit

<http://www.fws.gov/whitenosesyndrome/>

Properties of White-Nose Syndrome

White-nose syndrome (WNS) a disease known to affect six northeastern bat species, is responsible for the estimated loss of more than a million hibernating bats from Nova Scotia to western Kentucky (see map, Appendix F). Current research indicates that the cold-loving, keratinophilic fungus, *Geomyces destructans* is the likely cause of the disease. *Geomyces destructans* infiltrates the skin on the hairless portions of the bodies including the bats' wings, arms, muzzles and ears and is visible as a white, filamentous fungus while bats are in their hibernacula. Once the bats have emerged either in the winter (abnormal behavior associated with WNS) or upon normal spring emergence, external evidence of the fungus disappears, most likely as a result of the bat grooming itself. External evidence of WNS, including abnormal behavior or the fungus itself, have not been observed in the summer or early fall. Transmission studies have demonstrated both bat-to-bat and aerosolization as a means of spreading the disease in a captive setting.

Identification of WNS

At this time, seven species of hibernating bats [*Myotis lucifigus* (little brown bat), *M. septentrionalis* (northern long-eared bat), *Perimyotis subflavus* (Eastern pipistrelle or tri-colored bat), *Eptesicus fuscus* (big brown bat), *M. leibii* (small-footed bat), *M. austroriparius*

(southeastern bat), and *M. sodalis* (Indiana bat)] within the WNS-affected region (Appendix F) are considered to be potentially WNS-affected.

Symptoms:

Suspect WNS is currently defined in the field during winter months as:

- White, fuzzy fungus seen around the muzzle, ears, wing/limbs, and/or tail of an affected bat;
- Above normal bat mortality at the winter hibernaculum;
- Thin animals and/or dehydrated wings (wrinkled and not pliable); and
- Aberrant bat behaviors (found on ground inside or outside the hibernaculum, roosting near hibernaculum entrance, daytime bat activity outside the hibernaculum during cold weather)

These symptoms are primarily observed from November through May. Not all of these signs must be present for a bat to be considered affected by WNS (including visible fungus); however, the more signs exhibited by an individual bat, the higher the level of suspicion that the bat is affected. Most rehabilitators may receive sick bats from the general public who will not have any knowledge as to the origin or conditions at the hibernaculum. It is imperative that any rehabber receiving bats during the winter contact the state biologist (Appendix A) and report the bat's capture location and reason for submission, the information will assist in WNS surveillance.

Requirements for WNS Bat Rehabilitators:

Prospective rehabilitators are well aware of the labor-intensive nature of care and time commitment required for this particular group of animals. Although rehabilitators are not state employees, if they chose to take on the task of bat rehabilitation, they must be willing to work closely with state WNS coordinators and FWS contacts.

Because bats require a great deal of specialized care, only rehabilitators who either specialize in bats or who have prior experience working with bats should care for WNS-affected bats.

The following recommendations are for facilities to care for WNS-affected bats (not organized by priority):

- Rehabilitators must have proof of prior experience working with bats or the willingness to train with experienced persons prior to accepting WNS-affected bats;
- Rehabilitators must have pre-exposure rabies vaccination and an acceptable titer level;
- Rehabilitators must follow established principles of wildlife rehabilitation [e.g. adherence to NWRA's professional ethics and IWRC/NWRA *Minimum Standards of Care* (Appendix A), willing to use subcutaneous (subQ) fluids, appropriate housing];
- Rehabilitators must implement the **Quarantine, Isolation and Handling Protocols (see following section)**;
- Rehabilitators must provide or obtain appropriate euthanasia to end suffering;
- Rehabilitators must have access to veterinary care;
- Rehabilitators should be trained on wing-scoring protocol (Appendix A, Reference F);
- Photo documentation of all bats will be required if a state biologist is unable to verify the species shortly after arrival into the rehabilitation facility due to the difficulty in

distinguishing *M. lucifugus* from *M. sodalis* (applies only to states within the range of *M. sodalis*);

- Rehabilitators must have state or federal permit coverage to handle and maintain listed species for the possibility that some WNS-affected bats coming into rehab are federally- or state-listed species [State listed species in SC are Rafinesque's big-eared bat, Small-footed bat and Southeastern myotis];
- Rehabilitator must maintain data sheets on bats taken into rehabilitation and submit copies to the state WNS coordinator annually.

State agency personnel will provide guidance to rehabilitators for bats that die while in rehabilitation (see section on Disposition). It may be necessary to submit these cases to the state rabies lab (SCDHEC) or to the Southeastern Cooperative Wildlife Disease Study (SCWDS). Submission to SCWDS must be done through the SCDNR because the two agencies have a cooperative agreement and SCWDS does not accept submissions directly from the public. Dead bats should be kept refrigerated or on ice in double Ziploc sealable bags (with detailed labels) prior to shipment in a cooler. To prepare a specimen for the SCDNR to ship please refer to WNS submission guidelines by SCWDS (<http://www.scwds.org/>). Note that SCDNR does have coolers for shipping bat specimens. Specimens cannot be submitted on Fridays or on week-ends or Holidays because the testing lab is closed then.

