

# Introduction to Wetlands



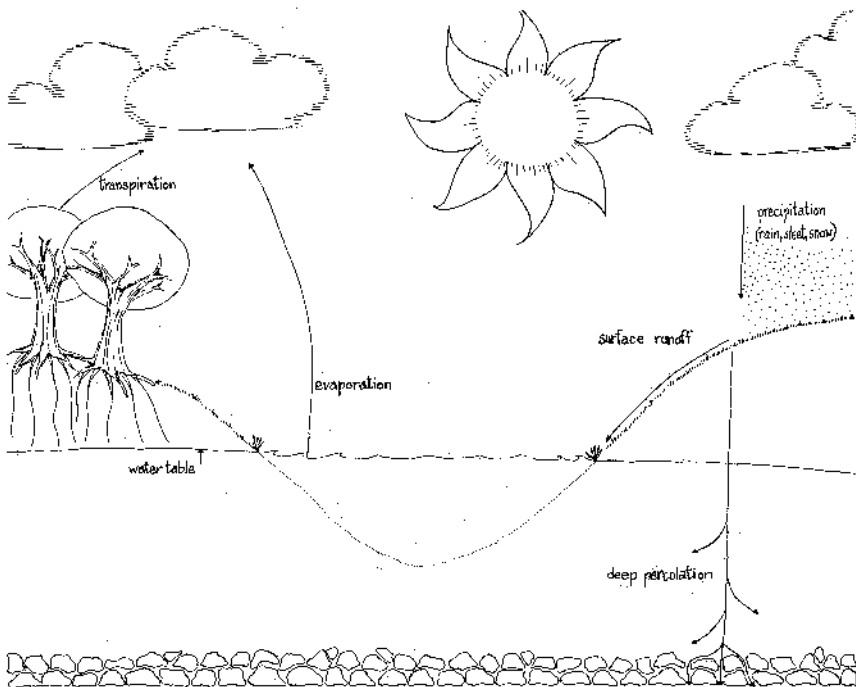
As a game played in a natural setting, golf presents far more than a recreational outlet for golfers. Golf courses are diverse landscapes that can be managed to showcase natural plant communities and wildlife **habitats**—including some of our most valuable: *wetlands*.

Yet golf course superintendents are often unsure of how best to manage wetlands. Questions abound: What is a wetland? When do regulations apply? When is it best to just leave a wetland alone, and when is it best to actively manage it? How can the golf course take advantage of wetlands on-site to enhance their wildlife value and enjoyment by golfers? This book attempts to answer these questions and provides case examples from numerous golf courses that are managing wetlands successfully and with confidence.

## WHAT ARE WETLANDS?

Wetlands are special areas that possess a set of common physical and biological features. These are areas that are covered with water or have saturated soil at least part of the year. Wetlands are “lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface” (Cowardin et al. 1979).

A great diversity of wetlands can be found on golf courses. Some wetlands may appear completely dry during portions of the year. Shrubs and/or relatively large trees, such as cypress and gum, grow in wetlands called swamps, bottomland hardwood forests, and riparian woodlands. A treeless wetland occupied by grasses, rushes, and sedges is referred to as a marsh or wet meadow. An area of predominantly open water may be considered a lake or a pond. Flowing water systems are commonly known as rivers, streams, and creeks. Wetlands are ecological communities with a diversity of living



**Figure 1-1** The hydrological cycle showing the major ways in which water moves through the landscape and the atmosphere.



**Figure 1-2** Wetlands on golf courses, such as this wooded wetland at the Country Club of Virginia in Richmond, Virginia, often are located in little used areas of the course. Protecting wetlands ensures that they continue to absorb and filter storm water and provide critical wildlife habitat. (Courtesy of Audubon International.)

organisms such as plants, fish, insects, snails, amphibians, reptiles, birds, and other organisms well adapted to a watery environment.

Wetlands are an integral part of the larger hydrologic cycle. In that cycle, water falls on the land as rain or snow. The water is then taken up by plants, flows back to the ocean or other water bodies, and is taken back into the atmosphere through the energy of the sun (see Figure 1-1).

Rivers, streams, lakes, and other wetlands often receive a significant amount of runoff from the surrounding landscape. The area that drains into a certain river system is called a watershed. The quality of water in the lakes and streams reflects the activity in the watershed. The only way to protect a lake, river, stream, or wetland is proper stewardship of the land in the watershed (see Figure 1-2).

