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Urban Biodiversity: The Natural History of the New Jersey Meadowlands

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Book Review

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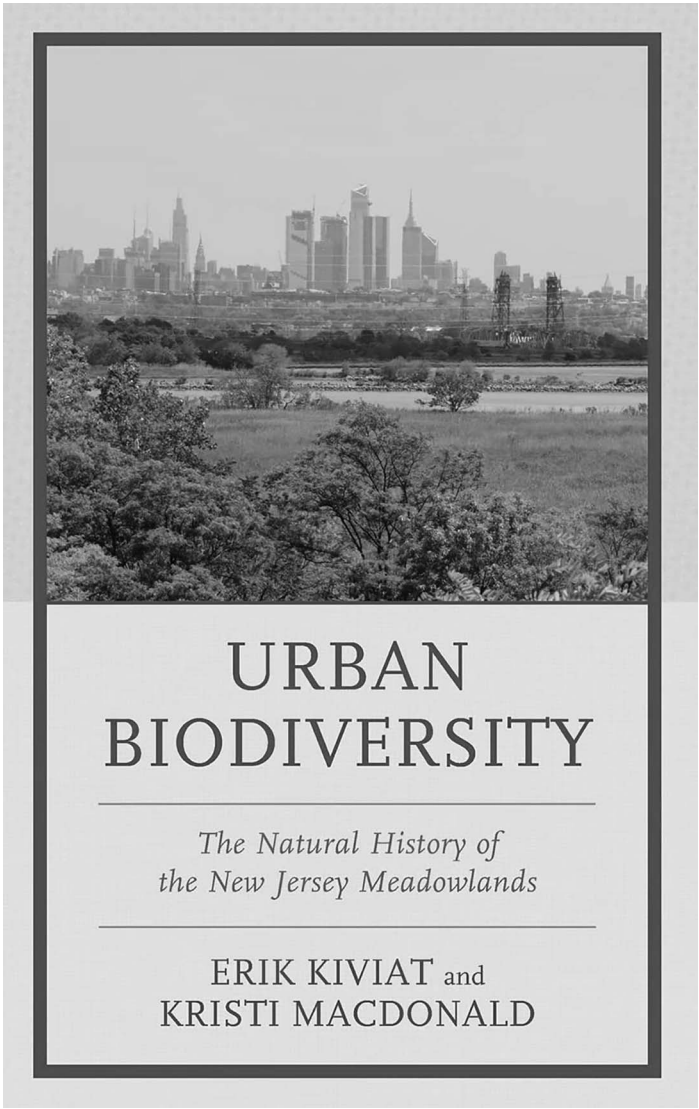
Fort Collins, Colorado

Urban Biodiversity: The Natural History of the New Jersey Meadowlands
Erik Kiviat and Kristi MacDonald
Lexington Books
447 pp, hardcover, 2022
[ISBN: 978-1-49859-991-7]

When many people hear the name New Jersey—especially those who are not familiar with the Garden State—the words conjure a stereotypical image of a landscape of refineries, clogged freeways, urban sprawl, and polluted waterways. In some places, the image is not wholly inaccurate. The extensive marshlands along the lower reaches of the Hackensack River—the eponymous Meadowlands—have been extensively filled, channelized, and developed for over three centuries. Two very heavily traveled spurs of the New Jersey Turnpike (Interstate 95) cut through the heart of the wetlands, bringing the landfills, factories, residential and commercial development, and wetlands now dominated by seeming monocultures of common reed (*Phragmites australis*) front and center to millions of travelers every year. Yet, as authors Erik Kiviat and Kristi MacDonald make clear in this excellent book, a vibrant and biodiverse ecosystem persists amid the urban infrastructure located less than five miles west of Manhattan.



The Meadowlands are a result of continental glaciation. As the final Pleistocene glacier advanced, it gouged a north–south oriented valley. On its eastern side, the valley was confined by the resistant diabase sill now recognized as the Palisades along the Hudson River opposite Manhattan. On its western side, the valley was separated from its neighboring drainage (now occupied by the Passaic River) by a sandstone ridge. As the glacier began to melt back northward, a terminal moraine blocked the valley's southward drainage toward the ocean, forming a deep freshwater impoundment, Glacial Lake Hackensack. Soil carried downstream into the lake from the retreating glacial front deposited layers of rich, unconsolidated sediment.

