and BCI; relatively few have been done at Cocha Cashu and MCSE.

Reflecting the relatively rudimentary knowledge about the life histories and ecology of most species of plants and vertebrates at each site, most chapters focus on estimates of species richness, relative abundances, trophic structure, and biogeographic affinities of particular taxa. Much of this information is summarized in a large number of tables, figures, and appendixes representing about one-third of the book. It tells us that the three rich-soil sites are much more similar to each other floristically and in the structure of their vertebrate faunas than they are to the MCSE site; that biogeography and phylogeny have strongly influenced diversity patterns; and that high amphibian diversity is not necessarily correlated with high annual rainfall. Studies of bird populations indicate that densities are higher and home ranges or territories smaller in forest near BCI than at Cocha Cashu. Bird communities at La Selva receive substantial annual influxes of migrant frugivores and nectarivores. The high diversity and abundance of mammals at Cocha Cashu, compared with La Selva and MCSE, appear to be related to high plant productivity (fruits and seeds), high habitat diversity, and the absence of hunting. Janson and Emmons support Terborgh, who has argued that the intact predator fauna at Cocha Cashu has profoundly influenced populations of medium-sized seed-eating mammals and the plants whose seeds they eat.

Studies of the forest dynamics at these sites are in their infancy. Such studies are being conducted on plots ranging in size from 0.9 hectare (Cocha Cashu) to 50 hectares (BCI) covering time spans of less than 20 years. Trees with a DBH (diameter at breast height) of 10 centimeters or more have mortality rates of 1 to 2 percent per year, and annual gap formation averages about 1 percent of the forest area. Stand turnover times, defined by Hartshorn as the time needed for gaps to cover a unit area of forest (1 hectare, for example), at La Selva and BCI range from 62 to 137 years, depending on study plot. Foster estimates that much of the forest around Cocha Cashu is less than 200 years old owing to the profound influence of the meandering Rio Manu.

This book represents a milestone in our knowledge about the structure and function of New World tropical forests. Though it contains an impressive amount of information about what we do know about certain aspects of these forests, it is perhaps more valuable for highlighting what we do not know about them. We know little about the long-term population dynamics of most species of tropical plants and animals. Studies summarized in this book pay little attention to plant-animal interactions, perhaps the topic of greatest interest in tropical biology today, as it was for the 19th-century tropical explorers such as Belt. Insects have been totally neglected, as the editor acknowledges. When written, books on these and other tropical topics will fill libraries. Clearly there is enough ecological and evolutionary work to be done in tropical forests to keep Janzen's "armies" busy for the foreseeable future. Given the uncertainty of funding for tropical research, however, much of this work will be done in piecemeal fashion instead of being coordinated and directed toward answering large questions requiring long-term studies. Owing to the shrinking nature of the tropical "ocean," much of this research will be conducted at the four "ponds" described in this book.

THEODORE H. FLEMING
Department of Biology,
University of Miami,
Coral Gables, FL 33124

"Subsidence of an organic soil (in this case a Saprist) has lowered the ground surface around the pilings and around the septic tank of this house at the Everglades Research and Education Center, Belle Glade (Gold Coast-Florida Bay physiographic district). The ground surface originally was just below the floor of the house." [From Brown *et al.*'s chapter in *Ecosystems of Florida*; photo by R. B. Brown]

The Sunshine State

Ecosystems of Florida. RONALD L. MYERS and JOHN J. EWEL, Eds. University of Central Florida Press, Orlando, FL, 1990. xviii, 765 pp., illus. $75; paper, $29.95.

The Rivers of Florida. ROBERT J. LIVINGSTON, Ed. Springer-Verlag, New York, 1990. xii, 289 pp., illus. $59. Ecological Studies, vol. 83. From a conference, Tallahassee, FL, June 1987.

When I was a child, I looked forward to our annual spring family vacation in Florida. As a budding naturalist, I was fascinated by the swamps near Windermere—cypress trees festooned with Spanish moss, wintering parula warblers, anhingas, and the occasional alligator. Now the swamps are gone, the lakeshores dotted with boathouses, and the wildlife scarce. What was a natural wonderland has been replaced by suburbia, Disney World, and an interstate highway.

A peninsula extending into the tropics, with a rich geological history of wetland, Florida is one of the most diverse landscapes of the United States. Within a few kilometers, one may pass from xeric sand pine (*Pinus clausa*) woodland with frequent fire to dense cypress forest in permanent floodwater. Unfortunately, most of that landscape has been abused, environmental planning forgotten as the state has tried to accommodate one of the fastest rates of population growth in the United States. In *Ecosystems of Florida*, Ronald Myers and Jack Ewel capture what is known of the extent, composition, and function of the diversity of Florida's natural ecosystems. First gathered at a conference at the Archbold Biological Station in 1986, 31 authors have contributed 18 chapters covering the major habitats of the state. The result is a masterful blend of science and natural history that will capture the interest of the academic ecologist, the land planner, and the educated weekend naturalist. The book could also serve admirably in undergraduate classes in plant ecology and regional biogeography.