Rehabilitation Guidelines

The South Carolina Department of Natural Resources (SCDNR) does not issue permits for wildlife rehabilitation of nongame mammals (including bats). As a courtesy to the public, SCDNR, does provide contact information of groups and individuals that do wildlife rehabilitation. The SCDNR does NOT certify anyone doing rehabilitation and the agency urges anyone handling wild animals including rabies vectors to use extreme caution and to undergo prophylactic rabies immunization.

For SC, on the “leading edge” of WNS in 2011, the first bats coming in which are suspected to have WNS prior to the hibernation period will need to be euthanized and sent for analysis to confirm WNS.

Bat Transport Recommendations:

Live bats should not be directly handled by the general public. Trained and vaccinated volunteers, should be recruited for transport of bats to a rehabilitation facility to minimize public interaction with affected bats and reduce rehabber workload (since they are doing it voluntarily).

If a qualified person is unable to pick up the animal, the rehabber or state contact should tell the individual there is no recourse but to let the animal die.

Transport by qualified and rabies-vaccinated personnel:

1. The qualified individual transferring the bat to rehab should follow strict decontamination protocols found on the WNS website:

http://www.fws.gov/whitenosesyndrome/pdf/WNSDecontaminationProtocol_v012511.pdf

2. Bat(s) may be transferred to a secure box with lid using objects that can be cleaned and disinfected or saturated with disinfectant and discarded in the trash.
3. Bats should never be carried over state or county lines.
4. The transport box should be placed inside another clean box or loose bag (ensuring there is access to air) before placing it inside the vehicle to transport to the rehab facility.
5. The individual should transfer the bat to a wildlife rehabilitator outside of the bat care facility.
6. Transport box should not be opened to examine the bat(s) until inside the dedicated bat quarantine room (see Quarantine, Isolation and Handling Section).

Documentation:

Note: the following section provides general procedures including an intake data sheet (Appendix B) to document WNS in bats undergoing rehabilitation.

- Maintain a call log to track where animals are observed and recovered;
- Secure waiver and recovery location from whoever initially recovered the bat (Appendix E);
- Start data sheet and assign number (example in Appendix B);
- Collect standard metrics: gender, age class, weight, forearm length, etc;
- Apply wing-scoring protocol;
- Photograph wings, face, and any visible scarring or fungus;
- Start a care record sheet (Appendix C); and
- Contact state WNS coordinator (in SC, Mary Bunch, bunchm@dnr.sc.gov or Al Segars SegarsA@dnr.sc.gov)

REHABILITATORS CAPTIVE CARE PROTOCOL FOR WNS-AFFECTED BATS

Quarantine, Isolation and Handling Protocols:

UNDER NO CIRCUMSTANCES SHOULD TREE BATS (RED BATS, NORTHERN YELLOW BATS, HOARY BATS, SILVER-HAIRED BATS, SEMINOLE BATS, EVENING BATS) BE HOUSED CONCURRENTLY AT THE SAME FACILITY (i.e. building) AS WNS-SUSPECT BATS.

1. The bat quarantine area should be a separate, contained room dedicated to only housing WNS-suspect bats. Outside flight-conditioning cages should be located away from other species pens and separated from each other by a minimum of 20 ft.
2. DO NOT house bats collected from different locations (greater than 5 miles apart) together at any point during the rehabilitation process. Each quarantine group will require its own pre-release flight cage. If bats can be identified as originating from a particular hibernaculum, those bats may be housed together. Bats of uncertain hibernaculum origin should be housed separately and preferably in separate rooms. If housing bats in separate rooms is not possible, then all bats may be in one quarantine room, BUT there should be dedicated separate equipment for each housing unit, gloves must be changed between handling different groups.

