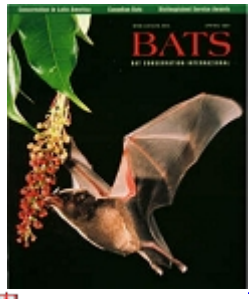

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Canadian Bats: A Caver's New Love
Alisa Vanderberg and Martin Davis

In winter, 1993, four cave explorers trekked into the snow-veiled mountains of Vancouver Island, British Columbia (B.C.), on the west coast of Canada. Their goal was Ursa Major, a 164-foot (50 m.) deep shaft, which swallows two streams into its massive subterranean void. Although the diminished waterfalls were mantled in ice, easing the cavers' descent, the water that poured into the mouth was actively engaged in a relentless process of erosion and dissolution. Where the stream slipped down to lower realms, the cavers crawled along a dry, silty passage into what was by contrast a serene chamber. There, they discovered the first bat hibernation site ever recorded on the island. The motionless, hanging creatures appeared at one with the rock and seemed to have “Do Not Disturb” written all over them, so the cavers moved quickly and quietly away.

In 1994, Martin Davis, who was on the Ursa Major expedition, conducted a cave inventory in B.C.'s old-growth forests for a timber company licensed to undertake logging operations in the area—the Weymer Creek watershed. The inventory revealed a coastal area rich with caves and many rare species of flora and fauna. He and other members of the British Columbia Speleological Federation eventually discovered 160 caves and have since mapped over 14 miles (22 km.) of cave passages within this watershed.

News of the hibernating bat colony rippled through the scientific community, sparking interest in a site visit. The B.C. Forest Service provided helicopter support, enabling scientists to visit in May, 1995. We (Vanderberg and Davis) quietly led representatives from the Ministries of Environment and Forests, the Royal B.C. Museum and the local logging company into the depths of the cave to view the hibernating bats. David Nagorsen, mammal curator at the museum, tentatively identified one of the bats as the rare Keen's myotis (*Myotis keenii*). This was the first documented hibernation for this species, which inhabits only the rainy northwest coast of North America. Skull measurements from a skeleton collected nearby confirmed the identification.

Other myotis species also inhabit the caves, which are deep with occasional large chambers, making it impossible to rigorously inspect the caves without years of effort. We have occasionally observed bats flying into inaccessible ceiling-level passages, and believe that the intricate passages are capable of housing hundreds of bats. With the discovery of this multi-species myotis hibernation site, the only one known in B.C., most of the high-elevation Weymer caves received park status in 1996.

Our fortuitous discovery prompted many questions. Why do myotis use this particular site? What species are here, and what type of cave climate do they need for hibernation? Does clear-cutting the forest influence the deep cave environment? And so began our study of the bats of Weymer Creek.

Using 5 square miles (12 sq. km.) of mountainous terrain as our study area, we deployed bat detectors and mist nets at cave entrances and forest flyways to determine which bats were present. We also placed guano collection sheets within the caves to map active roosts, and collected bat skulls to record historical usage. Temperature and humidity dataloggers

were placed inside and outside of caves, and in clear-cuts and forested sites, ranging from 2,953 feet (900 m.) elevation to sea level. We received technical and material assistance from Trudy Chatwin, Endangered Species Specialist with the B.C. Ministry of Environment, David Nagorsen and many other experts and volunteers. However, 1997 was a difficult year. Our base camp was crushed by an unusually heavy snowfall, and funding was scarce, so we were only able to continue work on a reduced scale.

Through BCI and the B.C. Habitat Conservation Trust Fund, renewed funding allowed our work to continue in 1998. In May, we flew supplies to our campsite near the headwaters of Weymer Creek and built a sturdier base camp. By late July, during swarming season, we were inundated with male myotis. At higher elevation caves, we netted four species, including Keen's myotis, long-legged myotis (*M. volans*), little brown myotis (*M. lucifugus*), and Yuma myotis *(M. yumanensis*). California myotis (*M. californicus*) and big brown bats (*Eptesicus fuscus*) were captured at non-cave sites. In the meantime, David Nagorsen had confirmed the existence of the four cave myotis species from skulls collected, along with a possible fifth, the western long-eared myotis (*Myotis evotis*).

