

## Preliminary Assessment of the Impact of Hurricane Hugo to Columbids Populations in Puerto Rico and Offshore Satellite Islands

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Biologists of the Puerto Rico Department of Natural Resources conducted standardized roadside counts to evaluate the immediate effect of Hurricane Hugo on columbid populations in Puerto Rico. Counts were conducted in eight five-mile principal sampling units (=replicates) that covered the following municipalities: Aibonito, Arecibo, Barceloneta, Barranquitas, Cayey, Guayama, and Luquillo. Sampling units were divided according to life zone (wet versus moist) and estimated impact to vegetation (low versus high). Post-hurricane counts (October 1989) were compared to pre-hurricane counts (October 1986 and 1987) with the use of three-way analysis of variance with repeated measurements at one factor (years). Total counts of columbids were pooled and log-transformed ( $\log + 0.5$ ) prior to the analysis. *P*-values were considered significant at  $\leq 0.05$ .

As expected for this time of the year, counts of columbids were significantly higher in the moist zone ( $F = 46.629$ ;  $df = 1,4$ ;  $P = 0.002$ ); but, counts in the moist zone were significantly higher for replicates showing low impact to the vegetation ( $F = 19.020$ ;  $df = 1,4$ ;  $P = 0.012$ ). When counts were pooled ( $n = 8$ ), there were no significant differences among years ( $F = 2.627$ ;  $df = 2,8$ ;  $P = 0.133$ ). That is, counts of October 1989 on average were not significantly different from counts of October 1986 (paired *t*-test,  $P = 0.793$ ) and October 1987 (paired *t*-test,  $P = 0.107$ ).

Post-hurricane counts could have been positively biased because of an increase in visibility along sampling units, and/or because of significant changes in the flocking behavior of columbids related to the availability of food at areas of low impact. Therefore, it is necessary to be cautious about the results obtained from counts unadjusted for effective area of detection (Rivera-Milán, in prep.). Assessment of the impact of Hurricane Hugo to columbid populations requires further intensive observations of nesting activity and success during the following season (February-July 1990).

Columbid populations in Vieques and Culebra islands were severely impacted by Hurricane Hugo. In Culebra Island, for example, scaly-naped pigeons (*Columba squamosa*) were detected forming foraging aggregations on the ground at patches of defoliated

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*Coccoloba wifera*. We also observed flocks of scaly-naped pigeons flying high from Culebra in the direction of eastern Puerto Rico. Food is expected to be a significant limiting factor during the next months at Culebra and Vieques islands. Columbid populations will be sampled during next season within nesting habitat to determine how the reproductive renewability of the resource has been affected.

Banding studies of zenaids (*Zenaida aurita*) will be continued at Culebra's offshore keys. In July and August 1989, 237 zenaids were banded at Culebra's Cayo del Agua. Surprisingly, the age (adult vs. juvenile) ratio was close to one (0.975). Our future studies will address survival of adults versus juveniles after the hurricane.

It will be of invaluable benefit if investigators exchange information about studies of the effects of hurricanes on the flora and fauna of the Caribbean islands. Therefore, I propose the creation of an accessible bank of information regarding the results of studies about the effects of hurricanes to the flora and fauna of the Caribbean. For example, as a starting point, abstracts can be presented as posters at the next meeting of the Society of Caribbean Ornithology at Jamaica in 1990.

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### Request for Information from the Society's Subcommittee on Columbid Game and Non-game Species

Submitted by Frank F. Rivera Milán

Project W-11 of the Department of Natural Resources of Puerto Rico, Terrestrial Ecology Section, is compiling information about hunting regulations of pigeons and doves in the Greater and Lesser Antilles. The purpose of this task is to present the information (probably as a poster) during the next annual meeting of the Society of Caribbean Ornithology at Jamaica (1990) as part of the achievements of the recently formed Columbid Game and Non-game Species Subcommittee of the Society. Please send such information to:

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## Survey Reflects Worldwide Concern for the Environment

On June 20, 1989, Lou Harris of Lou Harris and Associates reported on the first worldwide survey of public opinion and leadership attitudes on the environment at a briefing sponsored by the Energy and Environment Study Committee and Americans for the Environment. The survey, conducted for the United Nations Environment Programme (UNEP), clearly shows that people are alarmed at the state of their environment. Although not yet fully complete, the survey is already the most comprehensive global environmental opinion survey to date.