3. Once an animal enters the quarantine room, it should be considered exposed to WNS if other bats are present and not be returned to the general patient population.
4. Stock all necessary animal care supplies inside the bat quarantine room in order to minimize multiple trips. During bat handling or care, forgotten items should be brought by another person and placed just inside the door to minimize trips.
5. A dedicated set of supplies should be kept in the WNS-bat room and only used for WNS-affected bats. Do not mix these items with other supplies from outside the room.
6. Clean and disinfect quarantine room items separately from the rest of facility supplies, including laundry.
7. All bats entering a rehab facility should be held in quarantine for a minimum of 30 days before being transferred to a pre-release flight cage. Any individual bat or group of bats collected from the same location (within 5 miles) AND same time period (3 weeks) can be housed together upon admission. Questions regarding which bats may be considered to be from the same hibernaculum should be directed to the state WNS coordinator.
8. Bats received from known WNS affected counties should be housed in a separate, contained area (separate room) from all other animals. If WNS-suspect bats cannot be isolated from other animals under care in a separate room, then bats should not be accepted as patients.
9. Bats from known WNS affected sites should be handled only after other bat patients have been handled to reduce the risk of cross-contamination.
10. Bats should only be handled using disposable exam gloves and wearing dedicated, protective clothing (i.e.: coveralls, smock/scrubs, Tyvek suit, rain gear) that should be removed prior to exiting the room. Disposable shoe covers or rubber boots that can be cleaned and disinfected are recommended foot wear when inside bat housing areas.
11. Disinfectant foot baths should be used upon exiting any room/flight cage area housing bats to reduce the risk of unintentional transmission of disease to outside the bat holding room. Use a boot brush to wash all upper and lower surfaces of boots while standing in the bath. Boots can then be allowed to air dry and removed at the room entrance. Bath changing frequency depends on the type of disinfectant but should be changed out whenever it becomes dirty if prior to the scheduled replacement.
12. Launder protective clothing according to protocol at least once weekly or whenever they become soiled. It is highly recommended that personnel working inside the bat quarantine shower upon exiting the room/flight cages and before they handle any other patients in the main facility.
13. Animal cages should be located as far from the entry/exit doors as possible and away from blowing fans/vents to reduce the risk of aerosolization of fungal spores and contamination outside of the quarantine room.
14. Limit the number of people who have access to the bat isolation room and pre-flight cages.

Disinfection Protocols

1. All items to be removed from the quarantine room for a more thorough cleaning should be initially cleaned to remove debris and sprayed/soaked in disinfectant while in the quarantine room. Items should then be securely bagged for transport out of the room to the laundering site.

2. All non-disposable items (inside and outside caging, feeding equipment, cloths, clothing, etc.) in contact with bats must be cleaned with hot water and detergent followed by disinfection according to current recommendations posted on the FWS website. http://www.fws.gov/whitenosesyndrome/pdf/WNSDecon_Researchers_v012511.pdf
3. All disposable items and trash should be sprayed with disinfectant to saturation and discarded into a dedicated trash receptacle for the bat room. Trash should be double-bagged and discarded in the regular trash when the receptacle is full.
4. Vacuum bags should be burned or discarded after use in a contaminated room. Furnace and air condition filters should be discarded weekly and daily spraying of filters with 1:9 dilution of bleach and water to decrease the numbers of fungal spores. Steam cleaning must maintain water temps >109°F to be effective. [Source: “The 5 minute veterinary Consult Clinical” KH Rhodes, LP Tilley 2002].
5. Bat quarantine room should be thoroughly disinfected at the end of the season or once all bats have been transferred to pre-release flight cages before it is used to house any other species. All surfaces should be cleaned with a disinfectant (i.e. Formula 409[®] or Lysol[®] All-purpose Professional Cleaner). Disinfection procedures should be conducted three times to ensure complete disinfection.

Bat Care Guidance:

Most WNS-affected bats collected outside during cold periods will be suffering from exposure in addition to emaciation and dehydration. These bats require critical care procedures and must be carefully evaluated. Bats deemed on intake to be non-releasable (based on the best professional judgment of an experienced rehabber and in coordination with the state WNS coordinator) should be humanely euthanized.

On intake all bats should be checked for injury. Minor abrasions and injuries can be treated twice daily with topical applications of antimicrobial flushes or creams. Severe injuries should be checked by a veterinarian and treated accordingly. All information here is treated in much greater detail in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats* (Appendix A).

Initial and Subsequent Feeding and Hydration

Bats must be adequately hydrated prior to feeding. Severely emaciated bats should receive Vital HN or another liquid recovery diet as per instructions in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats*.

Rehydration: Bats must be rehydrated with subQ boluses of Lactated Ringers Solution warmed to body temperature. Oral fluid therapy will not provide adequate rehydration for these animals. Pale yellow urine is a reliable indicator of adequate hydration. Bats may be temporarily housed on white cotton sheeting (not terrycloth) so that urine is more visible. Severely emaciated animals should be offered small meals (~.25 cc) of a pre-digested liquid recovery diet such as *Vital HN* after rehydration. Less severely emaciated animals should not be fed before normal urination is observed.

Once stabilized, bats should be transitioned to a blended diet. As soon as a bat is eating, defecating, urinating, and drinking normally, it should be taught to eat live mealworms from dishes and supplemented with blended food as necessary. Do not assume that bats will recognize mealworms as food. Bats that require hand-feeding of either blended food or whole mealworms should be fed twice daily, as much as they can consume both am and pm, approximately 12 hours apart. *Myotis lucifugus* tend to learn to self-feed very quickly. *Eptesicus fuscus* and *Perimyotis subflavus* learn after some guidance, though some individuals take longer than others. Some species, such as *Myotis septentrionalis* are very hard to transition to self-feeding. The ability of *Myotis sodalis* to learn to self feed is as yet unknown.

