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Rejuvenating Pacific Forests
Peru counts on the fraternal fruit bat
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In Peru's Cerros de Amotape National Park, where surviving remnants of the Pacific Tropical Forest meet the equatorial dry forest, the fraternal fruit bat is the critical player in rejuvenating these fragile and degraded ecosystems. Our research, apparently the first study of seed dispersal and forest regeneration on the western side of the Andes, confirms that this bat, Artibeus fraterculus, is the principal seed-disperser in both disturbed and intact forests. Moreover, the seeds they scatter exhibit an unusually high germination rate and most are of pioneer species that are critical components of natural reforestation. Some of these bat-supported plants, meanwhile, are an important part of the diet of at least two endangered species. This is an exceptionally valuable bat to have around.

The partially protected forest in the Tumbes region of far northwestern Peru, part of a recently designated Biodiversity Hot Spot, is critically important. The Pacific Tropical Forest has shrunk dramatically over the decades, especially in Ecuador, and many once-common plant species are now extinct. It remains under threat from illegal timber harvests, livestock grazing and expanding human settlement.

With a Bat Conservation International Student Research Scholarship, funded by the U.S. Forest Service International Programs, my colleagues Sidney Nova, John Chavez and I set out to document the ecological importance of the fraternal fruit bat to this Neotropical forest.

The smallest of 18 species of the Artibeus genus of Neotropical fruit bats, A. fraterculus ranges from western Ecuador southward to northwestern and central Peru. Its population is believed to be declining.

We selected six locations ranging in elevation from 200 to 2,600 feet (60-800 meters), including humid tropical forests, equatorial dry forests and transition zones between the two. We set 10 to 15 mist nets in each zone at both disturbed and intact sites and captured bats for six nights at each site, keeping them in bags until they defecated. Then we recorded morphological measurements and released the bats.

We recorded 29 bat species, including four that had not previously been identified in Peru west of the Andes. These include the fisherman bat (Noctilio leporinus), Linneaus' false vampire bat (Vampyrum spectrum), riparian myotis (Myotis riparius), and white-winged vampire bat (Diaemus youngi).

By far the most abundant species we captured was the fraternal fruit bat, which accounted for 190 of 491 bats captured during our 2006 field season. This was followed by Pallas' long-tongued nectar bat (Glossophaga soricina) with 75 captures; this species' seed-dispersing role requires additional study.

The fraternal fruit bat was the dominant seed-disperser in all the locations we surveyed. This versatile bat is found in significant numbers in the dry forest, the Tropical Forest of

the Pacific and in transition zones, and in landscapes with and without human alterations.

We dissected the feces samples collected from captured bats, including 48 samples from fraternal fruit bats, to establish preliminary indications of diet. Excluding insect remains, we removed, counted and classified 250 seeds and plant remnants â€“ 122 of them from A. fraterculus. We compared the seeds to specimens at San Marcos University's Museum of Natural History and at La Molina University, identifying 22 species, including 15 from the fraternal fruit bat. The dietary diversity was far higher for the fraternal fruit bat than for any other bat species.

It should be noted that seeds were recovered from only 6 of the 15 surveyed localities, all of them disturbed landscapes in transitional zones. Additional research is needed. Nonetheless, the most common species linked to this bat is the shrubby chin chin (Acnistus arborÂ-escens) at 25 percent, followed by the Cetico tree (Cecropia polystachya) at 20 percent and the fig (Ficus eximia) at 15 percent.

We tested the germination of some seeds, maintaining them in laboratory dishes, to determine whether they are affected by passing through the bats' digestive system. (We are collecting more material for this research, since very little is known about the seeds of some of these species.) We recorded very high germination rates of Acnistus arborescens (81 percent) and Cecropia polystachya (49 percent), while seeds of the Ficus genus barely reach 25 percent germination.

The fraternal fruit bat's importance in maintaining and regenerating these battered forests is clear from our study. It is the dominant species in all ecological zones we studied, whether intact or disturbed, and it consumes a wide variety of plants. Moreover, the most common seeds it dispersed are of confirmed or likely pioneer species with a crucial role in restoring cleared forestland.

This bat seems to be a keystone species on which many other plants and animals rely. For example, plants grown from seeds it disperses are part of the diet of the Mantled howler monkey and white-tailed deer, both listed as endangered in South America.

Given the continuing threats to Peru's western coastal ecosystems, especially the much-diminished Pacific Tropical Forest, the fraternal fruit bat is a vital part of our hopes for restoring and protecting these forests into the future.

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RICHARD CADENILLAS is a biologist at the Museum of Natural History in San Marcos and the University of Peru. BCI's scholarship program allows promising young scientists like Cadenillas to conduct important bat-conservation research around the world. Please help us continue this very important program. Donate online at: www.batcon.org/donate.