THE FLORIDA ENDANGERED INSECT PROGRAM¹,²

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Florida is endowed with one of the most abundant and varied assemblages of plant and animal life to be found anywhere on earth. The preservation of this rich natural heritage is of vital importance not only to Floridians but to the entire nation and world as a whole.

Protection of native wildlife is not merely a luxury that affluent societies can afford to indulge in at their convenience but an absolute necessity, for human survival ultimately depends upon the proper functioning of natural ecosystems comprised of complex interacting networks of plant and animal species. If too many of the links in these life support systems are damaged or destroyed, they will cease to function properly. This inescapable dependence of human populations, regardless of their level of technological sophistication, on healthy natural ecosystems is now being forcefully driven home to Floridians in many ways. For example, as more and more communities face critical water shortages, the need to preserve natural wetland ecosystems for their value in water storage and recharge has emerged as one of the most critical areas of state concern.

Besides their basic role as working members of ecosystems, our native plants and animals are important to us in a variety of other ways. Many species are commercial sources of food or other products or provide important recreational benefits, which in aggregate represent a value of millions of dollars to the economy of the state. Of greater importance still is the aesthetic value of our native biota. The quality of human life is greatly enriched by natural beauty, and Florida’s spectacular natural landscapes and wildlife are among its most compelling attractions to visitors and residents alike.

As a result of past geological events, moderate climate, and partial isolation of the peninsula from the main North American land mass, the Floridian biota contain numerous endemic or relict species and races and forms possessing unusual adaptations for specialized environments. A number of plants and animals now entirely or nearly restricted to the state show relationships to remotely separated forms in the southwestern United States, Mexico, and Central or South America, raising some intriguing questions about how these unusual distribution patterns came into being. Florida is thus a treasure house of unique plant and animal forms which make it a vast natural laboratory for the study of many fundamental problems of ecology, evolution, and biogeography.

Beyond various practical arguments for the preservation of wildlife lies the question of moral responsibility. Man, as the only biological species that has acquired the ability to alter earth environments on a massive scale, now enjoys dominion over all other species. Such awesome power should carry with it the moral obligation of using it wisely and with the least possible detriment to other life forms.

¹Presidential Address, 59th Annual Meeting of The Florida Entomological Society.
²XV International Congress of Entomology (Invitational paper).
As a result of the ever-increasing tempo of degradation and destruction of the natural environments of Florida, more and more of our valuable wildlife species are being threatened. Some of the most distinctive members of the original flora and fauna found by the early explorers, such as the Florida red wolf (Canis rufus floridanus Miller) and Carolina parakeet (Conuropsis carolinensis (Linnaeus)), already have become extinct. Others, such as the Florida panther (Felis concolor coryi Bangs), Florida everglades kite (Rostrhamus sociabilis plumbeus Ridgway), and such arthropods as Schaus' swallowtail butterfly (Papilio aristodemus ponceanus Schaus), Houghtown Creek dragonfly (Cordulegaster sayi Selys), and the dusky-banded tailless whipscorpion (Hemiphrasmus raptator Pocock), are in immediate danger of being lost, and many other native plants and animals are becoming increasingly rare and may soon enter the endangered category if present trends are not halted. In addition, numerous other species or subspecies with limited distribution of restricted habitats in the state probably are threatened, but not enough is known about them to be sure of their exact status.

In recognition of the importance of Florida's native plants and animals and the increasing threats to the existence of many forms, the Florida Committee on Rare and Endangered Plants and Animals was established in 1973 under the leadership of Dr. James N. Layne, Director of Research at the Archbold Biological Station. It was sponsored by the Florida Audubon Society and the Florida Defenders of the Environment. Florida's Governor Reuben Askew and the Assistant Secretary of the U.S. Department of Interior, Nathaniel P. Reed, served as Honorary Co-Chairmen of the Committee, which was composed mainly of Florida scientists representing many of the state's universities, private research and educational organizations, and state and federal agencies.

