

PREFACE

Brian Lewis conceived of this little handbook as a supplement to the 1988 conference proceedings *Constructed Wetlands for Wastewater Treatment*, and at his urging, I finally committed to begin compiling the information.

As a student I was fortunate in working on several National Wildlife Refuges, and in one case, my research benefited from the historical information on wildlife populations in old annual reports. However, in digging out information on snapping turtles from the earliest days of the refuge, I discovered the tremendous wealth of information on methods developed to restore and create the marsh that I believed was largely natural. Later I discovered similar knowledge in the earliest reports from virtually every refuge and management area that I visited.

Since many of our "natural" wetlands today were in fact restored or even created, I have been surprised when colleagues state that we know so little about wetlands that we can't restore or create one as mitigation or for any other reason. In fact, the predominant conclusion from most recent wetland meetings would be our total ignorance of basic wetland ecology. Certainly we don't know everything about wetlands — they might not be as fascinating to some of us if we did — but to conclude that we lack the information to restore or create many types of wetland is to ignore or negate a considerable body of information gathered by competent, dedicated scientists and managers over many years.

Doubtless some will respond that this information only applies to marshes. Certainly much of it does, but some is also available for other types, because bogs, swamps, sloughs and fens were included in wildlife refuges and management areas. But more importantly, marshes are precursors, early successional stages for many other wetland ecosystems. If we can create a healthy marsh and then allow it to progress along the successional gradient to another wetland type, are we not well on the way to creating the bog or swamp that is the project goal? And do we know how to create a marsh and allow it to transition? Of course we do. We simply do not supply the disturbance factor that is critical to maintaining the site in the early marsh stage.

Although today's society places considerable importance on natural and created wetlands, it was not always so. While most of past society had little use or regard for "dark and dismal swamps," and wetland drainage was national policy, a few conservationists began raising the alarm over lost wetlands as early as the turn of the century. Extensive drainage projects coupled with the severe drought of the 1930s caused calamitous declines in North American waterfowl populations. Alarmed duck hunters, many wealthy and influential in society, initiated legislation taxing sport hunters to support wetland acquisition, management and research, which provided the basis for the National Wildlife Refuge System and comparable state wildlife management areas. Faced with a dearth of water and wetland habitats but charged with restoring

waterfowl populations, early managers slowly developed methods to create and restore natural wetland ecosystems to enhance waterfowl habitats throughout the country.

Creation of various public works programs (CCC, WPA, etc.) concurrent with the drive to restore waterfowl provided heretofore unheard of funding and manpower resources in the newly emerging field of wildlife management. Substantial efforts in these programs were directed towards developing methods to design and construct dikes and water control structures, plant and/or seed wetlands and terrestrial vegetation, re-stock wildlife and fish populations, manipulate water levels, and manage fish and wildlife populations in the restored or created wetland ecosystems. Probably because of the bureaucratic penchant for documentation, most of the methods developed and tested were reported in the "gray literature" — the annual reports for each refuge or management area. Not surprisingly, virtually all types of wetland ecosystems in the U.S. are encompassed. Simple examination of a distribution map for the National Wildlife Refuges reveals refuge locations from coast to coast, including most types of freshwater wetlands and some brackish/saltwater systems. Restoration and creation techniques were investigated and reported in the late 1930s, 1940s and 1950s on most of these areas.

Early managers unrestrained by the policy of not reporting "negative results" prevalent in scientific journals today, included failures as well as successes. Unfortunately much of this knowledge never found its way into scientific journals and, hence, is largely unknown to the new crop of wetland ecologists and managers. Some has not even been written down though it has been passed along and is still in use by present managers. But that information is still available in the files or from the staff of the local refuge or management area office.

Unfortunately many sincere and dedicated wetland enthusiasts are unaware of this wealth of information, or choose to disregard it — "they were only interested in growing ducks." I am afraid I must disagree with the latter. Techniques developed in the late 1930s and 1940s to establish or manage *Scirpus*, *Potamogeton*, *Spartina*, *Quercus*, *Larix*, or *Taxodium* or a host of other wetland plants need not be reinvented today, nor must we use the most expensive methods. Though propagation and hand-planting were used, early wetlands managers slowly discovered the growth requirements for important species and developed methods to foster or retard vegetative types through inexpensively manipulating water levels in appropriate seasons.

Methods developed for management of duck production, migratory or wintering areas have successfully provided wetland habitats for innumerable other species of wetland wildlife, fish, and plants. Ducks may have been the priority but "they didn't just grow ducks." In fact, many of the larger "natural" wetlands extant today are located in refuges, management areas and a few parks because they were restored, enhanced and, in a few instances, created by early waterfowl managers.

Finally, my earlier experiences creating or managing wetlands with the life support function as a primary goal, and more recent work with the water purification function have convinced me that a wetland ecosystem that supports diverse and abundant vertebrate populations does so because it has the complex, requisite structure. If the structure is present to provide significant life support, then that system likely has the structure to provide much of the water purification, hydrologic buffering and other important functions that we value in wetland ecosystems. Regardless of the prime objective, designing and constructing a wetland that will attract and support representative vertebrate species will likely achieve the prime objective plus support many other important functional values.

This then is a small attempt to organize and present some of the information on methods to create or restore freshwater wetlands accumulated by wetland scientists and managers during the last 50 years. It is my hope that the reader will interpret this volume as a general guideline and employ specific, localized information from nearby offices of wetland and waterfowl research/management agencies before starting a project.

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