Mealworms must be gut-loaded via the substrate they are kept in. Allow mealworms to feed on high-protein baby food cereals in which the grains are fine enough to be sifted, allowing easy access to mealworm removal. Mealworms must receive moisture food and be supplemented with Vionate[®] before feeding to the bats as per instructions in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats* (Appendix A). Prior to feeding, sift enough mealworms from the substrate and place in a tray with one end under a light source. Mealworms will move away from the light, leaving shed skins, dead larvae, and remaining substrate behind. Let bats naturally reach normal body temperatures (i.e., warm to the touch). If a bat is not responding normally (i.e., shivering or not warming on its own) it may be necessary to use an additional heat source such as an incubator or warm-water bottle. However, nonresponsive bats must never be placed lying down on any heat source as damage to internal organs may result. Signs of overheating include rapid, shallow breathing/open mouth breathing, rapid heart rate with weak pulses.

Housing and Food/Water Stations

IMPORTANT: WNS bats must be kept separate from any other animals, including other non-affected bats. Multiple bats recovered from the same site may be housed together; however, animals originating from different locations should not be mixed (see Quarantine section). Group housing for colonial bats must be carefully weighed against disease transmission concerns, length of time in captivity, and the ability of the rehabber to provide an appropriately enriched environment for solitary animals and decisions to house multiple animals together must be coordinated with the state WNS coordinator. Note: Because male *Eptesicus fuscus* (big brown bats) have been known to severely injure each other in captivity, we do recommend housing them singly during the fall/winter breeding season.

Bats can be temporarily housed in a JEEP soft crate model #JP5526GG or similar soft-sided crate or cage. Rehabilitators must have enough crates to house WNS bats separate from any other animals. Additionally, there should be enough WNS-dedicated crates so that bats can be shifted to clean crates while used crates are being disinfected and/or laundered.

Blue surgical towels, cotton/linen table napkins (in dark colors), or flannel receiving blankets can be draped and secured over the interior framework of the cage to provide roosting spots for the bats. Enough cloths should be provided to cover at least three walls of the cage. Roosting pouches may also be used.

Water dishes such as plastic pill containers or contact lens cases, which can be found at most pharmacies, can be secured to the support poles inside the cage using velcro. Narrow, shallow trays or finch-sized coop cups (small d-cups or honey cups are preferred) should be used for both training and for self-feeding bats. Good examples of narrow trays are common drawer organizers: <http://tinyurl.com/2z6971>. Two 4" to 8" trays or 2 coop cups per every 4 bats is recommended. Dishes should be placed against the wall of the cage or on the floor in order for bats to hang head down over the dish while self-feeding. If aggressive bats are preventing other bats from self-feeding, more dishes should be placed on an opposite side of the cage. Feeding stations can be partially obscured by draping, or silk or plastic foliage so that less aggressive bats can feed in comfort. Any material used to obscure or provide additional hiding places must adhere to the disinfection/containment protocol.

Heat: A small reptile heating pad on a dimmer switch set to half power, a human heating pad set to low, or a reflector light with a 25-watt red bulb should be provided for supplemental heat. Pads should be inside a fabric case and placed on the outside of a cage wall, never on the floor. Debilitated bats cannot escape floor heat and will sustain life threatening damage. Once bats are stabilized, heating sources should be removed and replaced with a heat bulb to remove spot heat. Cave-dependant bats are known to preferentially roost on heat sources, which contributes to chronic dehydration, discussed below.

Humidity: Maintaining a humidity level of 60-80% is crucial. Residential air-conditioning and heating systems typically force humidity levels that are akin to desert conditions. In these conditions, bats suffer from skin conditions suspected to result from chronic low-grade dehydration. The underlying causes of observed skin and wing conditions has yet to be identified, but maintaining proper humidity levels and temperatures that do not allow bats to enter into long-term torpor seems to reduce the development of severe skin problems. In winter, when WNS bats can be expected, humidity must be supplied artificially. Whole room humidifiers and air washers can be used to maintain high humidity levels. Bats must be watched closely for stiff wing membranes or flaky dry skin, as these are typical indicators of too-low humidity. Hygrometers and thermometers should be installed to monitor relative humidity and ambient temperature.

Lighting: Lighting should include access to full-spectrum light, bearing in mind that fluorescent units are only effective at approx 18" from the light source. In addition, compact fluorescent bulbs emit a great deal of ultrasound. Ballasted incandescent bulbs are available that are effective over greater distance; however, these bulbs put out great deal of heat and also contribute to a decrease in humidity. Lighting should be timed such that natural seasonal photoperiods are maintained.

