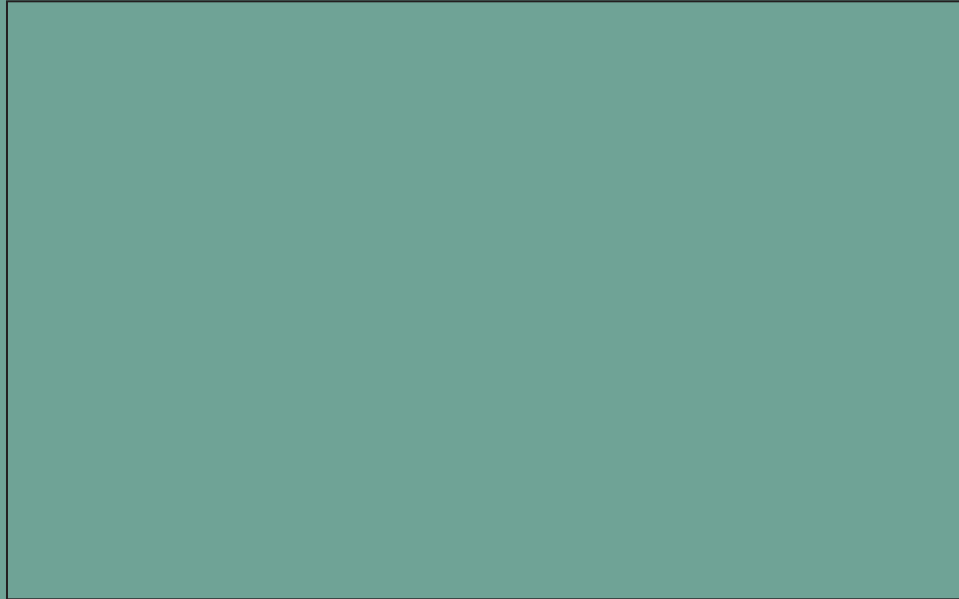


A Guide to Understanding, Protecting,
And Providing Habitat for Native Pollinator Insects



POLLINATOR
CONSERVATION
HANDBOOK

The Xerces Society
In Association with The Bee Works

Featuring Photographs by Dr. Edward S. Ross

Foreword

Science and common sense tell us that species exist in an extremely complex web of interconnections such that, when a single species is removed, scientists cannot always predict the consequences. However, there are natural interactions between species so fundamental that the loss of one of the species will clearly be disastrous for the other. Pollination is one such process.

Most flowering plants are pollinated by animals. If pollinator populations are depleted, many of these plants will produce fewer seeds or no seeds at all, thus failing to reproduce. The result is that plant populations are weakened or disappear altogether.

The *Pollinator Conservation Handbook* describes how you can help protect and re-establish populations of pollinators that are diminished or locally extinct as a result of human activities.

The most common and important groups of pollinators—bees, flies, and beetles—are also most prolific and diverse in somewhat disturbed areas where they can find bare ground and sunny stretches of woodland edges. Since people have created many such disturbed areas in the name of “progress,” you might think there would be more bees. However, we have gone much further and—armed with pesticides, weed killers, earth movers, and asphalt—we have occupied or degraded so much habitat, destroying nesting sites and floral food resources, that pollinator populations are threatened.

Pollinating insects are essential to our gardens, to most of the earth’s flowering plants, and to human beings who are dependent, like every organism, on the web of life. This handbook will help you learn how you can provide the habitat that pollinators need to thrive.

Charles D. Michener

Watkins Professor Emeritus of Entomology

University of Kansas, Lawrence

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Introduction

In the Hawaiian Islands, biologists rappel down sea cliffs to reach and pollinate plants of 'ōlulu (*Brighamia insignis*) and pua'ala (*Brighamia rockii*), two species that would be extinct without this human intervention. In California, the endangered Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*) survives on only a few acres of degraded sand dunes; it lacks pollinators and so produces only a fraction of its potential seed crop. The rare western prairie fringed orchid



Insect pollinators are necessary to the healthy reproduction of over 80 percent of the world's flowering plant species. Edward S. Ross.

(*Platanthera praeclara*), scattered across grasslands of the midwestern United States, is now visited by a species of moth that is not native to the habitat. This moth fails to pollinate the flowers because it can reach the nectar without touching the pollen and, furthermore, it drinks nectar that might otherwise attract hawkmoths with shorter tongues, which are the orchid's legitimate pollinators.

This alarming pattern is being repeated around the globe. As the insects that many native plants require for adequate pollination disappear, the effect on the health and viability of these native plant populations can be disastrous. And that's just the beginning.

Pollinators are keystone species, that is, species upon which the persistence of a large number of other species depends: they are essential to the reproductive cycles of most flowering plants, and thus to the ecosystem itself, supporting plant populations that other animal and bird species rely on for food and shelter. Pollinators are also indicator species, meaning that the viability and health of pollinator populations is a good marker of the health of the ecosystem of which they are an integral part.

The *Pollinator Conservation Handbook* focuses on North America. Native bees are the pre-eminent pollinators here as, indeed, they are world-wide, and it is with particular alarm that scientists from nearly every continent have been documenting dramatic declines in their populations in recent decades. In China, for example, fruit growers are pollinating flowers by hand because pesticide use has killed the bees in the orchards. Similarly, in Britain, rare orchids survive because biologists are doing the delicate work of transferring pollen by hand; the bees that pollinate these plants are locally extinct because their nesting habitat has been largely destroyed. In fact, nearly two-thirds of Britain's twenty-five species of bumble bees, once the common denizens of hedgerow and pasture, are in decline. At least one, the short-haired bumble bee (*Bombus subterraneus*), has not been seen since 1998 and is considered extinct in Britain.

Three factors—the loss and fragmentation of habitat, the degradation of remaining habitat, and pesticide poisoning—account for



A mining bee (genus *Andrena*). Bees are essential pollinators the world over. Edward S. Ross.

most of the declines in populations of native bees and other native pollinators. These factors have complex political, economic, and social origins and ramifications that are not easily addressed. But at another level, the solutions are simple and straightforward. Many insects are fairly resilient, and there are actions we can take in our own back yards and neighborhoods, on farms and ranches, and in city parks and wild areas, to help strengthen and support pollinator populations.

The *Pollinator Conservation Handbook* is a comprehensive guide for gardeners, farmers, ranchers, educators, city park managers, and public land managers to assist them in providing, enhancing, and managing habitat for pollinator insects. Also included are ideas for developing school curricula, as well as an extensive list of resources. The *Handbook* contains practical and specific information on how to establish flower-rich foraging patches and nesting sites for pollinating insects any place where there is space enough for a few plants, whether it is a backyard patio in Bangor, Maine, a golf course in the suburbs of Chicago, school grounds in Birmingham, Alabama, or field margins in rural California. Your efforts on behalf of pollinators will, in turn, help maintain healthy plant communities in wild lands and support bountiful harvests on our farms and gardens.