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To: Forest Supervisors

The Forest Service (FS) is actively working to manage our administrative infrastructure to reduce administrative site maintenance backlog and improve the agency's ability to realign facilities with today's workforce and mission. Underutilized sites are evaluated for sale or exchange. In certain situations, the sites are retained for new uses such as Granger-Thye permits.

Disposal of facilities will happen in two ways: 1) those that will be conveyed with land out of FS ownership, normally by competitive sale, and 2) decommissioning, with facilities/structures that will be removed offsite, but the land will remain under FS ownership. Information on properties under consideration can be found at http://fsweb.r6.fs.fed.us/eng/facilities/Conveyance_Web_Site/Data/R_6_Conveyance_Web_Site.htm. Maps and fact sheets about the facilities are available along with more information about this Act. The website is still under construction, so please check often for updates.

Biologists need to work with their local Recreation, Lands and Minerals and Engineering staffs to determine what facilities are being considered for conveyance or removal. All facilities should be examined for bat presence.

The following enclosures were developed by an interagency group of biologists and researchers with expertise in northwest bat biology and bat habitat. The enclosures provide information on:

1. bat species likely to roost in buildings
2. how to survey buildings to determine bat use
3. management options for buildings that contain bats
4. bat education and information sources

If you have questions please contact Pat Ormsbee at (541)-225-6442 pormsbee@fs.fed.us on the Willamette National Forest or Elaine Rybak at (503) 808-2663 erybak@fs.fed.us in the Regional Office.

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Enclosure

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Enclosure 1 Bat Species and Roosting Habits in Buildings

Bats roost in attics, walls, under shingles, and other features of homes, outbuildings, and offices, regardless of the age of the building and some times regardless of human occupancy. This is especially true for forest-dwelling bats in rural settings such as small towns or in administrative compounds surrounded by forested habitat. Buildings often provide stable roosting habitat with ideal temperatures and protection from predators for maternity, day, and night roosting, and for hibernation.

Species	Building use
pallid bat	uncommon ¹
silver-haired bat	unlikely ²
Townsend's big-eared bat	common ³
western long-eared bat	uncommon
fringed myotis	uncommon
long-legged myotis	uncommon
California myotis	uncommon
Western small-footed myotis	unlikely
Yuma myotis	common
little brown myotis	common
Keen's myotis	unknown
hoary bat	unlikely
big brown bat	common
Brazilian free-tailed bat	common
spotted bat	unlikely
1. uncommon-rarely documented, atypical roost habitat	
2. unlikely- generally not documented	
3. common- commonly documented although other roost habitat is more typical	

Enclosure 2 Surveying for Bats in Buildings

The overall objective for surveys associated with the Forest Service Facility Realignment and Enhancement Act is to assess if buildings and structures identified for conveyance or destruction are used by bats. If a building is occupied by bats, a decision will need to be made about how to protect buildings used as roost sites, as directed by the NW Forest Plan and the Interagency Special Status Sensitive Species Program, or how to mitigate for the loss or destruction of a roost site.

Safety

Safety is of utmost importance. Old buildings may be structurally compromised. Rotten floors, ceilings, roofs, and walls are subject to collapse. Evaluate the structural condition of the building before entering and if the building appears to be unsafe to enter conduct external surveys only. When inspecting a building of any condition, be aware of protruding nails, dust and insulation, precarious routes, such as crawling along rafters or in areas with extensive wiring. Wear a respirator with a filter designed to guard against fine, airborne particulates. This is extremely important if the old building have evidence of rodent infestations because of the potential for Hanta virus. See the link below for information on respirators.

<http://www.cdc.gov/ncidod/diseases/hanta/hps/noframes/prevent7.htm>

Wear knee pads if crawling is involved. Wear protective clothing and gloves so that exposure to insulation or sharp objects is avoided. Wear a hardhat if the structural integrity of the building is of concern.

Equipment list

Required:

- “Soft” clothing: fleece or cotton (nylon and waterproofed fabrics make sounds most detectable by bats)
- Headlamps (with red filter)
- Spotlight (with red filter)
- Respirator
- Data Sheets
- Note Pad/Pen

Additional:

- Knee Pads
- Heavy gloves
- Eye Protection
- Hard hat
- Temperature and humidity loggers (Kestrel or HOBO).
- Night-vision equipment
- “Night-shot” video cameras
- Digital camera
- Bat detector

Internal Surveys

Because buildings can have numerous points of egress, internal searches are generally more efficient and effective than external methods for detecting bats. Internal observations are to be used whenever safety, skills, and access are not an issue.