Enrichment: Cage furniture should be provided to create an enriched environment that stimulates natural behaviors as per instructions in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats*. Provision of an enriched environment is spelled out in the IWRC/NWRA Minimum Standards of Care for wildlife rehabilitation. However, enrichment materials must adhere to the disinfection/containment (See previous section). Provision of companions (if possible) and multiple roost and feeding sites are the best means of enrichment. But other methods such as providing cloth slings, horizontal roost sites, natural or artificial foliage,

tunnels, paper towel tubing, etc., can be used. These methods can be constructed from spare bedding material or other materials that can be disinfected or disposed of. Natural enrichment such as leaves, branches, etc., can be microwaved to kill parasites and other organisms and then disposed of as necessary.

Once bats are stabilized and ready for long term housing, they will need access to flight cages for conditioning. Free standing pop-up mesh tents work well for this purpose. There are several models available, though most need to be modified to provide flooring and prevent escapes. Group housing during initial rehab or flight conditioning must be discussed with and approved by the state WNS coordinator.

Daily Management

All bats should be given daily physical examinations. This is the only way to ensure that individual bats are accounted for, are maintaining weight, and are not developing disease or sustaining injury. Daily exams allow for quick detection of developing problems, thereby increasing the likelihood of successful treatment. Bats have been observed to become familiar with an individual and to exhibit signs of stress when unfamiliar persons interact with them. In order to maintain healthy bats, personnel changes must be minimized.

Fecal matter should be removed from floors daily. It is not recommended that cage walls or roost materials be cleaned daily as removing all traces of scent markers may be distressing. Portions of cage walls can be cleaned on a rotating basis using a 10% bleach solution followed by thoroughly rinsing with cool water. Bats should be removed temporarily during cleaning and rinsing if the rehabilitator does not have a second cage available (See Appendix D).

Water and food dishes should be washed with dish soap and hot water (>110 °F) and thoroughly rinsed with cold water. Fresh dishes of water must be provided to the bats. Tap water may be used but if regional tap water is suspect; filtered water or store-bought is preferable. Water can be treated with Calcimize[®], a water conditioner that provides trace amounts of calcium, but not in amounts that can jeopardize animal health.

Roosting pouches and sheeting should be washed daily. Hot water and mild unscented laundry soap are adequate for cleaning fabric roosting materials.

Veterinary Management

State WNS coordinators may decide what, if any, medical treatment may be used for WNS bats. The following guidelines presume that medical management is permissible. All bats should be triaged on intake to determine health status. Any injuries or nutrition/hydration issues must be addressed. While not immediately imperative, fecal samples should be analyzed for endoparasites and captive groups treated according to findings as per instructions in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats*.

Euthanasia

Whenever possible, euthanasia should be performed with inhalant anesthesia such as Isoflurane or Halothane as per instructions in *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats*. Because of bats' high tolerance for carbon dioxide (CO₂), it is considered an

inhumane method of euthanasia. Euthanasia methods must conform to AVMA guidelines causing minimal stress and a rapid loss of consciousness before death.

Flight Conditioning

If the state WNS coordinator has determined to permit the release of rehabilitated WNS-affected bats, pre-release flight conditioning will be necessary, most likely prior to the spring release of the bats. Free-standing pop-up screen tents make good, temporary flight cages. Floors should be padded and secured to prevent escape. Roosting areas and feeding and watering areas can be hung directly on screen walls. Branches and silk foliage can be suspended from the ceiling to provide enrichment and practice for obstacle avoidance.

Records and Identification

An intake and record sheet should be started for each bat, recording the weight, urination/defecation, and other required information (See previous Documentation section). Each bat should be marked for identification by fur clipping or by using a non-toxic livestock marker. (Livestock markers can be punctured with a flat toothpick and then stirred to soften. Use the flat end of the toothpick to apply color to the forearm, ears, or tail membrane.) If agencies require that bats be banded prior to release, bands must be placed by experienced state personnel, not rehabilitators unless they have adequate experience to prevent band-related injuries.

Support and/or Training in Bat Care:

Bat World Sanctuary maintains a Yahoo Groups list to provide advice to rehabilitators working with WNS-affected bats. This list is open by invitation only and is moderated by the author. Subscription requests can be sent to batworldnova@verizon.net. In addition, the **Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats** (Appendix A) is available as either a free web-based publication or a downloadable document from www.batworld.org (click on rehab data).

It may be advisable to develop regional rehabilitator training workshops. Such training could be incorporated into various training opportunities offered by state wildlife rehabilitation organizations or national organizations such as National Wildlife Rehabilitator's Association or International Wildlife Rehabilitator Council. In addition, Bat World Sanctuary offers a week-long summer training session specifically for insectivorous bat rehabilitation.

