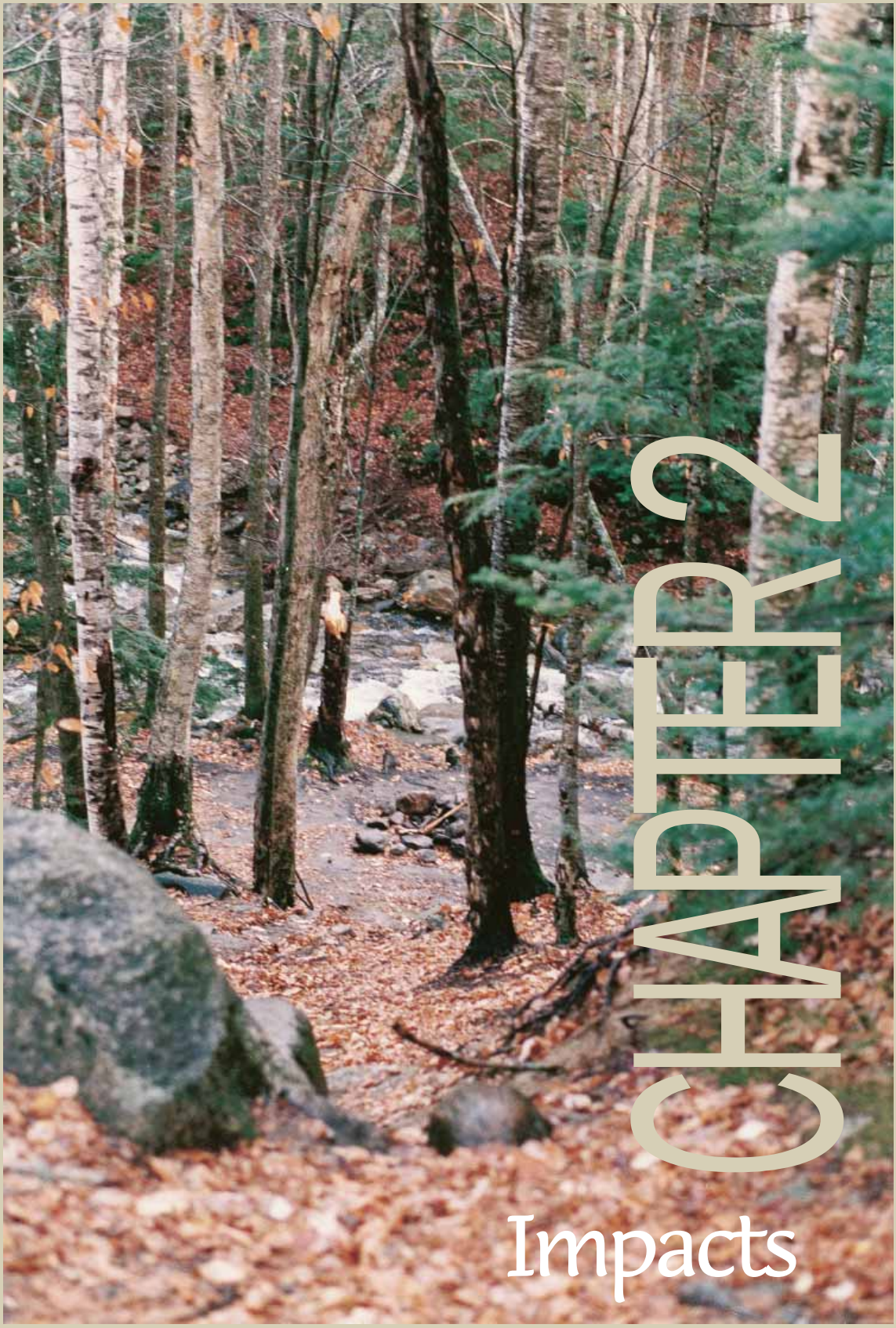

CHAPTER 2

Impacts

IMPACTS

Traditional management and engineering practices, coupled with increases in developed and dispersed recreation use, are cumulatively producing a range of effects from damaging to devastating on many riparian ecosystems.

Traditional Design

Traditionally, designers and engineers have focused on providing recreation experiences through infrastructure and access with little regard for the consequences to natural systems, such as flood plains and riparian forests, and effects on wildlife. They developed sites primarily with regard to how visitors would benefit. See figure 18. The design process did not include a holistic scientific approach with a goal of sustaining riparian and aquatic structures and functions while allowing human use. See figure 19.

