

ERASING SUPERSTITION
in the Philippines

Borneo's bats build
A DAUNTING STAIRWAY

Includes
2004-2005
Annual Report

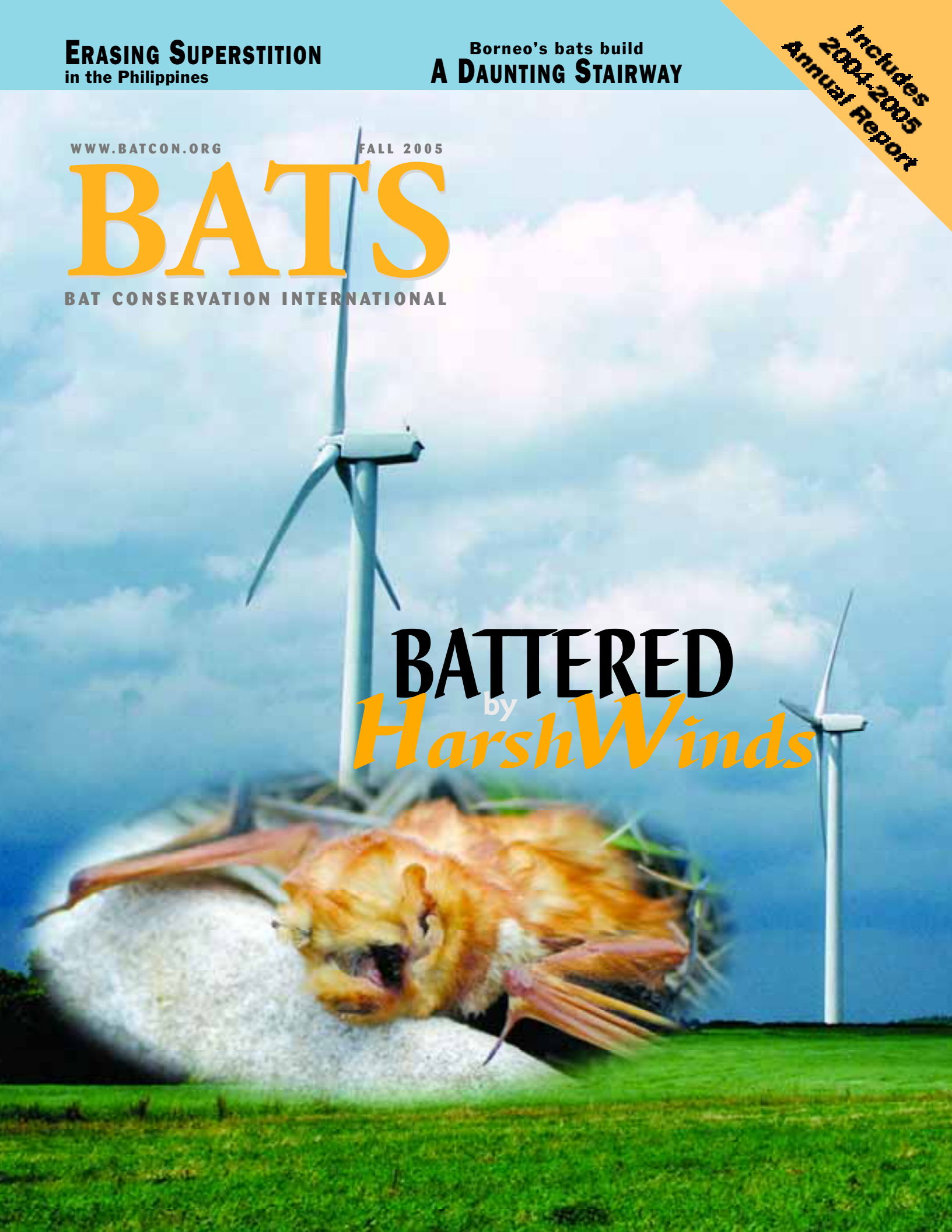
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FALL 2005

BATS

BAT CONSERVATION INTERNATIONAL

BATTERED
by
Harsh Winds



BATS

Volume 23, No. 3, FALL 2005



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COVER PHOTO: Wind-energy facilities, like this one in Pennsylvania, are taking an alarming toll on bats. This red bat (*inset*) was killed in a collision with wind-turbine blades. Story on page 1.

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PHOTO BY MERLIN D. TUTTLE (STORY ON PAGE 1)

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Battered *by* *Harsh Winds*

Must bats pay the price for wind energy?

by Merlin D. Tuttle

Through the psychedelic lens of a thermal-imaging camera, the 115-foot (35-meter) blades of giant wind turbines are blends of reds, yellows, blues and purples. Then a bat arrives as a surreal triangle with an orange core that shifts through yellows, reds and shades of blue out to its wing tips. The images show the colorful little bat meeting the spinning blade and spiraling down and out of the picture. If the camera could have tracked the bat, it would have seen orange warmth fade to cold blue.

JASON HORN, BOSTON UNIVERSITY



PHOTOS © ED ARNETT, BCI



The \$60,000 thermal imaging cameras set up at the Mountaineer Wind Energy Center in West Virginia showed bats approaching the electricity-producing turbines almost like curious kittens enchanted by a tumbling ball of yarn. When the blades were spinning at their standard 17 revolutions per minute (rpm), the results could be and often were fatal. Yet bats sometimes chased harmlessly after the tips of slow-moving blades as though investigating the inexplicable devices that proved neither prey nor bat. Some bats actually landed on stationary blades, suggesting curiosity about potential roosts or sources of insects.

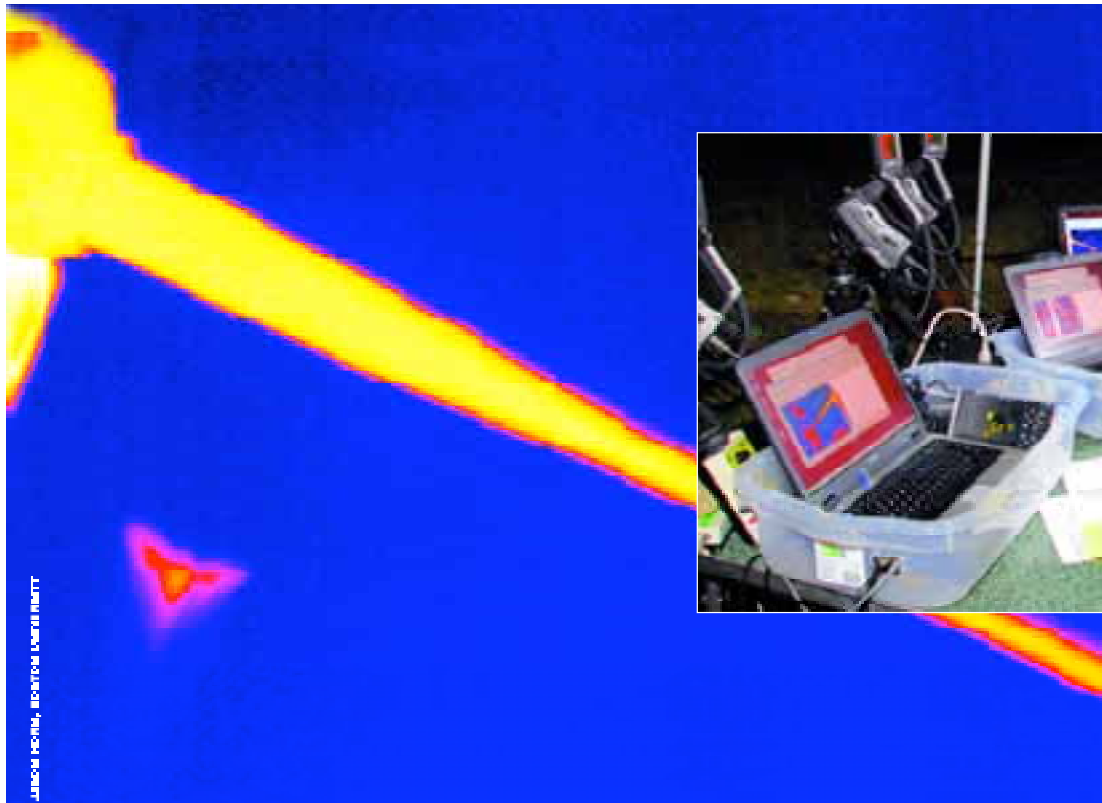
Boston University researcher Jason Horn set up three thermal-imaging cameras night after night at the Mountaineer Wind Energy Center in Thomas, West Virginia, to record, for the first time, bats' interactions with the 220-foot-tall (67-meter) wind turbines. He collected and stored hundreds of hours of video footage – more than 8,000 gigabytes of data – that has since been