## WHY ARE WETLANDS IMPORTANT?

Wetlands are vital to the planet's water resources. They carry out many functions that are beneficial to plants, animals, and humans. We now realize that wetlands must be protected for the variety of important functions they perform:

- Standing water wetlands (called **lentic** systems) filter water as it moves to streams and influence the rate of flow (especially during storms); they may also act as storage basins during floods. Wetlands improve overall water quality, recharge aquifers (groundwater), and mediate floods by holding storm water runoff.
- Vegetation along flowing waters (called **lotic** systems) helps prevent flooding and erosion by slowing the flow of water and dampening



**Figure 1-3** One hundred twenty acres of wetlands at Old Marsh Golf Club in Palm Beach Gardens, Florida, draw more than 80 species of birds, as well as otters, bobcats, deer, and alligators, to the golf course and residential community. The staff of the golf course has worked closely with the Palm Beach Water Management District on wildlife and plant management and aquatic weed control. Five pairs of sandhill cranes, a threatened species in Florida, live on the property. Golf management proceeds with environmental sensitivity—especially in terms of fertilizer and pesticide use. (Courtesy of Audubon International.)

wave action. Plant roots also hold the soil in place. Both of these qualities reduce the maximum rate of runoff and delay the flood crest in downstream areas.

- Wetlands have a strong influence on water quality because sediments (as much as 80 percent) and heavy metals are deposited, and nitrogen, phosphorus, and other nutrients are extracted and modified by cycling within the marsh system (Kadlec and Kadlec 1979).
- Wetlands provide habitat for many plants and animals. Even upland animals visit wetlands in search of food and water. Some plants and animals that require wetland environments are rare, and wetland conservation and restoration/creation can provide crucial habitat for these species. Thus, wetlands serve as reservoirs of **biodiversity**.
- Wetlands have intrinsic beauty. A pond with water lilies and bald cypress or a salt marsh with swards of waving cordgrass provides a scenic and relaxing setting.

Historically, and unfortunately, wetlands have been considered wastelands in need of draining in order to be useful. In large proportion, wetlands have been drained, dredged, dammed, and otherwise altered drastically from their original state (see Figure 1-3).

## ▶ CASE STUDY

### **Old Brockway Golf Course in Kings Beach, California, Serves as a Wetland Mitigation Site**

*By David Laurie\**

When a Safeway grocery in North Lake Tahoe decided to expand its store and parking area, Old Brockway Golf Course, which borders the store, agreed to mitigate some of the land use change. The project involved creating five water treatment ponds on the adjoining ninth and first holes of the nine-hole public golf course. These created wetlands not only treated storm water runoff, they also enhanced the wildlife habitat and playability of the golf course (see Figure A).

---

\*David K. Laurie is the golf course superintendent at Old Brockway Golf Course in Kings Beach, California. The course was designated as a Certified Audubon Cooperative Sanctuary in 1998.

---

### **Implementation and Maintenance**

We had an outside contractor provide rough shaping for the wetland areas and enlisted local agencies to help us select appropriate plant material. We chose a specific wildflower mix, as well as indigenous shrubs, trees, and grasses. During plant installation, we irrigated and fertilized these areas to help them get established.

Subsequently, we haven't had to do much to maintain these areas. We no longer water or fertilize them. Occasionally we pull a weed or remove trash that has blown in.

### **Success All Around**

The success of this project garnered attention from the Tahoe Regional Planning Agency, who named it Best Commercial Project of the Year. The viewing corridor of the golf course, as seen from the nearby roadway, has



**Figure A** A created wetland at Old Brockway Golf Course improved the beauty and wildlife habitat of the course. (Courtesy of Audubon International.)

---

---

been the talk of the town for its beauty. Habitat acreage was increased, and managed acreage, which had been intensely managed in the past, decreased.

Golfers, too, are ecstatic about the project. Though the golf holes are tougher to play, the total beauty of the wetland and wildflower areas more than make up for it. Our pro shop, as well as our local newspaper, kept the public apprised of our progress and success. The project also built pride and confidence in our employees. Because of our initial success, we have repeated this project on hole 2, following the same procedures.

### **Project Cost**

All costs were covered by the Safeway store.

---

## **TYPES OF WETLANDS**

Many wetland classification systems exist and, depending on the scale and the classifier, many types may be recognized. Any classification system involves dividing what is really a continuum. For the purpose of this book, seven general wetland types are presented for incorporation into managed areas: (1) estuaries, (2) rivers, streams, and creeks, (3) lakes and ponds, (4) marshes and wet meadows, (5) forested wetlands, (6) shrub wetlands, and (7) bogs. Detailed information about each of the following types can be found in Chapter 4.

### **Estuaries**

Waters of most streams and rivers eventually drain into the sea. The interface where fresh water meets salt water is known as an estuary. Estuaries are semienclosed areas in coastal regions (generally influenced by tides) where salt water is diluted and partially mixed with fresh water from the land. Estuaries vary in size from small bays or inlets to extensive open marshes. Estuaries are found along the Atlantic and Gulf coasts of the east and the Pacific coast in the western United States.