APPENDIX A - REFERENCES

Reference A: SCDNR Contacts:

Headquarters (Columbia Office): (803) 734-3886

For wildlife contacts in the Four Regional Offices use the link below:

<http://dnr.sc.gov/admin/regions.html>

Reference B: *Diagnostic and Treatment Update for the Rehabilitation of Insectivorous Bats*

<http://www.batworld.org/worldbatline/data.html>

Reference C: *The Project: Realities and Recommendations*; presentation from managers session

WNS Strategy Meeting, Albany NY, June 2008

(WEB LINK HERE—to be established, also available from the L. Sturges)

Reference D: AVMA Guideline for Humane Euthanasia

http://www.avma.org/issues/animal_welfare/euthanasia.pdf

Reference E: NWRA Code of Rehabilitator Ethics

<http://www.nwrawildlife.org/page.asp?ID=2>

Reference F: Wing Scoring Protocol

http://www.fws.gov/northeast/PDF/Reichard_Scarring%20index%20bat%20wings.pdf

Reference G: Bat World Sanctuary Wing Banding Position Statement

<http://www.batworld.org/main/positionstatements/position%20statement-%20banding.pdf>

Reference H: IWRC-NWRA Minimum Standards of Care

<http://www.iwrc-online.org/pub/Standards%203rd%20Edition.pdf>

APPENDIX B - BAT INTAKE RECORD

ASSIGNED ID # _____

DATE: _____

SPECIES: _____

LOCATION FOUND/COLLECTED (address, zip code):

Contact information of finder, if available (email, telephone, address):

NUMBER OF BATS OBSERVED AT LOCATION:
___LIVE/NORMAL ___SICK ___DEAD

DATE OF ONSET:

INCREASED BAT ACTIVITY IN AREA: YES NO

REASON FOR SUBMISSION:

IDENTIFYING MARKS

BAND NUMBER

Sex: _____ / Adult Juvenile / Weight: _____grams/ Forearm length _____mm

PHYSICAL EXAM RECORD (Circle)

GENERAL CONDITION:

thin/emaciated crusty snout weak lively matted/dirty fur

abnormal behavior/(describe: _____)

HYDRATION STATUS:

good fair poor

FUNGUS :

on snout on limbs/wing membrane on ears body absent

DISCOLORATION - can be light or darkened areas on hairless areas:

forearm(s) uropataguim elbows feet

WING & TAIL MEMBRANE:

intact tears holes

Wing Score: _____ per Wing Scoring Protocol :

http://www.fws.gov/northeast/PDF/Reichard_Scarring%20index%20bat%20wings.pdf

EYES:

bright droopy/sunken glassy swollen discharge (watery; mucoid; crusty)

MENTAL STATUS:

alert lethargic/depressed unresponsive

RESPIRATION:

normal labored shallow noisy slow rapid

GUMS (visual observation only, do not physically check gums):

bright red pink bluish

LEGS/FEET/TOES/THUMBS:

functional swollen fractures claw injury

ADDITIONAL INFORMATION

Body Disposition

Date _____

DIED EUTHANIZED DOA

MEDICAL TREATMENT PROVIDED:

YES (provide treatment record to lab)NO

NECROPSY: Y N

DATE _____

FACILITY/Contact Info (name, address, telephone number)

IF BAT RELEASED:

RELEASE DATE: _____

RELEASE LOCATION _____

BAND NUMBER _____

TRANSFERRED:

DATE _____

REHABILITATOR / FACILITY _____

NOTES:

APPENDIX D: Recommended Equipment List

Caging:

Gear Inc. JEEP softcrate model #JP5526GG

(<http://www.petgearinc.com/JEEP%20CRATES.htm>) or similar item. Collapsible cages should have mostly mesh walls, as bats cannot cling to rubber coated canvas or tight weave material walls often used in collapsible cages.

Critical care phase caging can also be provided with small collapsible dog/cat carriers from Target http://www.target.com/Pet-Carrier/dp/B0009NWVEG/qid=1226631194/ref=br_1_15/179-0848492-0936448?ie=UTF8&node=14287971&frombrowse=1&rh=&page=1.

Note: Each rehabilitator should have 2 cages so caging can be switched out and disinfected. Cage covers can be laundered in a standard washing machine then hung to dry. Cloth drapes, enough to cover at least three walls of the cage, to provide roosting sites. Blue surgical towels (available in bulk from on-line suppliers) or cotton/linen table napkins in dark colors may be used. Other alternates are dark hemmed cotton flannel sheeting, old Crown Royal bags with drawstrings removed, flannel receiving blankets, or any cotton cloth with a loose enough weave for roosting. Avoid polar fleece or other synthetics. Urine tends to pool on synthetic material and results in dirty, greasy bats. Roosting pouches (see http://www.batworld.org/bat_bazaar/bat_bazaar.html -- scroll to roosting pouches) may also be used. This might be a worthwhile project to which the public or volunteer groups could contribute. Wildlife rehabilitators have been gifted with bedding, pouches and quilts from volunteer groups.