Internal Visual Observations

Assess safety concerns before entering the building and guard against mishaps. Have a backup safety plan including a check-in plan with headquarters and/or someone who is not entering the building with you.

- One or two people are usually adequate to conduct an internal survey of a building. If there are safety concerns, such as walking on rafters or climbing vertical ladders, two people need to be present. Avoid conversation or unnecessary noise while inside the building by determining the survey route and responsibilities of all parties prior to entry. Have needed accessories (headlamps, spotlight, notepad, and pencil) easily available and functional.
- If the building is inhabited by rodents and/or the survey involves searching in confined areas, wear a respirator.
- Wear “soft” clothing such as fleece or cotton and avoid “noisy” clothing such as nylon or Velcro. Use soft cloth collection bags such as cotton instead of plastic or paper.
- When possible and safe, use a deep red filter placed over a headlamp or auxiliary light to search for bats and urine and body oil stains on the ceiling, along beams, and against or in walls. Use white light when necessary to negotiate the building or to augment detections of bats, guano deposits, insect remains (e.g. moth wings), and bat carcasses on the floor, rafters, beams, sills, etc. Bats may be found roosting low, high, clustered, spread out, or solitarily, depending on the building temperature. Sometimes, night vision equipment, auxiliary infrared lighting, or both can be used for internal surveys.
- Stay alert to audible sounds emitted by bats. Use a bat detector in conjunction with visual surveys to potentially detect bats.
- If bats are detected, avoid disturbing them. Keep as far away from the bats as possible and stay quiet. Without disturbing the bats, obtain a quick estimate of the number and location of bats by completing a partial count of bats for a small area in the cluster and multiplying the number to reflect the whole cluster. Make a visual sweep of the adjacent area for additional solitary roosters or small clusters. The numbers of bats in a cluster can vary greatly depending on the season, presence of young, and size of cluster. Published packing densities also can be a good resource for estimating numbers, though they are typically reported only by species (see Thomas and La Val 1988).
- Do not attempt to handle bats. Identify bats by obvious features (e.g. fur color, ear size) only if possible from a distant vantage point.
- If the building can be surveyed without forcing bats to abandon their roost, complete a survey of the entire building.
- If there are no bats, but signs of bats (e.g. guano, urine stains) are detected, record the type; freshness; amount and location of the sign. The size of stained areas where bats have roosted or the sometimes the size of guano piles can be used to estimate cluster size.
- Whenever feasible, install temperature, airflow, and humidity data collectors inside the building. Data collected about where bats are not located can be as important as data collected where bats are located because it provides information on microclimatic conditions that can help predict where bats will and will not roost.

While this is nice information to have, it probably won't be a factor in building disposal or demolition. If you have a maternity roost of rare bats, temperature and humidity data won't influence the decision. On the flip side, having temperature and humidity data that indicates good conditions but bats aren't present, this probably won't influence decisions either. Funds and personnel might be better used elsewhere.

Internal Remote Observations

Internal remote surveys can be difficult to do in buildings with more than one floor or room or where bats are using external features such as roofs or shutters.

The use of internal remote surveys can be effective in small buildings or where signs of bat use (guano, urine or oil stains) have been detected, but more information on use is needed.

- Set up remote detection equipment in enough locations or over enough time to ensure that the entire building interior or targeted areas are completely surveyed.
- Test the range and sensitivity of detection for video recorders and cameras (test for distance of focus for light conditions), motion sensors (test for size of object it takes to trigger sensor), and bat detectors (test for range of sensitivity by using an electronic pet flea collar) to insure coverage.
- Test the equipment with a bat detector to make sure it is not emitting high frequency sounds that are audible to bats and may cause them to avoid the site.
- Identifying bats to species is an important step when addressing roost sites in old or occupied buildings because the site is being considered for restoration, moving, or demolition and managers are only willing to forgo such actions only if the species is a species of special status. We should be pushing for conservation of large roosts of common bats as well, and we need to convince managers that large colonies of any bat are important. Why shouldn't a manager want to conserve a maternity roost of 1,000 little brown bats?

External surveys

When investigating small buildings or buildings with limited access points for bats during seasons when bats are active, external surveys can be productive. Where safety, poor access, or the skills of the investigator are a factor, external methods are worth trying, regardless of building character or size. Bats can also use external features for roosting, such as roof shingles or shutters, that could go undetected during internal searches.