Approximately 10,000 years ago, the lake breached and began to drain. At that time, the Meadowlands became a broad, forested valley crossed by numerous meandering freshwater tributaries draining into the newly formed Hackensack River. After centuries of rising sea levels, the Atlantic Ocean encroached on the lower portions of the valley, forming the Hackensack River estuary.

About 1000 years ago, sea level rose to near contemporary levels. The rising waters flooded and killed most of the Meadowlands' forests. The forests were replaced by tidal fresh and brackish marshes dominated by cordgrasses (*Spartina* spp.)—hence the Meadowlands name. Patches of Atlantic white cedar (*Chamaecyparis thyoides*) remained where soil and moisture conditions allowed the trees to persist. Tidal marshlands and cedar swamps were the prevailing habitat types until the estuary was modified by Dutch and English colonists through filling, burning, lumbering, diking, and ditching. The Meadowlands' proximity to the rapidly developing city of New York guaranteed their urbanized fate.

The authors consider the Meadowlands in two geographic contexts: the Core Meadowlands and the Greater Meadowlands. The Core (79 km^2) encompasses the broad estuarine and formerly estuarine wetlands and wetland fill alongside the Hackensack River. This is the area for which the most biological information is available. The Core is roughly coincident with the state-designated Meadowlands District, a planning jurisdiction.

The Greater Meadowlands (approximately 150 km^2) include the Core plus biologically related non-tidal wetlands and uplands within or close to the estuarine areas. Because the Greater Meadowlands embrace considerably more geological and habitat diversity than the Core, biodiversity of the larger area is also considerably greater.

In writing this book, the authors had two goals: (1) compile and synthesize every bit of biological information about the Meadowlands that they could identify, and (2) posit the Meadowlands as exemplars of urban biodiversity. They accomplished their first goal admirably. By conducting their own field studies in the Meadowlands over the last two decades and assembling reams of literature, they exhaustively document every single taxon ever recorded (except the protists). They include taxa that probably occur but have not yet been confirmed as well as taxa that have been extirpated.

Three introductory chapters profile the Meadowlands' environmental setting, aquatic habitats, and uplands and forested wetlands. The next seven chapters review the plants, cryptogams, mammals, birds, herptiles, fish, and invertebrates that inhabit the region. Where appropriate, the authors evaluate the effects of urbanization on the organisms and their habitats. For some species, urbanization has enhanced populations. For others, it has reduced or eliminated them altogether. For a third group, especially those animals inhabiting the extensive *Phragmites* stands that have largely replaced the cordgrass marshes, the effects are ambiguous.

The authors compare their Meadowlands findings with observations from other urbanized ecosystems to address their second goal: comparing ecosystem function across urbanized landscapes. Because ecosystems and regions are so different, these comparisons can be useful but are not always directly equivalent. The book concludes with a somewhat redundant chapter that summarizes the preceding 10 chapters and delves more deeply into the effects of extreme urbanization and land use change on ecosystems.

At 447 pages, this is a hefty volume, but the main narrative is 300 pages. The text is accompanied by two appendices (seed plants and birds), a comprehensive list of references, and an index. In addition to eight maps, the text is illustrated with 24 black-and-white photographs.

My only criticism of this otherwise superb treatise centers on six of the eight maps. The maps are important additions, especially for readers who are not intimately familiar with the region. The bedrock geology map presents 10 geologic formations, plus roads, jurisdictional boundaries, and water bodies in varying grayscale patterns; the result is confusing and difficult to interpret. The surficial geology map is no better. Four maps depict streams of the northern and southern Meadowlands, and important sites in the northern and southern Meadowlands. Unfortunately, these small maps occupy only one-third of a page each, are overlain on pale grayscale base maps, and include almost no contextual detail, especially major roads. In addition, the two important sites maps are not comprehensive, and omit many locations mentioned in the narrative. I found myself consulting these maps frequently, but was often frustrated because the location I was seeking was not shown, or because the maps were so vague they did not provide sufficient context.

This book is oriented toward a professional audience of ecologists, natural area stewards, land use planners, and citizen-advocates. Nevertheless, the authors have gone to great lengths to define and explain potentially unfamiliar terms; as a result, the book could be appreciated by most well-educated readers. However, the biological detail likely would discourage casual readers. Anyone interested in a more general natural history of the Meadowlands would be advised to obtain a copy of the highly readable and richly illustrated *Fields of Sun and Grass: An Artist's Journal of the New Jersey Meadowlands* by John R. Quinn (1997, Rutgers University Press).