meticulously studied to finally let biologists see how the rapidly spreading wind turbines are killing bats and, we hope, learn how to avoid those deaths.

Horn joined forces during the summer of 2004 with BCI Conservation Scientist Ed Arnett (wind energy research coordinator), statistician Wally Erickson of Western Ecosystems Technology and biologist Jessica Kerns from the University of Maryland in the most intensive investigation of bat fatalities at wind farms ever conducted. The six-week field study, from July 31 through September 13, 2004, was under the direction of the Bats and Wind Energy Cooperative (a BCI-led alliance of key federal agencies, wind-industry groups and international experts).

The study was funded by BCI, the American Wind Energy Association, the U.S. Department of Energy's National Renewable Energy Laboratory and alternative energy initiatives from several states. Florida Power and Light Energy, a key industry partner in last year's progress, offered

This red bat (*top right*) was killed when it collided with the spinning blade of a wind turbine at the wind-energy facility at Meyersdale, Pennsylvania (*left*). The BCI-led Bats and Wind Energy Cooperative has identified a strategy that has the potential to sharply reduce these bat fatalities, which number in the thousands annually at single wind-energy farms.



Jason Horn (right) and Roger Rodriguez monitor thermal images being recorded at wind-energy turbines of the Mountaineer, West Virginia, facility. The image at left shows a bat approaching a potentially lethal turbine blade.

its wind facilities at Mountaineer, West Virginia (44 turbines), and Meyersdale, Pennsylvania (20 turbines), for the study. Both are located along the Appalachian Plateau.

The scientists' report summarizing the first year's research into potential causes and solutions to the bat kills was released last June (see www.batcon.org/wind/research/). The study documented alarming kill rates at both facilities. We

calculated that between 1,364 and 1,980 bats were killed at Mountaineer and 400 to 660 died at Meyersdale during just this six-week period. These estimates support the observation that wind farms built on forested ridges, as these were, pose especially high risks for bats.

Our work pointed us toward a promising and apparently low-cost possibility for sharply reducing bat kills at turbines. At both locations, the majority

of bat kills occurred on nights of low wind, when electricity production was insubstantial but blades were kept spinning at or near full speed. Of the 64 turbines studied, only one produced no bat fatalities – it was also the only turbine that was out of service, with its blades “feathered” (turned parallel to the wind and left to rotate slowly, so they posed little or no threat to bats) throughout the study.

Key Wind Industry Player Deals Bats a Blow

The Bats and Wind Energy Cooperative – an unusual partnership of conservationists, government and industry – made tremendous progress last year. We conducted the most detailed studies ever on bat fatalities at wind sites, building a firm foundation for understanding why bats are being killed and how those deaths might be prevented.

As a result of that research, BWEC scientists recommended comparing bat mortality at turbines with their blades “feathered” (turned parallel to the wind and essentially immobile) in low winds versus those with blades rotating normally. Since most bat kills occurred during periods of low wind, when little electricity is produced, feathering the blades at those times might sharply reduce the threat to bats at minimal expense. The goal is to document exactly how much mortality might be prevented and at what cost.

Then things started falling apart.

After being presented with the 2004 research results and with proposals for new research that holds the potential for significantly reducing bat kills, officials at FPL Energy – America's largest wind-power producer – withdrew the company's cooperation toward critically needed research. In fact, the company is now denying our scientific team further access to any FPL facilities nationwide. Since FPL owns more than half of all U.S. wind facilities, many of which are currently killing bats, this decision prevents our most critical

scientific research.

FPL's Woodward facility, for example, is just a few miles from the Selma Bat Cave, a protected bat sanctuary near Woodward, Oklahoma, that is home to some 5 million Mexican free-tailed bats. Reports from bird researchers suggest that substantial numbers of bats are being killed there, but that most deaths occur at only relatively few turbines. Research to determine why bat mortality is high at some turbines but not others at the same facility could prove invaluable in identifying possible solutions. BCI has offered to fully fund the research, but still we have been denied access.

We are making every possible effort to collaborate with industry in the search for solutions to this developing crisis. And we are encouraged by the continuing support of the American Wind Energy Association, the U.S. Department of Energy's National Renewable Energy Laboratory and several leading wind-energy companies, which are committing to multiyear studies of bat activity and mortality.

To date, the Cooperative has not found a wind-farm owner willing to host our most critical experiments. We are, however, still pursuing this promising area of research. We face many challenges in our search for answers and urgently need the support and cooperation of all players, especially industry, if wind energy is to fulfill its promise.

The Bats and Wind Energy Cooperative scientists propose that most bat kills can be avoided by simply not attempting to power up blade rotation until wind speeds reach profitable levels. Based on these findings, our scientific team recommends experiments that would compare fatalities when turbine blades are feathered versus when they are set to spin at near-normal speeds during low-wind periods. The goal is to measure precisely how much mortality can be prevented and at what impact on power production.

Unfortunately, the cooperative has not yet found a single wind-farm operator willing to permit such experiments, despite earlier promises of participation.

The 2004 research identified bat fatalities of six species at both sites: hoary bats (*Lasiurus cinereus*), eastern red bats (*Lasiurus borealis*), eastern pipistrelles (*Pipistrellus subflavus*), little brown myotis (*Myotis lucifugus*), silver-haired bats (*Lasiurus noctivagus*) and big brown bats (*Eptesicus fuscus*).



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Northern myotis (*Myotis septentrionalis*) were killed only at Meyersdale.

Rain or shine, for six weeks in that August and early September, field technicians searched each day along transect lines under turbines looking for dead birds and bats. Half of the turbines were searched once each day while the others were searched once a week so the fatality counts of the two sampling intervals could be compared.

The searchers' ability to find dead

A researcher adjusts this high-tech mobile radar unit that is used to track the nocturnal movement of birds and bats at the Mountaineer, West Virginia, wind-energy facility.

bats was, not surprisingly, highest on bare ground and declined precipitously as the height and density of vegetation increased. Overall search efficiency was estimated at just 25 percent at Meyersdale and 44 percent at Mountaineer.

We also confirmed that the removal of dead bats by scavengers such as ravens

Accurately counting the bats killed at wind-energy farms is complicated because the small bodies disappear into the typically mixed and often-dense vegetation. BCI Wind Energy Research Coordinator Ed Arnett searches for bat casualties at Mountaineer.