Water dishes:

Plastic pill containers or contact lens cases that can be found at most pharmacies, glass tea light holders (10 for \$1.99 at IKEA), plastic film canisters cut to size (free at most photo processing centers), or small finch-sized coop cups (filled halfway with glass marbles) are all acceptable. Velcro can be used to attach plastic dishes to the support poles of the cages. Coop cups can be hung from mesh sides. See http://www.batworld.org/worldbatline/pdf_files/enrichment.pdf for examples.

Food trays:

Mealworm trays for self feeding: <http://tinyurl.com/2z697l> (stick with the narrow dishes). Small coop cups or honey cups (<http://www.redbirdproducts.com/cagesaccessories.htm>).

Mealworms:

An initial order of 20,000 medium sized mealworms will be needed to make a 2nd stage recovery diet, as well as provide whole food to stabilized animals. Note that more mealworms will be needed if the bats survive. Sunshine Mealworms is a good source: 800-322-1100 as is Nature's Way: 800-318-2611. Both companies offer discounts for rehabilitators.

Baby Food Cereal can be used as mealworm substrate, as can a blend of oat bran, wheat bran, ground flax meal, and rodent chow. For long term care, refer to the Bat World Sanctuary medium described at

http://www.batworld.org/worldbatline/pdf_files/tartar%20control%20diet.pdf.

Moisture food for mealworms include sweet potatoes, fresh corn, fresh green beans, fresh carrots, and apples, etc.

Nutritional Supplies:

- Multivitamin Vionate (<http://www.squirrelsandmore.com/product/1493/vionate-vitamin-supplement.htm>);
- Critical care recovery diet Vital HN: <http://www.squirrelsandmore.com/product/611/vital-hn.htm> Critical care recovery diet alternate: Enteral Care HLP (currently on backorder from manufacturer);
- Flax seed oil (can be purchased at health food stores); and
- Bland baby foods such as applesauce, pears, bananas, garden vegetables, sweet potatoes and corn, carrots and green beans, etc.(these are used to vary the flavors of the diet)

Medical and misc supplies:

- Lactated Ringers Solution (LRS): Purchased at veterinary clinics or through rehabilitator groups
1 cc and 3cc o-ring syringes: <http://www.squirrelsandmore.com/product/425/1cc-slip-tip-oring-syringe.htm>, <http://www.squirrelsandmore.com/product/426/3cc-oring-slip-tip-syringe.htm> for feeding or administering subQ fluids;
- 29 ga insulin needles (depending on state may be available at pharmacies without a prescription) for administering subQ fluids;
- 18 and 25-gauge needles: <http://www.medcareproducts.com/prodinfo.asp?number=NN> for drawing up fluids (18ga) or administering subQ fluids to larger bats (25ga);
- Heating pads , purchased at pharmacies and department stores;
- Revolution (for kittens) to treat external parasites (once animals are stabilized). Purchase at veterinary clinics; requires a prescription;
- Glass medicine droppers for feeding;
- Interdental brushes: <http://store.facevaluesonline.com/300410853402.html> for grooming or cleaning teeth;
- Forceps or tweezers: <http://www.allheart.com/ma25730.html>;
<http://www.sciencelab.com/page/S/PVAR/10-385-B>, or available at hobby/craft shops, for feeding;
- Cotton swabs. Purchased at pharmacies and department stores;
- Cattle markers in assorted colors
http://www.jefferslivestock.com/ssc/product.asp?CID=2&pf_id=16190 or farm supply stores, for marking individual animals;
- High-quality iris or manicure scissors. Purchased at pharmacies and department stores; and
- Large capacity humidifier: <http://tinyurl.com/2ofedr> or similar

For a detailed list of rehabilitator supplies, please see <http://www.batworld.org/worldbatline/basicssupplylist.html>.

APPENDIX E: Bat Intake Waiver

http://www.batworld.org/worldbatline/pdf_files/batadmission-waiver.pdf

PUBLIC WAIVER (taken from the Bat World website):

Bats are a rabies vector species. Rabies is an infectious viral disease that affects the nervous system of humans and other mammals. People get rabies from the bite of an animal with rabies (a rabid animal). Any wild mammal, such as a raccoon, skunk, fox, coyote, or bat, can have rabies and transmit it to people. It is also possible, but quite rare, that people may get rabies if infectious material from a rabid animal, such as saliva, gets directly into their eyes, nose, mouth or a wound.