Introductory chapters on climate, soils, and geologic history are followed by three major sections that contain chapters on upland forests, wetlands, and coastal ecosystems. Pine "flatwoods," cypress domes, and other specialized features of regional plant ecology are given special attention. Movements of water and soil nutrients and occurrence of fire are shown to control the juxtaposition of plant communities on the landscape and to maintain the functional linkage of ecosystems. Most chapters describe the extent and history of human perturbation—first for citrus and later for urbanization. In Florida, human mastery of the land is paramount. In Palm Beach County, 81 percent of the shoreline is now developed.

The Rivers of Florida (whose editor is also a contributor to *Ecosystems*) focuses on the conduits that form the hydrologic network of the state and link its ecosystems. Several introductory chapters provide background on the origin and function of stream ecosystems in Florida and their accompanying floodplain forests and fishes. Seven chapters then cover the major drainage basins of the state. In one of these, James Kushlan provides an especially concise overview of the

"Lake Istokpoga, Florida's fifth-largest lake, covers 11 km^2 in Highlands County." [From Brenner *et al.*'s chapter in *Ecosystems of Florida*; photo by J. N. Layne]

water management problems of the Everglades. There are few other cases in the United States where the diversion of surface water for human use has been so complete and the consequences so devastating to nature.

None too soon, these books are a record of the natural history that once was Florida and the loss of that heritage wrought by the wholesale management of the landscape for human use. Both offer provocative indications of how continued poor management could ultimately lower the habitability of Florida for humans. The challenge is formidable. In *Ecosystems of Florida*, Myers and Ewel leave us with a sobering thought: "Take, for example, 1500 acres of farm or forest, divide it into 300 lots, dig 300 wells, plant one septic tank on each plot, and add a home for three people. You will have accommodated just one day's worth of immigrants to Florida."

WILLIAM H. SCHLESINGER
Departments of Botany and Geology, Duke University, Durham, NC 27706

Work at Oxford

Elton's Ecologists. A History of the Bureau of Animal Population. PETER CROWCROFT. University of Chicago Press, Chicago, IL, 1991. xx, 177 pp., illus. $35; paper, $14.95.

Elton's ecologists are the 85 people who worked in the Bureau of Animal Population at Oxford University from 1932 to 1967. The Bureau was a small research institute founded in 1932 by Charles Elton, the father of animal ecology. This book is an informal history of the Bureau during the critical period when ecology was in its infancy.

The Bureau was a recipe of small and beautiful science: take half a dozen good scientists, focus them on a small array of related problems, provide them with superb technical support, a good library, and tea, and top it off with a boss who is brilliant yet humble and given to asking questions rather than stating dogma.

In 1932 the Bureau began with one office, a cellar for keeping voles, and an old shed for a laboratory. Its main aim was to understand the reasons behind the fluctuations in numbers of wild animals and to develop methods of forecasting periods of abundance and scarcity. The species of interest were voles, mice, lemmings, squirrels, muskrats, beaver, lynx, and snowshoe hares. The new *Journal of Animal Ecology* began in the same year as the Bureau, with Elton as its first editor.

The early years were for Elton a mixture of science and fund-raising. The university provided moral support and space but little money. Gradually university and government funding was provided, but Elton still had to raise half of the operating funds. These years were clearly an exciting time. Crowcroft documents in a most readable manner the early work of George Leslie on life tables, Dennis Chitty on vole populations, Doug Middleton on squirrels and partridges, and Mick Southern on rabbits.

When the war began in 1939 Elton volunteered the Bureau's resources to investigate the loss of foodstuffs to vertebrate pests. The staff doubled, and research centered on the brown rat, the black rat, and the house mouse. The results were practical ecology at its best and resulted in the introduction of novel ideas into British rodent control. This work is well summarized in the three-volume *Control of Rats and Mice* (1954).

After the war Elton's interests returned to the study of animal communities. While vertebrate population dynamics remained a strong focus under the guidance of Chitty and Southern, invertebrates became the focus of more of the graduate students. Elton developed the Wytham Biological Survey at this time, which culminated in the publication of *The Pattern of Animal Communities* in 1966.

As Elton neared retirement in 1967, the future of the Bureau came under increasing doubt. The head of the department was a molecular biologist whose ignorance of ecology was exceeded only by his contempt for the subject. This mental "disease" alas has spread to other zoology departments around the world. The Bureau was closed upon Elton's retirement in 1967.

Crowcroft has done an excellent job of providing an informal history of the Bureau of Animal Population and the central role that Charles Elton played in its intellectual life. Elton's vision of ecology lives on in intellectual lineages that compensate for the sadness associated with the demise of the Bureau at the hands of lesser men. We should remember the magic of the Bureau and when possible try to emulate its success.

CHARLES J. KREBS
Ecology Group, Department of Zoology, University of British Columbia, Vancouver, BC V6T 1Z4 Canada

"David Eccles collecting emerging aquatic insects from a Wytham stream. 1956." [From *Elton's Ecologists*; photograph by Denys Kempson, courtesy of Charles Elton]

"Dennis Chitty taking some fresh air while baiting rats in sewers. The King's Arms tavern nearby has caught his attention." [From *Elton's Ecologists*; courtesy of Charles Elton]