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A Lethal Crisis

Wind is touted as an endlessly renewable, “green-energy” step toward reducing our reliance on fossil fuels. That potential may yet be realized – but only after we resolve well-documented threats to wildlife. An energy source simply cannot be “green” if it kills thousands upon thousands of bats.

Many misleading claims are being made for wind energy, and concerns are rising among conservationists and biologists. The National Academy of Sciences, as well as The Wildlife Society, is initiating a technical review of the impacts of wind farms on wildlife. Most leading environmental and conservation organizations have supported wind-energy development. But some are now reassessing their positions because of mounting evidence of bat and bird kills and the dearth of scientifically credible evidence to support responsible development.

Because there is no legal protection for most bats, they have been virtually ignored in early wind-energy planning. As of November 2004, only 12 of more than 200 U.S. turbine facilities (with a nationwide total of some 16,000 turbines) had been examined for bat kills – and only six of those attempted to estimate total bat mortality. Most mortality searches were conducted at 7- to 28-day intervals and did not adequately account for dead bats that were removed by scavengers or missed by searchers working amid dense vegetation.

In Texas, more than 1,400 turbines have been built without *any* assessment of bat kills – and the absence of reported mortality has been presented by wind-power proponents as proof that turbines pose little or no threat.

And still more wind turbines are being proposed at an alarming pace, particularly with the recent extension of federal tax incentives for wind development. The U.S. Government Accountability Office says more than 62,000 additional turbines would be needed by 2020 to meet Department of Energy goals for wind energy.

At least 300 new turbines are proposed or under construction in Texas, with several more projects under review. Wind energy is moving from private property onto public lands, as well: 500 megawatts of wind power already are installed on U.S. Bureau of Land Management property. The BLM has authorized 88 new applications for wind-energy development and has another 68 pending. Applications also have been submitted to



A hoary bat after its fatal encounter with a wind turbine in Pennsylvania.

the U.S. Forest Service.

If the approximately 900 turbines currently proposed for wooded ridge tops within a 70-mile radius of our study sites in Pennsylvania and West Virginia are built, those turbines alone could kill more than 50,000 bats a year. Given bats' low reproductive rates, kills of such magnitude could put entire species at risk.

To prevent an environmental crisis, it is essential that local authorities require wind-energy companies to resolve wildlife concerns during the permitting process. We believe that wind energy can be compatible with bat conservation, but only if clear, well-researched safeguards are enacted.

We strongly encourage research and development of efficient, wildlife-safe wind technology. But we cannot support the current rush to development without first finding solutions to prevent bat kills that could have devastating cumulative impacts across North America.

It is imperative that those of us committed to maintaining healthy ecosystems make our voices heard. Some of America's largest, most ecologically and economically important bat populations could be reduced to endangered status, or even eliminated, if we do not act now.

And, as always, we urge that greater energy conservation – by far our most powerful tool available for dealing with worldwide energy shortages – be encouraged and implemented much more aggressively throughout society.

You can make a difference by sharing your concerns in your community and with conservation organizations you support. Contact local companies, permitting officials and state and federal legislators to insist that wildlife problems are not ignored in new wind-energy projects.

We must not rush into an energy source that is not yet green, but could be.

and coyotes seriously reduced overall mortality estimates, demonstrating the necessity of daily searches. At Mountaineer, scavengers removed 70 percent of confirmed bat kills within 24 hours. At Meyersdale, where scavenging rates were low, the estimates for daily and weekly searches were similar. The Mountaineer facility began operation one year earlier than Meyersdale and it is possible that scavengers had more time to learn of a new food source beneath turbines at Mountaineer.

At both localities, bat kills were in full swing prior to beginning our six-week study and they continued unabated through its end. Peak kills showed similar timing at both sites, suggesting that broader, perhaps regional, conditions – landscape, weather patterns or prey availability – contribute to the patterns of fatalities we observed. As noted, most bat kills occurred when average wind speed and power production were low but turbine blades were kept spin-



BCI's Ed Arnett examines an eastern pipistrelle killed by the blades of a wind turbine in West Virginia.

ning at relatively high speeds. More male than female bat fatalities were recorded, but the timing of the kills was similar. Bat kills occurred at turbines located throughout both facilities, but higher-than-average numbers were found at turbines near the ends and centers of both wind farms. The presence of aircraft warning lights on turbines had no detectable impact on bat kills.

The thermal images indicated that bats were attracted to both moving and non-moving blades. Images of bats chasing turbine blades rotating at slow speeds suggest the possibility of attraction to movement that may be confused with prey or perhaps other bats.

This study covered only six weeks of a single year and was not intended to measure a full season of bat activity, behavior or fatalities. Unusually cool summer temperatures and the passage of four major hurricanes in August may have greatly reduced ridge-top bat activity, as high winds and low temperatures are known to suppress bat and insect activity, particularly at higher elevations.

Full-season searches, extending from

Merlin Tuttle and Jessica Kerns of the University of Maryland examine a hoary bat killed at a wind farm. The remains of a red bat and eastern pipistrelle are on the notepad.

April through October, are needed to fully understand the patterns of bat fatalities at wind turbines. Nonetheless, our results reveal an emerging pattern of alarming kill rates at wind-energy facilities on forested ridges. Similar fatality rates are likely at other sites with comparable forests and topography. There are also reports of widely distributed but poorly documented kills under varied conditions in the western United States.

This vital, state-of-the-art research could not have been accomplished without the Bats and Wind Energy Cooperative and the support of all parties involved. By working together, we now have a much better understanding of the causes and potential solutions to this rapidly escalating problem. We still face many challenges, however, and much more research is required. Bat Conservation International cannot condone further turbine construction, especially along wooded ridgelines, until solutions are found, tested and applied to minimize bat kills at wind-energy facilities.

But we are, as always, committed to gathering solid, scientific data and working with diverse partners to develop solutions that can benefit all of us without endangering the ecosystems upon which we must build the future.

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Bat Conservation International thanks those who supported the Bats and Wind Energy Cooperative through its first year of research:

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Merlin D. Tuttle is Founder and Chief Executive Officer of Bat Conservation International.