People cannot get rabies from having contact with bat guano (feces), blood, or urine, or from touching a bat on its fur (although bats should never be handled!). You should contact your local health department if you have been bitten by a bat or if infectious material such as saliva from a bat has gotten into your eyes, nose, mouth, or a wound, or if the bat has been found in a room with a person who cannot reliably rule out contact, such as a sleeping person, a child, a mentally disabled person or an intoxicated person*. If no one has been bitten or had direct contact with this bat, please rewrite the following statement in your own handwriting:

No one has been bitten or had direct contact with this bat.

NAME: _____

PHONE: _____

ADDRESS: _____

CITY/STATE: _____ ZIP: _____

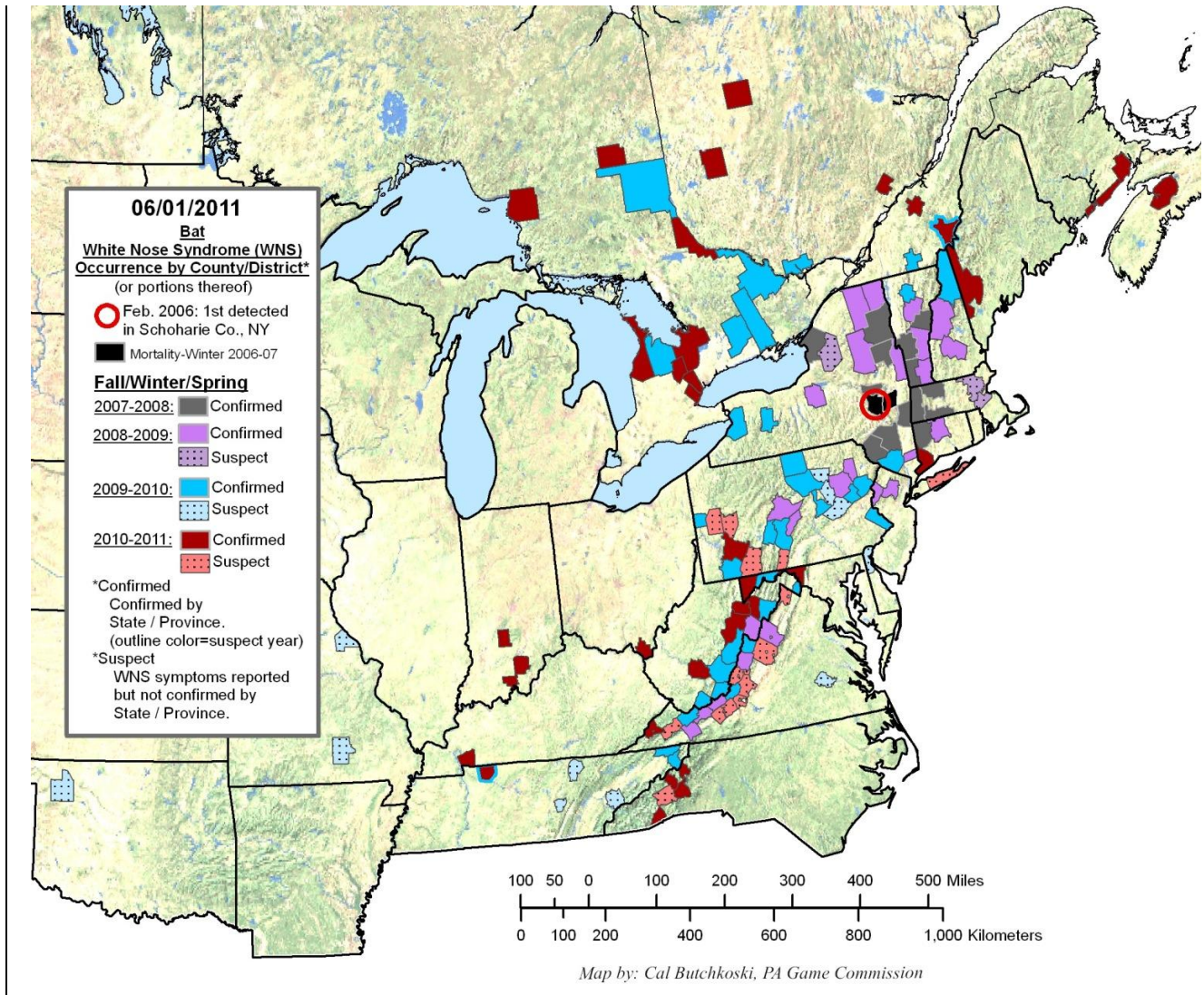
By signing below, I state that all of the information above is true:

SIGNATURE: _____

DATE: _____

*Bats and Rabies: A public health guide (1998). The US Centers for Disease Control and Prevention. www.cdc.gov

Appendix F – WNS Range



Note - the map of affected counties will be updated when necessary. Coordinate with your state wildlife agency to ascertain whether additional counties have been confirmed to be affected or check the U.S. Fish and Wildlife Service website for recent WNS occurrence information:
http://www.fws.gov/northeast/white_nose.html.