Vital Habitats: Wetlands and Wildlife

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Yellowstone offers visitors a rare opportunity to observe animals interacting in a natural setting, and much of the best viewing is near wetlands. The quality of wetland environments as habitat for birds, fish, and other wildlife is one of their most visible and popular attributes. An estimated 80 percent of Wyoming's native animals rely on wetlands, especially the areas along rivers and creeks (Consolo-Murphy and Murphy 1999). Wetlands serve as both home and "supermarket" for innumerable species, many of which depend upon wetlands during some part of their daily, seasonal, or life cycles. Some species, such as beavers, tiger salamanders, and American dippers, are year-round wetland residents.

Yellowstone is home to a vast array of native animals—more than 400 types of aquatic insects, at least 300 birds, 100 butterflies, 60 mammals, 12 fishes, and 10 reptiles and amphibians. The majority of these species have some association with wetlands during their lives, whether for food, water, shelter, breeding, nesting, spawning, migration, wintering areas, or predatory opportunities.

Aquatic insects are a vital part of wetlands and, like reptiles and amphibians, are good indicators of overall ecosystem health. Each species requires certain attributes in the system it inhabits, and if that system is changed, the species will change in response. Aquatic insects are abundant both in species and total number, contributing to ecosystem biodiversity. They have important roles in the nutritive relationships within wetlands, serving as food for birds and fish. Their presence, absence, kinds, and numbers can tell us about the survival chances of fish and the kinds of fish we can expect in an area (Roemhild 1982). Water fleas and other filter-feeding aquatic invertebrates also help to maintain the water quality of lakes by removing algae. Aquatic invertebrates may play an important role in wetland nutrient cycling. They can regenerate as much as 35–60 percent of their own nutrient content each day, helping fuel algal growth and influencing algal competition by altering nutrient ratios (Duffy 1999). Aquatic insects depend upon wetland environments in all degrees—the larvae of horse flies thrive in mud, mosquito eggs require a few days in water to develop into adults, immature caddisflies and mayflies live in water for a few months, and water boatmen and backswimmers spend all of their lives in water.

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Mosquito.

NPS

Moose eating aquatic vegetation. Top right: chorus frog.

Common snipe. J. Whipple

Birds also occupy all of Yellowstone's wetland environments. More than 50 percent of the park's resident breeding bird species—including rare trumpeter swans and the nation's own bald eagles—are associated with wetlands, which provide them with ideal food and nesting habitat. A similar percentage of migratory bird species, such as yellow-headed blackbirds, stop in wetlands along flyways to rest, breed, and eat. Although deep-water lakes and amphibious environments, such as shores, streambanks, and ephemeral marshes, are home to a diversity of birdlife, they cannot compare with shallow water wetlands and marshes for bird species richness and abundance. The complexity of these habitats offers a variety of food, nest sites, and shelter to birds of all sizes.

Butterfly diversity is correlated with plant diversity, which makes wetlands the perfect habitat for many of these winged species. Butterflies are commonly found in Yellowstone's wet meadows. The Yellowstone checkerspot, for example, is a species that typically prefers wet sedge meadows

Beaver lodge and dam. NPS

Grizzly on elk carcass. NPS

and will lay its eggs on a shrub called black twinberry—but only if the shrub is in a wet meadow. Other moisture-loving species are the painted lady and the western meadow fritillary, whose host plants include willows, violets, and legumes (Debinski 1996).

Large mammals are perhaps the most recognized wetland residents. In summer, moose move tranquilly through shoulder-deep water eating aquatic plants, and beavers cut willows to eat and to build lodges. In spring, bears fish for spawning trout in shallow streams. Winter visitors may see wolf tracks imprinted in the snow-covered frozen marshes. River otter may be seen fishing and swimming in summer and sliding down snowbanks in winter. All mammal species visit wetlands for water, offering predators various feeding opportunities.