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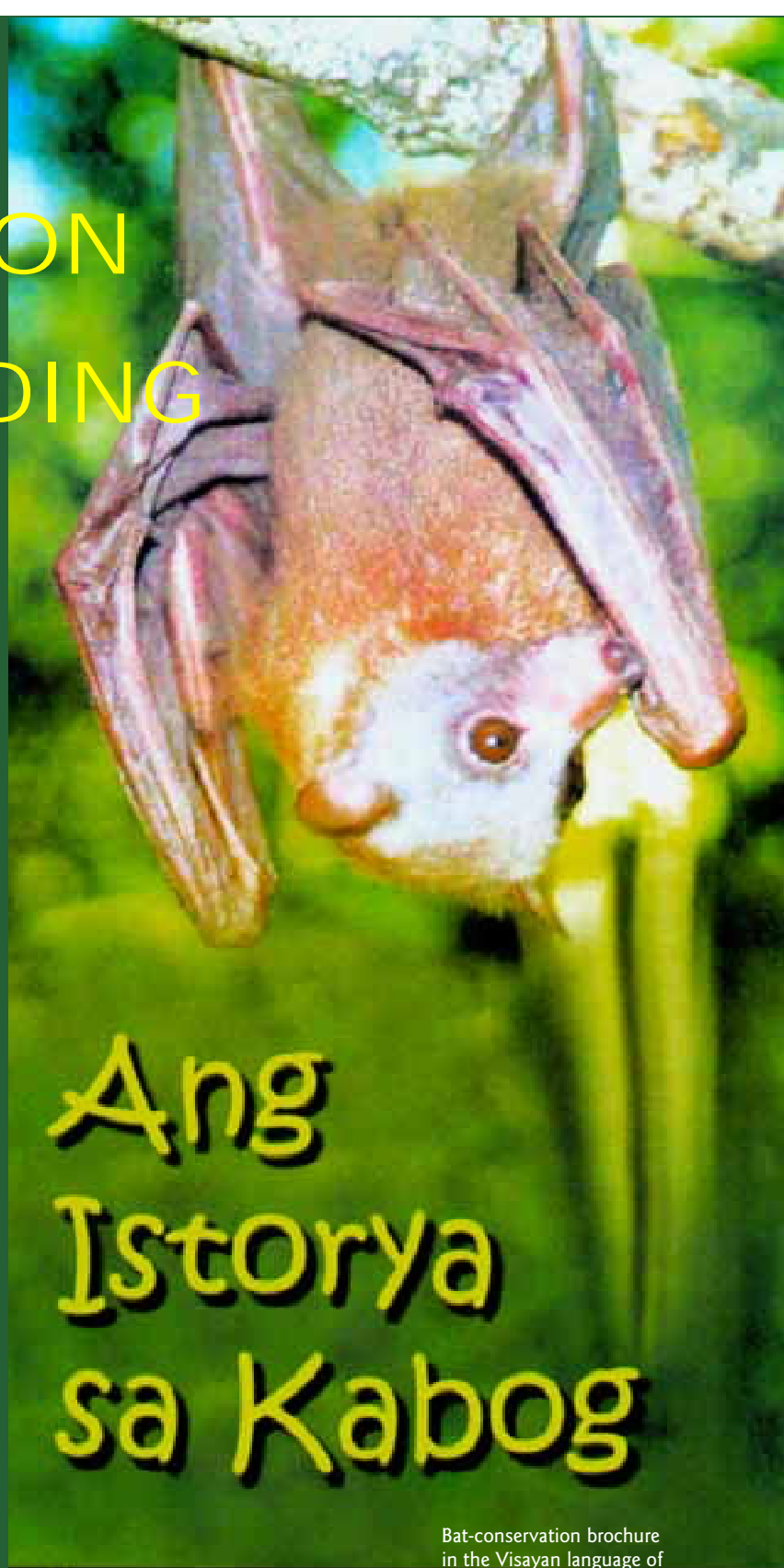
SUPERSTITION UNDERSTANDING

Bat conservation in the Philippines

by Julie Cerqueira

Deep in the *barangays* of the Philippine archipelago, bats are reviled as crop pests and feared as witches and demonic messengers. Many are killed out of fear or hunted to become a delicacy known as bat *adobo*. Farmers insist bats gather at night to eat their coconuts and drink tuba, the native coconut wine collected in bamboo stalks. Filipino folklore warns pregnant women to place palm fronds over their bellies to thwart the *Aswang* – a much-feared evil spirit whose torso detaches from its legs at night and takes flight on bat wings to steal the unborn children of pregnant women. In the Philippines, as in many other parts of the world, generations of superstition and misinformation too often overwhelm any appreciation of bats' great environmental and economic importance. It is little wonder that bats face a precarious future here.

Volume 23, No. 3



Ang Istorya sa Kabog

Bat-conservation brochure
in the Visayan language of
the Philippines.



FALL 2005 7 BATS



The winner of a bat-conservation essay contest (above) reads her report at a high school in the Philippines, while children (right) get their artistic juices flowing during a poster-making contest during a bat-education program.



PHOTOS COURTESY OF JULIE CARREON

The Soil and Water Conservation Foundation (SWCF) in the Philippines, with a BCI Global Grassroots Conservation Fund grant and other support, is going into the *barangays* (the Philippines' smallest governmental units) to replace mythology with facts and soften attitudes toward bats. The well-publicized effort uses an integrated program of biodiversity research and public education, as well as efforts to help Filipinos improve their economic status without damaging the amazing environment of which they are a part.

Until now, biodiversity research in the nation's 7,100 islands has been anemic at best, and little is known about the state of the country's flora and fauna. It is, however, clear that an annual growth rate of more than 2 percent and a population density of 730 people per square mile (282 per square kilometer), a quarter of whom live in poverty, have cost the archipelago more than 90 percent of its original forest cover. The Philippines supports a vast array of wildlife, much of it found nowhere else on Earth. Of 1,084 terrestrial vertebrates, fully 45

percent are unique to the Philippines. And of these, 56 birds, 48 amphibians and 47 mammals are now listed as threatened to some degree.

SWCF's research team surveyed the flora and fauna, particularly bats, of Bohol province, incorporating the results into databases maintained by the Department of Environment and Natural Resources and the Bohol Environment Management Office. The main site, Rajah Sikatuna Protected Landscape in Bohol Province, is home to 29 villages and more than a third of the approximately 70 bat species identified in the Philippines.

The foundation trained local college students and farmers to capture, identify and release bats and

An extensive bat education and conservation program in the Philippines, partially funded by BCI's Global Grassroots Conservation fund, won extensive media attention in two languages.





PHOTOS COURTESY OF JULIE CERQUEIRA

this team documented 26 bat species, seven of which had not previously been reported on the island. They are the Philippine nectar bat (*Eonycteris robusta*), lesser dog-faced fruit bat (*Ptenochirus minor*), arcuate horseshoe bat (*Rhinolophus arcuatus*), Luzon horseshoe bat (*Rhinolophus subrufus*), yellow-faced horseshoe bat (*Rhinolophus virgo*), Philippine pygmy roundleaf bat (*Hipposidemus pygmaeus*), and wrinkle-lipped bat (*Chaerophon plicata*).

The research results were incorporated into a bat-conservation education campaign used throughout Bohol province. We – and bats – also received considerable favorable attention in Philippine newspapers and radio stations. Students and farmers were trained to conduct the sessions using PowerPoint presentations and entertaining activities designed to be more like camp than class. The sessions include BCI's popular video, *The Secret World of Bats*, dubbed in Visayan, the local dialect, with English subtitles (for high school students practicing English). Working with local officials, teams of two or three people visited high schools and villages in 36 municipalities, distributing the video, a poster

and pamphlets, all in the local dialect.

SWCF and a U.S. Peace Corps volunteer, in cooperation with the Department of Education, developed six bat-conservation modules, complete with activities, worksheets and lesson plans, which were distributed to the roughly 100 high schools in the participating municipalities. Teachers were trained to introduce the modules to their schools and prepare other teachers to integrate them into science, English and math classes.

To encourage cross-curricular study of bats without the need for team teaching, the schools are integrating the bat modules in all three subjects in the same time frame, thus reinforcing bat conservation without adding more topics to a curriculum that is already overloaded.

To reach city dwellers who weren't touched by the rural campaign, a team went to the provincial capital of Tagbilaran City to present a week-long exhibit about bats, biodiversity and cave systems. An especially powerful aspect of the program was the opportunity for residents to meet Filipino researchers, a rare opportunity given the lack of local scientists in the Philippines.

Farming families in *barangay* Omjon listen to speakers describe the amazing variety and benefits of the bats that live in Bohol Province forests. The presentations are made by specially trained local students and farmers.