External Visual Observations

- Prior to surveys, determine how many observers are needed and where to place them to detect emergence from all possible aspects of the building. Use the sky to backlight emerging bats when possible.
- Approximately 30 minutes before sunset, station observers so they do not obstruct or hinder emerging bats (approximately 3-16 m [10-50 ft] away). Night vision equipment can be used if visibility is low or if late emergence or night roosting is suspected. Arrive early enough to be in position and ready prior to bat emergence.
- Remain quiet and still during the survey to reduce interference with normal emergence patterns.

External Remote Observations

Prior to external visual observations, a bat detector can be used in conjunction with listening for audible sounds of roosting bats.

- Listen as quietly and discretely as possible in all accessible areas where you expect bats to roost. Be alert for signs of bats, such as guano deposits.

- Cameras and bat detectors may be useful in conjunction with external visual surveys or where the area of potential emergence is very small. Usually, reliance on cameras and audio equipment to detect bats is not as effective as direct visual observation because cameras have a limited range and with audio equipment it can be difficult to determine if bats are associated with the building or arriving from somewhere else.

Survey Recommendations by Season

Summer survey recommendations

- Conduct daytime visual and acoustic searches in and outside of buildings, looking for any sign or sound of bats, using white light to search and red light on bats. Use a bat detector for audio detection.
- Allow enough time to conduct a thorough search – this can take several hours. Begin surveys just prior to dusk when bats are becoming active, but still roosting. End surveys when emergence is complete.
- Combine internal searches at dusk with external observations prior to emergence. Conduct these paired surveys over at least 2 consecutive days/evenings within 1 week at least once a month, 1-2 weeks apart, between June 15 and August 15.
- If no bats are detected, but guano is present, it is likely the site is being used for night roosting. Although further surveys are not required to establish use, validation of night roosting can be confirmed by one of the following methods:
 - Remove the guano or cover with a tarp during the day and check for new deposits on following days.
 - Install remote camera, video, or bat detector equipment directed at a probable roost location.
 - Conduct nighttime internal surveys beginning at midnight and then every hour after until bats are detected.
- Once bats or evidence of bats are detected, surveys can be terminated.

Fall survey recommendations

- Conduct paired surveys using the same protocol as is described for summer surveys above over at least 2 consecutive days/evenings, 2 weeks apart, at least twice between September 15 and November 1.
- Fall activity is often associated with swarming so that nighttime surveys may be the most effective for determining bat presence.

Winter survey recommendations

Bats using a building as a hibernaculum can be difficult to impossible to detect because they can be inconspicuously wedged under shingles or between walls and are most likely torpid. Our ability to assure that roosting bats are absent from buildings in winter is very limited. It may be advisable to assume bat presence in winter and forgo the investment of time and money to conduct winter bat surveys.

When winter surveys are conducted:

- Conduct surveys using internal visual methods once a week between January 1 and February 30.
- If weather patterns shift (warming or cooling) adjust survey schedules and/or conduct additional surveys to include searches during these fluctuations.
- Consider installing remote cameras, videos, or bat detectors to augment visual surveys.

- Temperature and humidity recorders may provide additional and insightful information.
- Additional surveys during March and April may result in detections of winter roosters leaving hibernation.
- Once bats or evidence of bats are detected, surveys are terminated.

Spring survey recommendations

- Conduct paired surveys using the same protocol as described for summer surveys above over at least 2 consecutive days/evenings, 2 weeks apart, at least 3 times between April 15 and June 15.
- Additional night surveys may be beneficial.
- Once bats or evidence of bats are detected, surveys are terminated.

Determining Bat Species Roosting in a Specific Building

Once bats are determined to be present, determining which species of bats are using a roost site may be necessary. Roosting bats, especially those associated with maternity sites or hibernacula, are susceptible to disturbance that can result in death to bats. In many cases, species-identification surveys require handling of bats and should be conducted only under the guidance of an experienced bat biologist with pre-exposure rabies protection. For assistance in conducting surveys to determine bat species roosting in buildings, contact Pat Ormsbee, Regional Bat Specialist on the Willamette NF at 541-225-6442 or pormsbee@fs.fed.us

Literature Cited

Barclay, R.M.R. 1982. Night roosting behavior of the little brown bat, *Myotis lucifugus*. *Journal of Mammalogy* 63 : 464-474

Thomas, D.W. and R.K. La Val. 1988. Survey and census methods. Pages 77-89 in T. H. Kunz, editor. *Ecological and behavioral methods for the study of bats*. Smithsonian Institution Press, Washington D. C.