Organization

Subsequently the Florida Legislature designated to the Florida Game and Fresh Water Fish Commission the legal responsibility on behalf of the state government to pursue essentially the same objective as those that had been adopted by the independent committee already functioning. Since this committee encompassed many of the people within Florida with the greatest expertise on the subject and who already had made substantial progress toward assembling the basic data needed, the people comprising the Coordinating Committee of the Florida Committee on Rare and Endangered Plants and Animals were asked to serve as an official (but unpaid) Technical Advisory Committee on Endangered Species for the Florida Game and Fresh Water Fish Commission. This Technical Advisory Committee is a standing committee with its personnel reappointed annually. It has a continuing responsibility to gather and refine data, to attempt to monitor fluctuating populations of species of special concern, and to continue to serve as an advisory body to the Florida Game and Fresh Water Fish Commission.

The Technical Advisory Committee consists of the chairpersons of the special committees and as many additional members as are necessary to carry out the responsibility for over-all planning and direction of the project and to function as the editorial board in preparation of an inven-
tory for publication. Special Committees handle specific aspects of the data-gathering process. Most of them comprise specialists of particular groups of plants and animals. Nonmembers of the Technical Advisory Committee or Special Committees or agencies and organizations participating in the program are designated Cooperators.

**OBJECTIVES**

The primary objectives of the Committee are to 1) prepare a comprehensive inventory of rare and endangered plants and animals in Florida, 2) make recommendations and guidelines to aid in preserving threatened populations, 3) encourage further research on rare and endangered forms in the state in order to provide data that will help to devise strategies to aid their survival, 4) promote greater public understanding of the special significance of rare and endangered plants and animals as well as the values and importance of all wildlife, and 5) develop an annotated list of endangered habitats in Florida, with ratings of the urgency for action to be taken for their preservation.

The inventory of rare and endangered forms includes both inconspicuous and little known native plants and animals as well as the more spectacular and familiar wildlife species. It attempts to bring together all available information on the population status of these forms together with relevant data on their distribution, ecology, and life history in the state. The report also seeks to identify those regions and habitats in the state that are of critical importance for protection of rare and endangered forms as an aid to various governmental agencies and other organizations concerned with land use planning and preservation of natural resources.

**TAXONOMIC COVERAGE**

The inventory includes species, subspecies, and local populations of particular scientific, aesthetic, or environmental significance. All major groups of plants and invertebrate and vertebrate animals are covered, with the realization that the data for some groups such as insects or marine invertebrates will be far less complete than for those such as birds or mammals.

I have served, and continue to serve, as the Chairman of the Special Committee on Insects and Other Arthropods, excluding Marine and Fresh Water Crustacea. The scope of this committee also includes terrestrial molluscs, such as tree snails.

**STATUS CATEGORIES**

Florida as an island: For the purposes of the Florida list, the status of taxa with ranges extending outside the state is evaluated on the basis of the Florida population. Thus a taxon which might be abundant elsewhere but whose existence in Florida is threatened will appear on the list under the category which best reflects its status in Florida. The categories used to designate the status of forms included in the Inventory of Rare and Endangered Plants and Animals of Florida are as follows:

*Endangered.* Taxa in imminent danger of extinction or extirpation and whose survival is unlikely if the causal factors presently at work continue
operating. These forms are those whose numbers have been reduced to such a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their loss.

Threatened. (Vulnerable in the International Union for the Conservation of Nature and Natural Resources (IUCN) list). Taxa believed likely to move into the endangered category in the near future if the causal factors now at work continue operating. Included are taxa in which most or all populations are decreasing because of over-exploitation, massive depletion of habitat, or other environmental disturbance; taxa whose populations have been heavily depleted by adverse factors and the ultimate security of which is not yet assured; and taxa with populations which may still be abundant but are under threat from serious adverse factors throughout their range in the state.

Rare. Taxa with small populations in the state which, though not presently endangered or threatened as defined above, are potentially at risk. Included are those localized within a restricted geographical region or habitat or thinly scattered over a more extensive range. They may be insular or otherwise isolated forms or relicts with wide distribution. They also may be seldom-recorded forms which may be more common than supposed, although there is reasonably good evidence that their numbers are low.