Representatives of the bat-conservation project and the Soil and Water Conservation Foundation visit a farm in Ubay, Bohol, to discuss bats and sustainable agriculture.



Global Grassroots

YOU CAN HELP projects like this one conserve bats and bat habitats around the world through volunteerism, education and research. To support BCI's Global Grassroots Conservation Fund, please contact Director of Development Emily Young at eyoung@batcon.org or 327-9721.



A graduate (above) of a teacher-training program in Bohol trains other teachers to incorporate bat-education into their classrooms. Julie Cerqueira (right) uses a poster made by a program student during an outreach program at *barangay* Cancatac.



The project, funded by BCI and the Foundation for the Philippine Environment, culminated with a biodiversity drama staged at a local shopping mall. The skit, written and performed by students trained as outreach speakers, attracted more than 400 students and shoppers. A measure of its positive impact is that several university students were inspired to do their senior theses on bat ecology and to organize a symposium on bats, biodiversity and caves.

These educational programs proved popular and effective. The now-trained teachers and speakers – and others we hope they will train in turn – will keep

bat conservation alive on Bohol Island for years to come. But in an impoverished region where fresh meat is an expensive luxury and bats, especially large, slow-flying fruit bats, are free for the hunting, more help will be important.

Alternatives that tap the direct economic value of bats are also needed. The Soil and Water Conservation Foundation is testing income-generating projects in selected communities. These include organic vegetable farms, flower nurseries, livestock dispersal, micro-lending and cooperatives built around such environmentally sound income-generating projects as ecotourism, guano collection for

farm fertilizer and the general stores known as *sari-sari* that serve villages far from the marketplace.

By increasing incomes while also educating residents about the vital roles bats play in pest control, seed dispersal and as pollinators of the valuable durian fruit trees, SWCF hopes to nurture a new feeling of stewardship for nature among the people of Bohol.

The project continues, but successes already are occurring. Some communities and schools are developing cave-management policies and *barangay* ordinances to regulate guano mining and encourage ecotourism. Many are conducting their own bat-conservation programs and designing cave-education modules for their own classes.

Perhaps the future for the bats of Bohol is not so gloomy after all.

Julie Cerqueira, of Milford, Massachusetts, is a U.S. Peace Corps Volunteer in the Philippines. With a degree in biology and environmental policy from Worcester Polytechnic Institute of Massachusetts, she began the bat-conservation program and worked extensively with volunteer students.



Students who conduct bat-education programs staged an original skit at a shopping mall in the provincial capital of Tagbilaran City.

The Soil and Water Conservation Foundation, Inc. project was supported by the United Nations Global Environment Facility Small Grant Program, European Commission, Foundation for the Philippine Environment, the U.S. Peace Corps and Bat Conservation International. Special thanks to Reizl Pamaong, Bat Specialist in the SWCF-EC project, and to William and Aida Granert for their contributions to this article.

Ecotourism can be a powerful tool for bat conservation, especially in regions with little history of understanding or concern for bats. Whether it comes from 1.5 million Mexican free-tailed bats (*Tadarida brasiliensis*) swirling out from under a bridge in downtown Austin, Texas, or 20,000 large flying foxes (*Pteropus vampyrus*) rising from tree roosts in the Philippines, few things improve the image of bats more than the direct infusion of cash into a local economy.

Our upcoming book, *Bats of Borneo* (by M. T. Abdullah and Les Hall), describes major bat caves that attract – or could attract – ecotourists to Borneo. Our research for the book took us to Gomantong Cave in the state of Sabah in Malaysian Borneo, home to 600,000 to 2 million wrinkle-lipped bats (*Chaerephon plicata*), whose evening emergence is an awesome spectacle.

We hoped to study the bats from inside the cave and collect information that could offer help in effectively managing and protecting this important colony.

Our caving expedition, however, turned into a greater adventure than we had anticipated. Uncounted centuries of roosting bats provided a functional, if somewhat unsavory, staircase leading to the home of the bats.

Les first saw the fly-out of wrinkle-lipped bats during a BCI Founder's Circle Trip in 1998. The cave is popular with both foreign and local tourists who come to see the bats and the spine-tingling harvest of swiftlet nests – the primary, and highly valued, ingredient for the bird's nest soup that's popular among the Chinese community.

Locals gave us directions to the part of the cave used by bats. They also noted that the area smells rather badly and no one ever goes there. We soon discovered just what they meant.

Gomantong Cave is a large, intricate cavesystem. The bats roost at the rear of a segment known as Simud Hitam (Black) Cave. Part of this segment is occupied by black-nest swiftlets (*Collocalia maxima*), which make their nests mostly out of the birds' saliva.

We emerged from the rain forest at the base of a limestone cliff where the dark entrance to the cave was fronted by a small cluster of timber long-houses