At lower elevations, where river estuaries, ponds and lakes provide excellent feeding areas, we caught predominantly females and juveniles of the same species. One might expect such sexual segregation. The insect-rich zones in lower elevations provide the prey mass necessary to meet the high-energy demands of pregnant and nursing females, whereas males can survive the cold climates and lower concentrations of insects in higher elevations. The males also profit from brief periods of torpor while night-roosting in caves.

On a warm summer night in August, five western long-eared myotis careened into a net we had set across the diminutive Knoll Hole Cave, located on a barren hillock 230 feet (70 m.) above sea level. This was the only low elevation cave where we detected bat use and adjacent feeding. Was it a maternity roost? Cave temperatures here only reached a maximum of 57 º F (14º C), balmy by comparison with the higher caves, but not typical maternal colony temperatures. (We speculated that the moms were teaching their pups cave navigation).

Radio-telemetry work in 1999 provided much new data on the life cycle of the Keen's myotis. Females spent their evenings feeding just above the ocean surface and in the adjacent forests, roosting in trees and cracks in limestone bluffs that were warmed by southwestern sun exposure. Temperatures taken from these cracks varied from 61 to 79º F (16 to 26º C), which is high, considering the mean annual ground temperature near sea level is only 46º F (8º C). The males use similar sites at much higher elevations and feed within the old-growth forests that blanket much of this area.

As fall and bad weather approached, the bats congregated at their cozy hibernation sites in the Weymer caves. We followed, discreetly peering into every nook and cranny underground, and located five new sites where bats were hibernating, but the larger congregations eluded us within the canyon-like labyrinths. The main hibernation area maintains temperatures from 37 to 39º F (3 to 4º C), with relative humidity at or near 100 percent. High humidity allows bats to wake up less often to drink, thereby conserving vital fat reserves.

One of our most confounding hurdles is a taxonomic, or classification, problem. So far, we have been unable to find a foolproof method of differentiating between the rare Keen's myotis and the common western long-eared myotis, which have overlapping ranges on Vancouver Island. In-hand differentiation between the two is subjective due to their

similarities. DNA research has begun with the help of Dr. Joseph Cook (Department of Biological Sciences, Idaho State University) who is doing a comparative analysis between this and other species. Preliminary genetic results indicate that the Keen's myotis has more in common with the little brown myotis than with the western long-eared myotis, which it most closely resembles.

Our experience with bats and involvement in the sport of caving is bridging a gap between sport and science that has long existed in this part of the world. We are on the verge of an important era of information exchange that helps bat biologists to be more effective and cavers to be more aware and less destructive.

Furthermore, cavers are constantly working with industry and government personnel in attempts to gain further protection for caves and their unique biota. In 2000, the government of British Columbia announced a new designation, the Wildlife Habitat Area, to protect endangered species. Based on our findings, we were successful in establishing the first such designation in the lower Weymer area, where logging was imminent. The protected area includes 74 acres (30 ha.) of oceanfront forest (feeding habitat for the Keen's myotis), Knoll Hole Cave and a stand of 164-foot (50 m.) high Douglas fir trees, which may provide maternity roosts.

We are now studying other cave sites around Vancouver Island, hoping to locate and protect other hibernation sites. Already, we have recorded bat use at several. We are grateful to all our funding sources for making bat conservation a priority in B.C.: BCI, Forest Renewal B.C., Science Council of B.C., Habitat Conservation Trust Fund of B.C., B.C. Ministry of Environment and Canadian Forest Products. Alisa Vanderberg has been an active caver for ten years and has been involved in bat and cave conservation since joining Island Karst Research in 1994. She is co-editor of B.C. Caver magazine.

Martin Davis has been an active caver for 35 years and has served as chairman of the B.C. Speleological Federation Conservation Committee for the past ten. He formed Island Karst Research in 1993 to promote cave and bat research, education and conservation.