Attachment 3 Management Options for Buildings (regardless of age)

Buildings or portions of buildings where bats are roosting should be maintained whenever possible. If expense or management conflicts are an issue, the significance of the roost site should be assessed (for example: a maternity site would be highly significant; a site with sporadic summer use by solitary males, in most cases, would be low). Retention of buildings is contingent on safety concerns. If retention of a roost site is not possible, Forests should make every effort to relocate a colony or mitigate for loss of a roosting site by using artificial roosts of appropriate size and design, based on species and size of roost. For additional help and expertise, contact Pat Ormsbee, Regional Bat Specialist on the Willamette NF at 541-225-6442 or pormsbee@fs.fed.us.

The NW Forest Plan includes Management Recommendations to provide additional protection for bat roosting sites of the fringed myotis, silver-haired bat, long-eared myotis, long-legged myotis, pallid bat and Townsend's big-eared bat as well as other bat species. Forests within the NW Forest Plan area should review these Standards and Guidelines and Management Recommendations. (See the "Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl" 1994; Pages C-41 through 44, Appendix A and the supplemental EIS and a ROD for Amendments to the Survey and Manage, Protection Buffer and other Mitigation Measures Standards and Guidelines, signed in 2001 amending the 1994 ROD and modifying the Standard and Guideline for bats in the 1994 ROD; Pages 37-38, Appendix A). The following provides information on managing bat sites, depending upon how line officers decide to proceed.

Retain Building

If a bat roost is considered significant (e.g. a maternity site) and the building will be retained by the Forest Service, a site specific management plan should be developed. The following provides information to consider when developing a site plan for a building containing bats.

Buildings are not subterranean and temperatures can fluctuate greatly throughout the day or season, and may vary widely within the building. Management of the area around a building is recommended (resource management protection zone). Possible strategies for managing the site are maintaining current exposure, roost access and privacy, and providing for fire safety. The use of seasonal restrictions when bats are present can provide flexibility for building maintenance and use.

Abandoned or Infrequently used Buildings

- Restore or maintain the building to preserve roost sites and maintain roost microclimatic conditions. Monitor the building for temperature, humidity, airflow, and bat use to help determine baseline and maintenance levels. Monitor bat use as little as possible and by remote methods when possible. Schedule construction activities for periods when bats are not present. If the site is a hibernaculum, it can be difficult to tell if bats are present under shingles, loose siding, etc. If bats are detected during construction, the work should be halted until bats vacate the site.
- Assure that access points used by bats to enter the building are retained.
- Prevent use of the building as a livestock shelter.

- Do not use chemical treatments to eliminate insect or animal pests from the building.
- If a building must be destroyed or collapse is eminent, construct alternative roost habitat if possible and feasible. If the species using the site is a chamber rooster (Townsend's big-eared bat), you may need to experiment with artificial roost structures that imitate the microclimatic conditions of the original roost. To minimize effects on bats, schedule intentional destruction of the building during seasons when bats are not present.
- Hikers and other casual visitors may cause a disturbance or vandalism problem that requires closing the structure to people while maintaining access for bats.
- Educate and develop a public relations plan, but only if it contributes to protecting roosting bats. (See Attachment 4)

Resource Protection Zone Adjacent to the Building (Abandoned or Infrequent use)

- Identify a realistic area to manage as a resource protection zone around the building. A resource protection zone is appropriate if bat use is determined to be locally significant.
- Maintain existing amounts and types of vegetation around the building and protect vegetation that provides wind or sun blocks. Retain flight paths used by bats to enter and exit the building.
- Develop a fire safety plan to protect the building from fire risk.
- Do not use chemicals or biological agents to control insects or animal pests in this zone.
- Maintain water sources in this zone.
- Management of livestock in this area should not conflict with the objective of maintaining the roost site.
- If hikers or other casual visitors cause bats to change previously observed use patterns or vandalism becomes a problem, consider closure of the resource protection zone.
- Use CFR (Code of Federal Regulation) closures, C-clauses in contracts and NEPA defined land allocations or Special Areas to implement seasonal and permanent protection of the resource protection zone and the roost building.
- Do not blast, drill, or create other vibration or noise-producing disturbances in the resource protection zone when the site is being used by bats for roosting. Schedule the activity during periods when bats are absent, unless bats can be discretely monitored during the activity and no effect is evident.
- Activities that may affect bats such as blasting, pesticide spraying, and increased recreational development, should be assessed for their effects on roosting bats, even if the activities are outside the resource protection zone. If such effects are a concern, provide protection for bats roosting in old buildings.