a frightful STAIRWAY to cave bats in Borneo

by M. T. Abdullah
Imelda Vivian Paul
& Les Hall

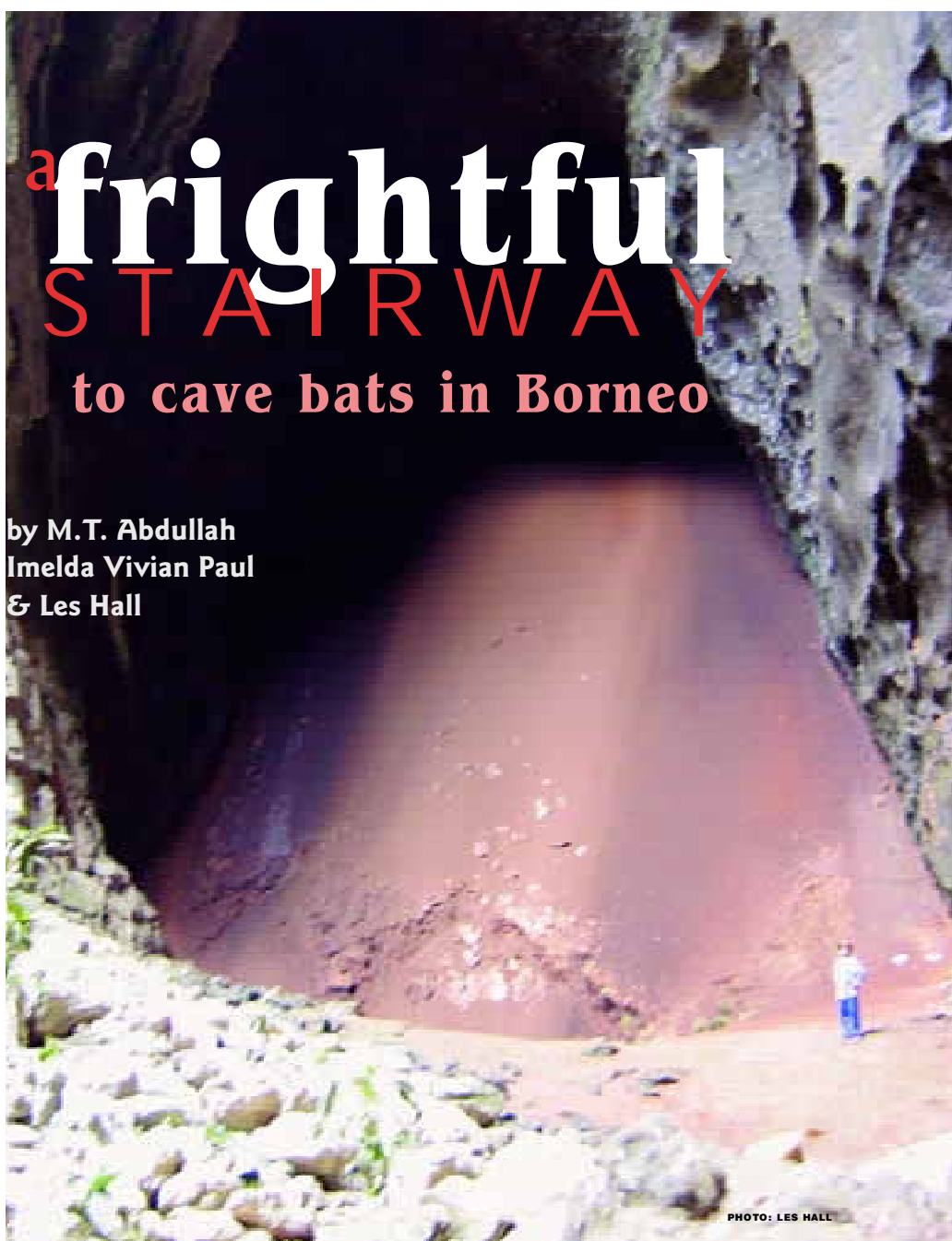


PHOTO: LES HALL

This mountain of guano leads to the cave ceiling, where as many as 2 million wrinkle-lipped bats roost. One of them is shown at right.

used by those who collect the nests. Inside the cave, ladders of twined rotan vine and hardwood rungs hung from the ceiling at dizzying heights. The nest collectors dangled from these ladders like flies in a spider web. Another type of ladder, made from a hardened bamboo pole, pivoted around the cave to reach the highest nests.

Inside the cave, we found ourselves at the base of a steep rock pile left by a collapse in the cave roof. Above the rocks, daylight streamed through a large hole some 200 feet (60 meters) above the floor – the exit through which the wrin-



PHOTO: M. T. ABDULLAH



Black-nest swiftlets (*top*) nest in and around the entrance to the cave used by wrinkle-lipped bats. The birds make their nests mostly out of their own saliva, and the results are highly prized for use in bird's nest soup, which supports a local industry that uses homemade ladders and ropes (*above*) to harvest the nests.

High inside Gomantong Cave, these Creagh's horseshoe bats (*Rhinolophus creaghi*) begin stirring from their roosts.



kle-lipped bats emerge at sundown. After scrambling up and around the rock pile, we had expected to encounter a tall chamber, since wrinkle-lipped bats almost always roost in cracks and on ceilings very high up in large caves. Most roost sites are inaccessible to humans.

What we found instead was both stunning and disconcerting: An enormous, chocolate-brown cone of guano rose more than 100 feet (30 meters) high. Here was a stairway to the wrinkle-lipped bats. The top of the guano mountain was lost in the darkness of the chamber, but we could hear the chattering of bats that seemed to be daring us to climb the pile.

With some trepidation, we stepped off the rocky floor – and immediately sank knee-deep in guano. Then we began trudging upwards as our boots filled with guano. Halfway up, the guano grew softer and our legs sank even deeper. The smell of ammonia was overpowering. Three-quarters of the way up, we were thigh-deep in guano and leaning forward almost on all fours. Our eyes began weeping and our throats burned from the ammonia.

Finally, we made it to the top and stood there on wobbly, aching legs. Still more than 15 feet (5 meters) below the ceiling, we aimed our flashlights into several deep crevices, causing the bats to add substantially to the guano pile. We could see very little in the dark crevices, although the bats' chattering increased markedly as they noted our intrusion.

Then we ventured into a side passage with a ceiling height of about six feet (two meters) – and suddenly we saw bats everywhere. Most were wrinkle-lipped bats ranging from naked newborns to gray-furred older pups and on up to adults. The young and their mothers occupied the deepest pockets in the ceiling, squeezed in tightly with just their heads poking out. Adult males often hung below the females and young on prominent projections from the ceiling. We also saw small clusters of Philippine horseshoe bats



PHOTO: LES HALL

Mother wrinkle-lipped bats and their pups roost together on the ragged ceiling of Gomantong Cave (above).

Philippine long-eared bats (right), many of them obviously pregnant, were also discovered roosting in the cave.

(*Rhinolophus philippinensis*) and fawn roundleaf bats (*Hipposideros cervinus*). Many females of both species were obviously pregnant.

At this height, the cave was extremely hot and humid, just what horseshoe and leaf-nosed bats look for in maternity sites. Perhaps this low-ceiling area also offered a choice microclimate for rearing young wrinkle-lipped bats? That's a question for another day. With sweat rolling off our foreheads and our glasses and cameras fogged, it was time to get out – both because of the extreme conditions and to avoid unnecessarily disturbing the bats.

Descending the pile was easy: We'd take one step and slide another until we reached the bottom. The total time of our journey up and back down the guano mountain probably lasted just 20 minutes, but the experience is guaranteed to remain in our memory forever.

Bat colonies play a vital role in maintaining healthy environments and economies, and many communities are also recognizing their cash value as destina-

tions for tourists. Around the Pacific, bats are becoming valuable tourist attractions, with popular colonies in the Philippines, Thailand, Malaysia, Indonesia and elsewhere.

This conspicuous cash value is generating new interest in protecting bat colonies. Now we need to gather and pool our knowledge to develop effective, long-term management strategies to ensure that the bat colonies remain healthy and continue to provide the spectacular emergences that so enthrall visitors from around the world. The great caves of Borneo require special, continued attention and monitoring to ensure that the bats can also continue to co-exist with the harvesting of bird's nests.

M.T. ABDULLAH is an Associate Professor at the Universiti Malaysia Sarawak and Head of the



Animal Resource Science and Management Program. He studies biodiversity and molecular ecology of bats in Borneo and Malaysia. IMELDA VIVIAN PAUL is a postgraduate student studying bats at the Universiti Malaysia Sarawak. LES HALL, a member of BCI's Scientific Advisory Board, recently retired from the University of Queensland but is still involved in bat research and is a Visiting Fellow at Universiti Malaysia Sarawak.

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The lush, bat-rich forests of Indonesia's Mentawai Islands are being rapidly (and illegally) transformed into barren landscapes.

Besieged Bats of Mentawai

by Scott Heinrichs

The plants and animals of the Mentawai Islands have been evolving in isolation since the Mentawais split away from the big Indonesian island of Sumatra 500,000 years ago. The unique native mammals attract extensive scientific attention. But little of that research has been aimed at bats, and now the forests are disappearing so fast that the islands could lose entire bat species before we even learn they existed – much less try to save them.

Only nine species of bats have been formally reported on the Mentawai Islands, so I was incredulous when my own research quickly found 16 species – one of them previously undescribed.

I came to the islands to assist primatologist Lisa Patculli in her behavioral study of the endangered pig-tailed langur (*Simis concolor*), but I also had the opportunity to survey the region's bat species. My goal was to increase public awareness of the values of bats and the impact they have on these islands.

Located off Sumatra's west coast, the islands of Siberut, Sipora, North Pagai and South Pagai are known as the Mentawai Islands. My research site was on North Pagai, in an area called Betumonga. When I arrived, the site comprised 335 acres (135 hectares) of forest, some of it surrounded by villagers' gardens. Fully half of that lush forest was ille-

gally logged over the next few months.

