FYI INFORMATION

A Research Summary From the Washington Forest Protection Association

New Technology Enables Scientists to Study Forest Management and Bat Habitat Relationships in the Pacific Northwest

Photo by William Leonard

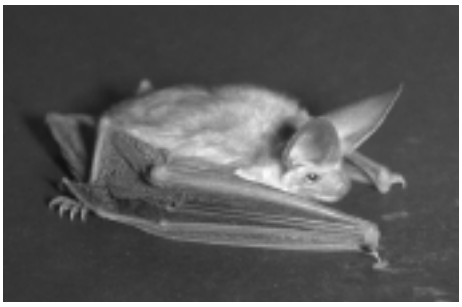

Photo by Dr. Lloyd Glenn Ingles

As the primary predators of flying insects – including those that are considered forest pests – bats are an important part of the ecosystem. Hoary bats (top) and pallid bats (bottom) are just two of the fourteen different species that inhabit Washington's forests. Bats are also thought to play a role in nutrient transference from riparian zones to upland forests. A technological breakthrough – the invention of an automated bat detector – has enabled scientists to gather data on bat populations and diversity that would not have been possible as recently as a decade ago.

Fourteen species of bats occur in forests of the Pacific Northwest. While bats are an important part of the forest community, our knowledge of the ecological role they play is very limited compared to that of other mammals, birds, fish, and forest vertebrates. The primary reason has been the difficulty in studying these small, elusive, nocturnal creatures. It has been only in the last 10-15 years that technological developments have made detailed studies of bats possible (see inset box on page two).

As darkness falls each night, bats come out of roosts in caves, hollow trees, crevices in sloughing conifer bark, and even from buildings and under bridges to feed on insects. Unlike birds, they rarely roost more than a few consecutive nights in the same place. To compound the difficulty for researchers, they feed only in darkness and their echolocation calls are inaudible to human ears.

Recent Studies Utilize New Technology to Analyze Bats

Historically, the problem with studying bats has been the virtual impossibility of gathering accurate data on their behavior. With the use of modern technology such as radio tracking devices and electronic echolocation detectors, however, research efforts—and, consequently, our understanding of bat biology—have increased dramatically in recent years. Dr. Stephen West, professor of wildlife science and associate dean of the University of Washington's College of Forest Resources, pointed out three recent studies using Anabat echolocation detectors:

1. **Timber/Fish/Wildlife (TFW) Landscape Study** – A survey of bat use of four common managed forest stand types on industrial forestland near Mt. Rainier National Park took place over a three-year period. West found that the highest bat activity was in recently harvested open areas. There was some bat foraging activity in thinned forests approaching harvest age, but a total lack of it in unthinned young forests. He theorizes that the lack of openings in an unthinned forest prevents bats from feeding in them.
2. **TFW Riparian Study** – In this study, bat echolocation surveys were done in three types of riparian areas: a 45-foot unharvested buffer zone on each side of the stream, a 100-foot zone, and an unharvested control area. During a two-year study after harvest, the majority of bats observed were small, maneuverable species of the Myotis genus, which did not show changes in use between harvested and unharvested riparian zones. The larger, non-Myotis species, however, actually increased their use where more area was harvested.
3. **Demonstration of Ecosystem Management Options** – In this study, bat responses to various patterns of green tree retention were

assessed before and after harvest. Once more, use of the areas by bats was virtually unaffected by the different patterns, except for the non-Myotis species, which again made extensive use of the more heavily-harvested areas.

The Value of Bats in the Forest

Because they are often disliked and even feared, one might wonder why we should care about the needs of bats. The answer is threefold, according to Dr. John Hayes, a professor of wildlife ecology at Oregon State University. "These remarkable animals are the primary predators of insects that fly at night. Many of the insects they consume are considered forest pests, so any decrease in bat populations would likely result in corresponding increases in insect populations that have the potential to damage trees."

In some cases, bats may also play a role in nutrient cycling in the forest environment. Because many species feed primarily on the high concentrations of insects over streams or lakes and then return to the forest to roost, they represent an important vehicle for nutrient transference to upland forests.

Finally, bats are a significant component of the region's biodiversity. Hayes argues that maintaining biodiversity is a fundamental tenet of good land stewardship. "It is likely that we will never fully understand all of the ecological functions that bats and many other species play in the environment," Hayes claims.

Feeding and Roosting Characteristics of Bats

According to West, bats have three primary habitat needs: foraging areas, day roosts, and night roosts. They typically have a pattern of foraging just after dusk, then seeking a night roost for rest between feedings throughout the night.

The Northwest Bat Cooperative

This public-private cooperative is one of the first of its kind, partnering the Washington Department of Fish and Wildlife with both large and small forest landowners, conservation organizations, wildlife biologists, and others to share knowledge and fund studies of bats across the region. The group is helping to promote forest management that will create better bat habitat.

The Anabat II bat detector has revolutionized the study of these elusive animals. Created by an Australian company about a decade ago, the unit can automatically turn itself on to record when it detects the echolocation call of a bat. This allows researchers to leave it in a study location for an extended period of time and download the data when the unit is retrieved. Computer analysis can help scientists understand not only how often bats are present at a site, but in many cases what species as well.

Tom Manning, a research assistant working for John Hayes at Oregon State University, is shown here adjusting the microphone on a site where they are studying the effects of salvage logging after a major fire.

Man-made structures such as bridges are often used for these roosts because they can retain the day's heat. During daylight hours bats use a different roost. "A bat's life is primarily concerned with conservation of energy," said West, "so during the day they need a protected place to sleep and warm themselves. A foraging area must have a water source—bats drink often during their active period or risk quick dehydration—and open areas containing an abundance of insects.

Population Decline Suspected

West estimates that bat populations—although impossible to quantify accurately—have declined 50 percent or more on the west side of the Cascades in this century. At the same time, they seem to be flourishing on the east side, with virtually all species breeding successfully. West believes that human activities that increase surface water, such as irrigation canals and livestock ponds, have actually enabled bat populations to increase there. West feels the population decline on the west side of the Cascade Range is due to the loss of forested land through its conversion to other uses like residential and industrial development.

Although little has been definitively demonstrated, early research suggests that some relatively simple changes in forest management practices can improve habitat conditions. West estimates, for example, that retaining a few large live trees within harvest units, as well as creating more openings through thinning more young stands, could greatly enhance the bat population. Forest managers have an interest in studies of bats and other forest wildlife, recognizing that a better understanding of how these species are influenced by forestry can provide direction to management techniques that address their habitat needs.

For further general information on bats, see Bat Conservation International's website at www.batcon.org. More in-depth technical information can be found in the following:
Hayes, J.P., 2003, "Habitat ecology and conservation of bats in western coniferous forests," pages 81-119 in the book, *Mammal community dynamics: management and conservation in the coniferous forests of western North America: management and conservation*, edited by C.J. Zabel, and R.G. Anthony.

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