Species of Special Concern. A species that does not clearly fit into the Endangered, Threatened, or Rare categories yet which, for certain reasons, warrants special attention. A good example is the American alligator (Alligator mississippiensis (Daudin)). This species, under recent protection, has increased in suitable habitats and can no longer be objectively regarded as endangered, threatened, or rare. Relaxation of protection of this species, however, in any way that would directly or indirectly stimulate commercial traffic in crocodilian hides of any species in any part of the world would be potentially detrimental to those species of crocodilians whose status is presently critical. The American crocodile (Crocodylus acutus Cuvier) already is a truly endangered species.

Status Undetermined. Taxa that are suspected of falling into one of the preceding categories but for which the available data are insufficient to provide the basis for a decision.

Recently Extinct. Species or subspecies that have disappeared from the flora or fauna of the state through extinction in historic times (since 1600).

Recently Extirpated. Taxa that have disappeared from Florida since 1600 but are still extant elsewhere. The bahaman swallowtail butterfly (Papilio andraemon bonhoeferi Sharpe) and the atala butterfly (Eumaeus atala florida Roeber) are examples.

Dissemination of Results

The work of the Committee is to be published as a comprehensive report containing accounts of each organism included in the inventory and additional sections dealing with the general significance of rare and endangered forms, an overview of the geographic and ecological distribution of rare and endangered plants and animals in Florida and the factors threatening their populations, descriptions and distribution of major terrestrial and aquatic habitat types in the state, and recommendations for the preservation of the state’s threatened biota. The format of the report will be
designed to facilitate updating of information and location of specific data. Individual accounts of species, subspecies, or unique local populations included in the list will follow a standard format, containing, where available, the following information in succinct form:

1) **Status.** Endangered, Threatened, Rare, Species of Special Concern, Status Undetermined, etc.

2) **Common and Scientific Names.** All parts of each scientific name will be shown, including the name of the describer or describers.

3) **Classification.** Normally the order and family will be given, although other or additional taxonomic categories may be advisable in some groups.

4) **Other names.** Other widely used common names for the taxon and any important synonyms of its scientific name will be given.

5) **Description.** A brief, nontechnical general description of the organism, including size, to aid those unfamiliar with the group to visualize its appearance. Also prominent sex and age differences and characters distinguishing it from closely-related forms or other organisms with which it might be confused will be given.

6) **Range.** Both the general geographic distribution of taxa whose range extend beyond Florida and as detailed information as possible on the range within the state will be given. The period to which distributional data apply and any major changes in the Florida range that have occurred in the past or are taking place today will be given, if applicable. Also to be included are the type localities of species or subspecies described from Florida and, if known, the present status of the form in terms of drainage systems, where relevant. Standard outline maps will be used to show the Florida range of each taxon and, for those forms with ranges extending beyond the state, an additional map showing the overall distribution.

7) **Habitat.** Description of habitats in which the taxon is found in Florida, indicating, where applicable, which habitats are primary or preferred and which are of secondary importance. Indication of which environmental factors appear to determine its habitat orientation. When possible, the location of especially favorable habitat conditions within the state will be given.

8) **Life History and Ecology.** Salient features of the life history and ecology of the taxon, with emphasis on those aspects such as home range size, dispersal tendencies, reproductive rates, and population dynamics that are relevant to understanding of its habitat relationships, population status, and geographic distribution will be given.

9) **Specialized or Unique Characteristics.** Any features of the taxon that give it special scientific, aesthetic, or economic significance will be given.

10) **Basis of Status Classification.** A summary will be presented on past and present population levels, destruction of habitats, and other evidence used as the basis for assigning the taxon to the given status category and discussion of possible future changes in status based upon present conditions and trends.