I wondered if this devastated habitat had driven the bats away or concentrated them in the remaining patches of vegetation. The latter proved to be the case: My survey began even before I had erected my mist nets. I quickly discovered a sheath-tailed bat (*Emballonura monticola*) roosting under my desk, then located an entire roost of sheath-tailed bats with pups in a rocky shelter beside a small stream.

As I began setting mist nets at the study site, the research house and the edge of the forest, I captured and released a number of short-nosed fruit bats of the genus *Cynopterus*. I also caught a Hill long-tongued fruit bat (*Macroglossus sobrinus*) and a fruit bat known as Leschenault's rousette (*Rousettus leschenaulti*), the first of its kind recorded on the islands (photo at right). My nets also revealed several insect-eating bats, including a large leaf-nosed bat of the genus *Hipposideros*, which is probably an undescribed species, and three species of horseshoe bats (genus *Rhinolophus*) – the first recording of any horseshoe bat on Mentawai.

I was joined by an Indonesian graduate student, Mai, from Andalas Uni-

versity in the fall, when durian trees were in full bloom. We sampled the bats attracted to their pale white flowers and were amazed to find six species of fruit bats. We added the dawn bat (*Eonycteris major*) and Geoffroy's rousette fruit bat (*Rousettus amplexicaudatus*) to the list of first recordings from North Pagai Island.

My brief research in North Pagai almost doubled the number of bat species confirmed on the island. Yet many more species likely await discovery and more work is urgently needed to conserve this rich diversity of bats.

SCOTT HEINRICHS, who used a BCI Global Grassroots Grant in 1999-2000 to help curb the over-hunting of fruit bats in Indonesia, founded the Flying Fox Conservation Fund to build a fruit bat research and rescue center on the Indonesian island of Sulawesi.



Sign up for BCI's 2006 Field Workshops



2005 Arizona Acoustic Monitoring Workshop

Looking for an exciting and unique outdoors adventure that will boost your skills in bat research and conservation? Look no farther. BCI is now accepting reservations for our 2006 field workshops for both professionals and serious bat fans. More than 1,200 people from 20 countries have gotten hands-on training at these sessions and gone on to apply what they learned around the world. Join them this summer. Space is limited, so sign up today! (Fees cover all materials, meals and lodging for 6 days and 5 nights, plus transportation from the departure city.)

Arizona Workshops Portal, Arizona

Bat Conservation and Management Workshop

Two sessions: June 12-17 & June 17-22, 2006

A field-identification extravaganza, this workshop in the Chiricahua Mountains features the catch-and-release of up to 18 bat species in a single evening. Veteran workshop leader Janet Tyburec and her team, including biologists from the Arizona Game and Fish Department, will share a wealth of knowledge covering all aspects of species identification (including echolocation calls), bat conservation, management, education, public health, nuisance issues and artificial habitats.

Each session limited to 15 participants
\$1,295 from Tucson, Arizona

Acoustic Monitoring Workshop

One session: June 22-27, 2006

This specialized acoustic-monitoring workshop is taught by echolocation experts Ted Weller, Sybill Amelon and Joe Szewczak. Improve your skills in the use of ultrasonic bat detectors, including Anabat, Pettersson and Sonobat models. This workshop is intended for those who

have completed a Bat Conservation and Management workshop or have previous field experience in bat research. Learn how to design and implement an acoustic survey and determine the best monitoring system for your needs.

Limited to 15 participants
\$1,295 from Tucson, Arizona

Pennsylvania Workshop Barree, Pennsylvania

Bat Conservation and Management Workshop

One session: August 7-12, 2006

Sign up for our popular Pennsylvania workshop and you'll net and trap bats over trout streams and beaver ponds and watch thousands of endangered Indiana myotis swarming at the entrance to a mine where they will later hibernate. Workshop Co-leader Cal Butchkoski of the Pennsylvania Game Commission, with two decades of experience, is a leading expert on surveying and radiotracking Indiana myotis. He is also one of the most successful builders of bat houses and other artificial roosts. Hands-on training includes mist netting and trapping, radiotracking, night-vision observa-

tion, bat house use, acoustic monitoring and habitat assessment.

Limited to 20 participants
\$1,295 from Harrisburg, Pennsylvania.

Kentucky Workshop Mammoth Cave, Kentucky

Bat Conservation and Management Workshop

One session: August 16-21, 2006

This workshop on cave-dwelling bats takes us into the heart of America's karst country at the Cave Research Foundation's Hamilton Valley facility. In the company of experts, you'll visit hibernation and nursery caves of endangered gray and Indiana myotis and learn how to detect bats' prior use of caves and how to identify the habitat conditions they need. Fieldwork includes netting and harp-trapping at cave entrances and at nearby feeding and drinking habitats. You'll get hands-on experience in identifying 10 eastern bat species. You'll visit bat gates with their designers and learn about habitat assessment, field research techniques, bat houses and public health issues.

Limited to 20 participants
\$1,295 from Nashville, Tennessee

For details and to download reservation forms, visit www.batcon.org.

Or contact Kari Gaukler, Bat Conservation International, PO Box 162603, Austin, TX 78716; (512) 327-9721; kgaukler@batcon.org.

Research to save Hawaii's endangered hoary bat

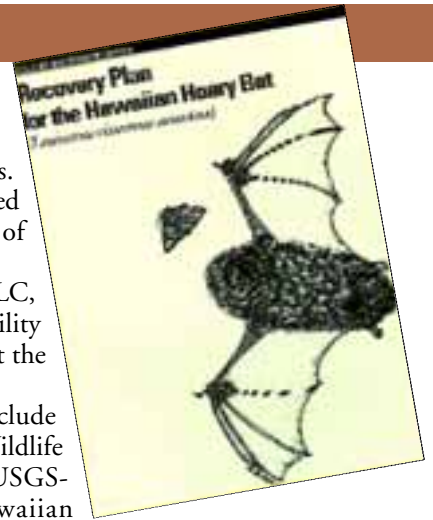
Hawaii's only native terrestrial mammal, the rare and elusive Hawaiian hoary bat (*Lasiurus cinereus semotus*), is endangered throughout its very limited range: the islands of Hawaii, Maui, Oahu, Kauai and Molokai. Known in Hawaii as 'Ope'ape'a, this subspecies of the wide-ranging hoary bat of North America has been scarcely studied. Relatively little is known of its behavior, habitat needs and even its numbers, estimated in the hundreds or low thousands.

The Hawaiian Bat Research Cooperative, which includes BCI, hired bat biologist Frank Bonaccorso to begin studying the Hawaiian hoary bat to

improve conservation and recovery efforts. He and his colleagues have already achieved the first-ever radiotagging and tracking of these bats.

Meanwhile, Kaheawa Wind Power, LLC, which plans a 20-turbine wind-energy facility in Hawaii, has pledged \$20,000 to support the research effort.

Other members of the Cooperative include the state of Hawaii, the U.S. Fish and Wildlife Service, The Nature Conservancy, the USGS-Biological Resources Division, the Hawaiian Forest Industry Association and others.



A 1998 recovery effort

Youngsters discover the fascination of bats



Kids say the darndest things – and with a little effort, they'll say lots of good things about bats.

BCI Education Coordinator Kari Gaukler took Bat Conservation International's message to an estimated 20,000 people who attended the Texas Parks & Wildlife Expo 2005 in Austin. Among them were a lot of youngsters who found themselves fascinated by bats.

After hearing Kari's educational presentation and asking plenty of questions, the children were given the chance to write what they'd learned on colorful bat-shaped posters (examples at left). The spelling wasn't always perfect, but the thoughts were certainly in the right place.