### **Rivers, Streams, and Creeks**

Current, or continuously moving water, is the outstanding feature of streams and rivers. The current in a particular stretch of river or stream is a



**Figure 1-4** Blacklick Creek contributes its name as well as its beauty to Blacklick Woods Golf Course in Reynoldsburg, Ohio. Natural vegetation stabilizes the creek bank, provides wildlife habitat, improves water quality, and reduces the need for intensive maintenance. (Courtesy of Audubon International.)

function of amount of water and topographic relief. Current cuts the channel, molds the character of the stream, and influences the organisms inhabiting the flowing waters. Some streams, however, are intermittent and dry up during part of the year (see Figure 1-4).

Streams may begin as headwaters or outlets of ponds or lakes, or they may arise from springs and seepage areas. In addition, surface runoff, especially after heavy or prolonged rains or rapid snow melt, contributes varying amounts of water to the system. Because precipitation, the source of all runoff and subsurface water, varies seasonally, the rate and volume of stream flow also fluctuate widely from flood conditions to essentially nothing, resulting in a dry stream bed, depending on the size of the



stream. In the case of golf courses, irrigation can also be a source of runoff. Rivers, streams, and creeks are found in all regions. The characteristic vegetation, rate of stream flow, and flooding regime vary from region to region.

### Lakes and Ponds

Lakes and ponds are inland depressions or **basins** that contain standing water. They vary in size from less than a hectare to thousands of square kilometers. They may range in depth from less than 1 meter to more than 2000 meters. A lake is a body of water larger than 0.4 hectare and deep enough that it does not freeze from top to bottom in winter. Lakes have deeper waters that do not permit light penetration and plant growth. Ponds are defined as small bodies of standing water (less than 0.4 hectare) so shallow that rooted plants can grow over most of the bottom. Ponds may or may not freeze from top to bottom in winter. Most lakes and ponds have outlet streams; both are changing features on the landscape because filling, no matter how slow, is inevitable. Lakes and ponds are found in all regions. Natural lakes and ponds are abundant in previously glaciated regions. Many human-made lakes and ponds (more appropriately called reservoirs) have been created by damming a river, stream, or depression.

### Marshes and Wet Meadows

Marshes and wet meadows are found in poorly drained, shallow water areas often adjacent to lakes or ponds and along streams or rivers. In some cases, they represent the last filling-in stages of a lake or pond. Marshes and wet meadows are usually saturated or contain water during the growing season. At times, particularly in early fall, the water may dry up and expose the substrate, a condition necessary for the germination of many wetland plants. As plants die, organic matter builds up and may create mounds, called **hummocks**, that are higher than the surrounding wetland. The vegetation may be discontinuous and distributed in small stands or clumps separated from one another. The dominant plants consist of sedges, rushes, reeds, cattails, and a variety of broadleaf aquatic plants. Marshes and wet meadows are found in all regions; however, they vary in species composition, inundation or hydrologic cycles, and basic structure.

### Forested Wetlands

Wooded wetlands may represent a successional stage from a marsh or wet meadow to a moist (mesic) forest. This type of succession, however, occurs



**Figure 1-5** Wetlands can be created in new golf course developments or on established golf courses, like the Carolina National Golf Club in Bolivia, North Carolina. Existing water, soils, and hydrology on-site will determine the most suitable type of wetland to create. (Courtesy of Audubon International.)

over a very long period of time unless the hydrology or substrate is altered. Most forested wetlands are commonly referred to as swamps or bottomland hardwood forests. Forested wetlands may be classified as deep-water or shallow-water swamps. Some trees grow in standing water, and others in periodically flooded areas. Many forested wetlands appear dry during the growing season and may not be saturated. Different types of forested wetlands are found in all regions of the United States (see Figure 1-5).

### **Shrub Wetlands**

Shrub wetlands are basically intermediate between marshes and wet meadows and forested wetlands. In fact, these wetlands are often transitional in

nature. Under certain natural conditions, however, they are maintained over the long term. Although to the casual observer wetlands of this type may have the appearance of a thicket, they contain much biodiversity and serve as habitat for many relatively rare species of plants and animals. Shrub wetlands sometimes occur within marshes and wet meadows and in forested wetlands. Shrub wetlands are found in all regions of the United States.

## **Bogs**

Bogs develop in areas with very poor drainage. Vegetation consists of sedges, shrubs (usually **heaths**), and sphagnum mosses, typically with peat formation and sometimes with an area of open water. These areas are sometimes called muskegs or mires, and any area that accumulates peat is referred to as a peatland. Cranberries, one of the few native plants cultivated commercially, occur in bogs. Bogs are a typical feature of previously glaciated regions, formed in depressions left by large masses of melting ice. They are also formed in other poorly drained depressions, including mountaintops. Bogs are most common in colder, northern climates with high humidity.