11) **Recommendations.** Notation of any steps already taken to protect the form in Florida and provision of additional suggestions of measures such as establishment of sanctuaries, protection from hunting, etc. to
aid in its preservation and recommendations for specific types of research needed to gain a better understanding of its status or critical features of its biology may be given.

12) Acknowledgments.

13) Selected References. Important published or unpublished works on the taxon will be given. Personal communications may be noted in the text but not in references.

14) Name of Author and Institutional Affiliation.

15) Illustrations. A photograph or drawing of the subject plant or animal and additional photographs of typical habitats or characteristic features of its life history or ecology will be used.

There are several difficulties which confront one in the attempt to survey for a particular species of invertebrate which usually do not confront one who is gathering information concerning vertebrate animals. These difficulties are due to: 1) the immense number of species involved, 2) the comparatively small size of most invertebrates, 3) the seasonal occurrence in the adult or readily identifiable life stage, 4) the lack of available data for many species, due in large part to inadequate survey . . . which, in turn, is due primarily to inadequate funding for surveys of invertebrates in comparison to what has been done for most vertebrates, and 5) the difficulty of identification the lack of competent taxonomic specialists in some groups, and underpaid, overworked specialists in others.

There are groups of insects and other invertebrates which are not being studied, have not been studied for many years, or have never been studied in Florida. There is a great need for a long-range survey of the arthropods of Florida, just to establish what is here, plus a tremendous amount of investigation needed to determine miscellaneous information about each species.

The current list of threatened and endangered species of Florida invertebrates is admittedly a much biased list, due to factors already mentioned. Most species for which data can be obtained with a high degree of confidence are restricted to those groups which: 1) can be located and identified by sound, such as certain Orthoptera, 2) those which occur only in special habitats, such as the fast-disappearing tropical hardwood hammocks of southern Florida, caves, water systems (which themselves are becoming endangered), 3) those associated with plant or animal hosts which are themselves endangered or threatened and to which these invertebrates are restricted (including food hosts and hosts of endo and ectoparasites), and 4) unique land habitats such as fossil sand dunes, and rare and unique microhabitats such as pack rat nests which harbor fauna of small animals often found nowhere else.

In conclusion I believe that most well-informed invertebrate specialists agree that the increased awareness of the general public of the need to take concrete actions toward preservation of threatened and endangered species of plants and animals, even including the many inconspicuous and supposedly non-economic species of invertebrate animals, is very important, but that the effort to protect most invertebrate species through over restriction on collecting promulgated by well-meaning government officials and by sometimes ill-advised government regulations is not, I repeat, is not the answer! Such restrictions often prevent or seriously handicap the continuing effort by competent researchers to obtain basic information
about species for which we know all too little, and they may even pinpoint the truly rare species for unscrupulous collectors!

The answer lies primarily in the preservation of adequate habitat samples sufficiently large to allow the preservation of rare species. Systematists should be among the most sensitive to this issue, for the accelerating reduction in the number of species on our planet is one of the fundamental issues of our time. Systematists, with their intimate knowledge of biological diversity, are in a unique position to convey that sense of wonder for our natural world, and they form a major part of the tiny band capable of doing so. The time may not be far off when conservationists, backed to the wall, will need to seek advice from systematists about which species to write off and those for which to fight harder. It should be noted that while legislative approaches and habitat preservation often are the conservationists' main manner of action, often in the end it is the single, spectacular species that "sells" a particular conservation project, and in the process permits the preservation of associated and similarly threatened species of less concern to the general public.

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Photo Story—Copulation of the firefly *Photuris SH* (unnamed sp.). Old fields in central New York State during June teem with thousands of these fireflies. Sexually active males greatly outnumber females, and competition among males is keen. Often several males are found gathered around a single responsive female. This photograph reveals a detail of copulation that may relate to this extreme competition—the mesothoracic legs of the male (hanging below the female) are raised, perhaps to strike at or sweep away rivals. Also of interest, this photo reveals that the lateral processes of the genitalic basal-piece remains outside the female during intromission, though this structure is seemingly too delicate to function as a clasper.—*J. E. Lloyd*