Gladys Barton

1921-2005

Gladys Mae Barton of Austin was over 80 when she joined the BCI family as a volunteer. She died recently at the age of 83, and her enthusiasm will be missed.

A nurse who served for a time in the U.S. Army, she and her husband, Harry, retired to Austin in 1976. She stayed busy contributing to her adopted community in a variety of ways. Bat Conservation International was fortunate to have been among her causes. She helped out with membership services and repeatedly proved herself a very special person.

Gladys is survived by her son and daughter-in-law, John and Dianne Barton, and granddaughter, Helen.

She traveled the world during her life, including a trip last year to Antarctica. Her family cites her favorite quote (from Helen Keller): "Life is either a daring adventure or nothing."

Why is the cave myotis in decline?

The cave myotis (*Myotis velifer*) once was an abundant species throughout the southwestern United States and Mexico, but many hints suggest its numbers have been falling at alarming rates for at least the past two decades. There is, however, too little scientific research to confirm that decline or even to fully understand its habitat requirements.

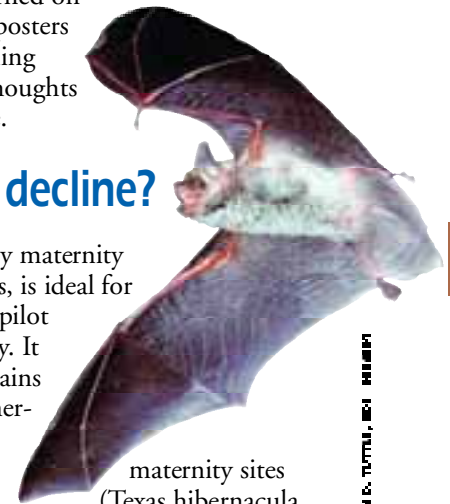
Bat Conservation International hopes to launch a pilot study to confirm the species' status and detail its conservation needs as an essential first step toward a much larger effort that may be the only way to prevent the cave myotis from becoming an endangered species.

Cave myotis rear their young in warm caves and hibernate in cold ones. Central Texas, an area where these bats once were abundant in

many maternity caves, is ideal for this pilot study. It contains numerous

maternity sites (Texas hibernacula mostly are in the Panhandle), yet many of them appear to be abandoned or in serious decline for no readily apparent reason. BCI Cave Resources Specialist Jim Kennedy hopes to investigate a sampling of these caves.

Your support can ensure this vital research will be undertaken and perhaps keep this species from becoming endangered. Please contact BCI Director of Development Emily Young: eyoung@batcon.org.



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BCI's
new
online
look



Sit down at your computer, open your Web browser, type “www.batcon.org” in the address line and enjoy the whole new look and feel of Bat Conservation International’s website.

Information Systems Manager John “Beej” Nunn and IT Assistant Steve Elkins spent more than six months creating the new site to devise a user-friendly and aesthetically pleasing portal that you’ll want to come back to again and again. Almost all pages have been replaced or updated, and the new interface is designed to move you to the exact information you need as quickly and painlessly as possible.

So give it a try. The latest bat-conservation news, upcoming events and information to help you teach a class, build a bat house, protect a bat colony, apply for a scholarship or grant, sign up for a workshop, contribute to BCI and just about anything you need to know about bats and BCI is just a click away.

We welcome your comments on our new site: feedback@batcon.org.

BCI Member Snapshots



BCI member Adrienne Blake of Hanover, Pennsylvania, and her friend Bridgid Brown decided to demonstrate their support for bats and educate friends by going, well, ‘totally batty’ one day not long ago. This is the result.

Share a snapshot of your bat activities with your fellow members: Send it to Robert Locke, Bat Conservation International, PO Box 162603, Austin, TX, 78716.

The **Wish List**

Your help with any of these special needs will directly improve BCI’s ability to protect bats and bat habitats. To contribute or for more information, please contact Emily Young at (512) 327-9721 or eyoung@batcon.org.

Preparing Bat Biologists

Sally Walker, founder of the Zoo Outreach Organization in India, has achieved incredible bat-conservation successes. She played a key role in winning first-ever government protection of some bat species. Working in part with Global Grassroots Conservation Fund grants, she has trained professionals and volunteers in bat research and management, organized workshops and produced websites, newsletters and educational materials. Increasingly, Walker is taking her training programs to other countries on the subcontinent. She has requested a \$5,000 Global Grassroots grant to train bat biologists in Sri Lanka and to teach field-research techniques to college students and professors in Nepal, which has no bat biologists. BCI was able to provide \$3,700 for the 2005 Sri Lanka project. Walker needs the remaining \$1,300 to launch her work in Nepal next year.

Finding Caves for Endangered Bats

Well over 100 Kentucky caves are known locally by names that include the word ‘saltpeter.’ Saltpeter is an essential component of the gunpowder used through the 19th century. It is found in bat guano, which was extensively mined for that purpose, so these caves likely once housed colonies of now-endangered Indiana or gray myotis. As part of recovery efforts for these two species, BCI and its partners are re-surveying these abandoned caves for evidence of past bat use with the goal of restoring bat populations. To complete this work, the Saltpeter Caves Project needs a portable weather meter and infrared thermometer, a digital camera and flash unit and a waterproof case. Total cost: \$895.

Gating for a Critical Colony

The long-abandoned Stonehouse Mine near Blythe, California, was recently found to house the largest known winter colony of California leaf-nosed bats (*Macrotus californicus*) – more than 4,000 of them. The mine, on U.S. Bureau of Land Management property, also shelters a spring colony of 1,800 cave myotis. But the complex mine, with multiple passages and exposed shafts, is considered extremely hazardous. People must – and will be – prevented from entering the mine. To protect this critical colony, as well as human visitors, BLM and the California Department of Conservation hope to partner with BCI to install two bat-friendly gates at \$5,000 each.



Keep the Legacy Growing

Support Bat Conservation International's Student Research Scholarships

ONE HUNDRED EIGHTY-FOUR BCI SCHOLARS have conducted key research in 45 countries since 1990. Many of our Scholars already are becoming leaders in biology and conservation, using their new knowledge and expertise to dramatically enhance bat conservation around the world. The scholarship program helped send 13 more young scientists into 10 countries during 2005. Their work is vital to accomplishing our mission of education, research and the conservation of bats and bat habitats. But we could do so much more. Limited resources force us to reject many excellent applicants with important projects. You can help Bat Conservation International support talented young scientists whose efforts will carry the BCI legacy into the future.



2004-05 Oracle Scholar Scott Cardiff (left) and a local assistant study a cave used by bats in Madagascar.

Oracle Bat Research Scholars

Oracle Corporation's steadfast support funded these BCI scholarships in 2005:

- Scott Cardiff**
Columbia University (Madagascar)
- Radek Lucan**
University of South Bohemia (Czech Republic)
- May Myo Nyunt**
Mandalay University (Myanmar)
- Andrea Dekrout**
University of Auckland (New Zealand)

- Lisa Winhold**
Eastern Michigan University (United States)
- Sandra Peters**
University of Toronto (Brazil)
- Adriano Bravo**
Louisiana State University (Peru)
- Tore Michaelsen**
University of Bergen (Norway)
- Miguel Munguia-Rosas**
Instituto de Ecología (Mexico)

For more information, please contact
Director of Development Emily Young at
512-327-9721 or eyoung@batcon.org.

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**TOMMY ANGELL • T.W. AMMERMAN
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