The study, "The Rising Tide: Public Opinion, Policy and Politics," notes that industrially developed countries and developing countries are equally concerned over the present and future state of their environment. Most people surveyed are pessimistic about future progress, but feel the negative trend could be reversed if environmental protection were to become a national and an international priority. Harris predicted that governments will fall simply because they fail to control environmental degradation. He concluded that next to war and peace, the environment may be the most important global issue that we face today.

For more information, contact Joan Martin-Brown at UNEP, 1889 F St., N.W., Washington, D.C. 20006, U.S.A. (202-289-8456). A copy of the report may be obtained by sending U.S.\$5.00 to Americans for the Environment, 1400 Sixteenth St., N.W., Washington, D.C. 20036, U.S.A.

From The Ecological Society of America Newsletter No. 11, September 5, 1989. Submitted by Fred Schaffner.

## Book Review

**Ay-Ay: an Island Almanac**, by George A. Seaman. Macmillan Publ., Ltd., London, November 1989. U.S.\$8.00, paper.

Hurricane Hugo and the tiny Caribbean island of St. Croix will forevermore be linked together. The U.S. island of St. Croix took a direct hit from that September 1989 storm, which may go down in the history of hurricanes as being the fiercest on record. Seemingly rising out of that disaster comes a wonderful 155-page book - *Ay-Ay: an Island Almanac* - that describes in a beautiful style the natural character of that tiny speck of land in the vast

## Book Review (Continued)

Atlantic/Caribbean ocean. Author George Seaman, a St. Croix native, paints a word picture of St. Croix the way it was before Hugo, from a perspective of one who explored and understands that island's every nook and cranny. "Within her borders," he writes, "dwelt all the beauty and magic a man could wish for ...."

Rarely does a book appeal to me as does Seaman's *Ay-Ay*. It has the same character as Aldo Leopold's *Sand County Almanac*, Louis Halle's *Spring in Washington*, and Sally Carrighar's *Wild Heritage*. All are chuck-full of information, but written in a style that makes them special. These books must be part of one's personal library, so that favorite sections can be read time and again.

*Ay-Ay* is more than a word picture of a Caribbean island. It contains a treasurehouse of morsels that is a must read for anyone who loves nature and its infinite diversity. *Ay-Ay* blends the tropical Caribbean climate with the great whales and the tiny bananaquit, the African tulip tree and the kalaloo crab, the spring arrival of zenaida doves and fall arrival of shorebirds, and the native trees Cruzans use at Christmastime. Its 12 chapters describe the fascinating changes that occur during the 12 months of the year.

Seaman describes January as the end of a "great pivotal journey." He writes that, "the entire earth and the heavens are making tentative and quivering resolutions against the new galactic voyage ahead. It is the celestial cycle's primordial moment. It is the Alpha of the planet's roster of exquisitely precise decisions. It is our home's bugle call to march. It is the zero hour for a diminutive, insular press to roll out its bulletin. It is January."

February is described as the driest month, the "month of purification...of the earth by the winds and the sun." Seaman points out, "There are many 'firsts' in this month - previews and songs of glories. A hesitant and isolated John Phillip (black-whiskered vireo) reaches the careful ear, hardly to be credited as the song which will dominate the woods and hills of July. A shining white cap of a hurtling blue javelin announces the vanguard of the white-crowned pigeon legions which will later seek our mangrove swamps in which to breed. And weirdest and most beautiful of all, that onomatopoeic first call of the chuck-will's-widow out of the evening's depth."

In April, Seaman describes the spring migration of zenaida doves. "In apparent endless numbers, pairs and groups come in from the west. This vernal migration of our 'mountain dove' does not, of course, always coincide with the celebration of Easter, but since it occurs annually after the vernal