Eighteen fish species, 12 native and 6 introduced, inhabit Yellowstone's waters. This number is small by most standards; some river systems in

the Midwest have more than 200 species, and some in South America have thousands (Varley and Schullery 1998). There are many reasons for Yellowstone's small number of fish species. Until relatively recent geologic times the park was covered by glaciers, so not much time has elapsed for fish to arrive or evolve. The headwaters of five major river systems are either in or just upstream from the park, and more than 200 waterfalls form barriers to the upstream movement of aquatic life. More than two-thirds of Yellowstone's lakes are naturally fishless (Varley and Schullery 1998). Many waters are not suitable for fish due to shallow depth or water chemistry and temperature, especially those receiving great quantities of heat and minerals from hydrothermal features. When fish stocking began in Yellowstone in 1890, fish were planted in almost all lakes and ponds, with little knowledge as to whether the transplants could survive. In many cases, they did not, due mainly to a lack of spawning habitat and to winterkill (Pierce 1987). Some plantings did succeed, changing the balance of life in many of the park's lakes and stream systems.

Nevertheless, Yellowstone is considered a sport fishing and fish-watching mecca, due largely to early habitat preservation measures. The park was heavily over-fished in early years, but the habitat remained largely undisturbed from development. With recent changes in fishing regulations, such as mandated "catch-and-release fishing," fish populations have rebounded and park waters have become world-renowned as examples of intensively used yet healthy fisheries. Today, Yellowstone contains 91 percent of the remaining habitat for the Yellowstone cutthroat trout population, most of which is in Yellowstone Lake. A typical stream in Yellowstone may support as much as 40 pounds of fish per acre of water (Varley and Schullery 1998). Unfortunately, the park is not immune from introduced species, and lake trout, whirling disease, and New Zealand mud snails currently threaten to change aquatic systems.

Cutthroat trout jumping LeHardy Rapids. NPS

Garter snake. J. Whipple

Six reptile species and four amphibian species are known to occur in Yellowstone. Three of the reptile species (the wandering garter snake, sometimes called a "water snake"; valley garter snake; and rubber boa) and all four amphibian species, (the blotched tiger salamander, boreal toad, boreal chorus frog, and spotted frog) are associated with wetlands. They are often significant elements of the food chain. Many species consume large quantities of insects, other invertebrates, and both aquatic and terrestrial vertebrates. For example, the wandering garter snake regularly catches and eats fish, and the valley garter snake depends heavily on amphibians. Rubber boas often feed on small mammals that are commonly found in grass and shrub habitats along streams and wetlands (Koch and Peterson 1995). Many reptile and amphibian species also provide food for predators such as trout, sandhill cranes, great blue herons, red-tailed hawks, otters, and other mammals.

Although reptiles and amphibians seldom receive as much attention as some of the park's more popular and visible inhabitants, they are believed to be good indicators of an ecosystem's health. They are sensitive to pressures from land and water development by humans, and to the

effects of pollution. Amphibians have sensitive skin and two different stages in their life cycle—one larval, aquatic stage and one terrestrial, adult stage—making them very vulnerable to environmental changes. Larvae may be exposed to waterborne contaminants such as acid rain. When adults prey on insects that harbor sublethal amounts of toxic pollutants, they accumulate these pollutants in their tissues; this can eventually impair normal development and reproduction or even kill the creature. Eggshell thinning caused by such an accumulation of toxic pollutants in the tissues of predators nearly caused the extinction of bald eagles and peregrine falcons.

Presently, many amphibian populations appear to be in decline throughout the world. Scientists are not yet sure what to make of this; it may be that populations fluctuate naturally in response to natural events such as drought, or human-influenced changes in global processes—warming of the earth, ozone depletion, increased ultraviolet radiation, or acid precipitation. Other activities that may harm amphibian populations include habitat alteration, such as draining or filling wetlands, introduction of contaminants to an area, and introduction of exotic species.

NPS

River otter eating cutthroat trout.

In Yellowstone, amphibians may be in better shape than in some other areas, but we lack the long-term population data necessary to determine the status of the park's populations. Unless we determine what is causing the world's amphibian populations to decline, amphibians in this region may encounter trouble in the future—if they haven't already.

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Bison and elk along the Firehole River.