Human Occupied Buildings

- Protect roost sites in occupied buildings that are regionally or locally significant by using seasonal restrictions on human activity or by isolating the roost site from human activity without changing the conditions of the roost habitat.
- If necessary, develop a monitoring strategy to detect changes in use patterns of roosting bats. Monitor roost sites in occupied buildings as seldom as possible and using remote methods to avoid disturbing roosting bats.
- In some cases, exclusion of bats from non-significant roost sites in occupied buildings may be necessary. Complete exclusions only after assessing alternatives, consulting with a bat expert, and complete exclusions during seasons when bats are absent. Include efforts to mitigate roost habitat when excluding bats from buildings.

Building Razed or Transferred from Forest Service Ownership

Retention of existing roost sites is the best way to protect and conserve bats. Creation of a new roost site or moving bats to a new roost site location is largely untried and rarely successful when attempted.

I am aware of several situations where bats have been successfully relocated to a new roost through the use of bat houses and exclusions or roost destruction. The best known example is probably the University of Florida bat house. As far as I am aware, this is the world's largest occupied bat house. It is 18' x 18' and sits 20' off the ground and has over 100,000 bats in it. It was built as an alternate roost site for bats that were to be excluded from the University of Florida track stadium.

The example I am most familiar with is the bat condo (8' x 8' and 8' off the ground) in Rushville, Ohio. This family had a maternity colony of little brown bats (about 1,000) in the attic of their old farm house. They wanted to tear down the old house and build a new one, but didn't want to lose their bats. The year before they planned to tear down the old house, they built the bat condo in a pasture between the old house and a nearby lake where the bats foraged, so the bats could check it out. The following winter they tore down the old house while the bats were elsewhere hibernating. When the bats returned to the site the following spring, they had no choice but to move into the bat condo. They have been in the condo for 8 years.

However, if retention of the roosting site is not feasible, the following should be considered when attempting to move or mitigate for a loss of a building containing a bat colony.

- Assess the surrounding area to determine if potential alternative roosting sites are already available (snags, bridges, other buildings, etc.)
- If alternative roosting sites are not available, assess whether modifications could be made to nearby structures (bridge, building, etc) to accommodate bat roosting or if alternative bat roosting structures could be installed (e.g. bat boxes).
- **PLAN AHEAD.** At a minimum, the alternate roost site should be in place one year before bats are excluded or the building is demolished. At a minimum, exclusion of bats from an existing roosting site should be done a year in advance. Provide bats sufficient time to relocate and acclimate to potential new roosting locations. Exclude bats from the existing roosting site only after bats have exited of their own volition.

(e.g. after pups are volant and long before the following maternity season so females will have time to locate new locations for roosting once they discover the current location will no longer be available). If bats cannot be physically excluded from a building, consider creating temporary disturbance at a site during the time bats may be selecting a site for roosting (e.g. hibernation).

Probably need to point out that currently there is no proven bat house design for any of the big-eared bats. This is an area where research could be done by testing multiple designs simultaneously at a big-eared bat maternity roost site. We will be testing at least 3 designs in the hurricane damaged forests of Mississippi where we have several years of data on Rafinesque's big-eared bat maternity roosts.

Attachment 4: Cave, mine, and bat educational/informational sources

Bats Incredible is a 120-page book of activities for grades 2-4, containing good ideas for interpretation and workshops. Available from Aims Education Foundation, P.O. Box 8120, Fresno, CA 93747. Telephone (209) 255-4094. About \$15. Also available with the BCI slide show for \$25.(see below)

Ranger Rick's Nature Scope Amazing Animals Part II has bat activities for various grades.

American Bat Conservation Society, P.O. Box 1393, Rockville, MD 20849. Telephone: (301) 309-6610. The society has fact sheets on bats in general, conservation status reports by state, specific fact sheets on 40 Species, and the "America's Bats Go to Schools" program. They will provide a catalog of their materials.

The Arizona Game and Fish Department, Information and Education Division, has a packet of bat information suitable for interested laymen and children. Debbie Noel is a nongame-branch bat specialist in that office and has worked with their education branch to develop a variety of bat teaching and training, ranging from school programs to field weekends for interested laypersons and agency personnel, 2221 W. Greenway rd., Phoenix, AZ 85023. Telephone: (602) 942-3000.

Project Wild has some bat activities and other general nature projects adaptable to bats.

Bat Conservation International, Inc. (BCI) P.O. Box 162603, Austin, TX 78716. Telephone: (512) 327-9721, has a wide variety of educational materials and programs.

Bats Northwest 4742 42nd Ave SW, Seattle, WA 98116. Phone: (206) 256-0406. Educational and informational resource on bats and bats exclusion techniques.