Figure 18–This area was filled to build a parking lot (flat area in upper right) and the bank was stabilized using riprap.

Figure 19–This well-used wooden structure was built to facilitate visitors dragging motorboats from one lake to another. Although this was a naturally occurring low area, it was altered when the structure was built; the banks were denuded and not replanted. They continue to erode. As visitors tie their boats to vegetation, they trample the bank, causing more erosion and damaging the riparian ecosystem.

In many cases what made a site attractive was ruined by the development. Designers and engineers overlooked detrimental effects of buildings, parking lots, and roads on riparian ecosystems. For example, they often cut off

flood plains from their streams and lakes by roads, trails, and parking areas. By design, they removed vegetation critical to the health of riparian ecosystems., In the process, wildlife habitat was lost (Knight and Gutzwiller 1995).

Existing Sites

In existing developed recreation sites, overuse and mismanagement also contribute to loss of valuable riparian resources. In many campgrounds and picnic areas, individual units become larger as visitors trample edge vegetation and trim branches. Units may serve more people than they were designed to accommodate. Visitors arrive with more and more recreational equipment (separate sleeping and eating tents) to use while camping, expanding campsite boundaries, trampling vegetation, compacting soils, and increasing the potential for runoff. See figure 20.

Figure 20–Many sites were designed for one car and a single tent. Camping habits have changed. It is not uncommon to see two tents at one site, or a recreational vehicle, and other amenities such as hammocks and tiki torches. Trampled vegetation and soil compaction are evident. This site is on the edge of a lake.

The pursuit of shrubs and saplings for firewood, hiking sticks, and so on causes considerable damage. Visitors trample the ground cover and saplings. For example, at a forest campground in Michigan where a portion of the campground had been closed, McEwen and Tocher (1976) found 76 saplings per acre in the open section of the campground and 338 saplings per acre in the closed section. Trampling was the cause for the low number of saplings in the open section (Manning 1979). This condition skews the age distribution of plants and affects soil and wildlife, that is, it affects the ecosystem.

Recreation impacts are at nodes (gathering points such as campgrounds, trail heads, and rest spots) and along travel routes (Ward and Berg 1973, as seen in Manning 1979). These impacted areas have a tendency to expand over time. Visitors create their own trails (social trails) between companion units or as short cuts to certain attractions. These expansions disturb or fragment riparian vegetation and interior habitats. See figures 21, 22, 23, and 24.

Figure 21–On this social trail, plants ere trampled and soil compacted.

Figure 22–This site is becoming larger and larger. There are no site boundaries and the entry is quite wide. A table is just barely visible behind the tree on the left. The grill seems to be a great distance from the table.

Figure 23–This user-made boardwalk, leading from a lake to developed campsites, is a hazard and an intrusion into riparian vegetation.

Figure 24–Riprap, in place of riparian vegetation, alongside a trampled, compacted streambank at a developed picnic site. Alder trees grow at the base of a riprap-covered bank.

Dispersed Use

Similar damage patterns occur at dispersed-use areas. All dispersed-use areas are minimally managed for recreation but are specifically managed for timber, game habitat, grazing, or other specific resource use. Some areas share grazing and camping, which compounds the impacts to riparian ecosystems. Both activities can lead to trampled vegetation, soil compaction, and destabilized streambanks and shorelines.

Trail use is dispersed-use recreation. Several studies have documented trail erosion in certain soil types to be 1 inch per year in depth and 1 inch per year in width (Katchledge and Leonard 1970, Whitson 1974, and Burden and Randerson 1972, as seen in Manning 1979).

Many of these dispersed-use areas are so popular that visitors repeatedly return to the same spots, developing "improvements" and creating, in essence, developed sites without U.S. Department of Agriculture (USDA) Forest Service-provided amenities and management. Visitors fashion their own camp tables, stools, and privies out of adjacent trees and other nearby natural features. See figures 25, 26, and 27. Heavily frequented dispersed-use sites that lack adequate toilet facilities pose a pollution problem because of improperly disposed-of human feces. (A study in Montana showed that the "cat hole" method

of burying human feces was ineffective; *Salmonella typhimurium* survived through a summer and a winter.) Improperly disposed-of waste is exposed to surface runoff. Pathogens that can cause human diseases end up in streams and lakes and eventually in drinking water supplies (Cole 2000). New visitors attracted to these seemingly developed sites increase impacts upon the sites. Visitors who prefer undeveloped sites go elsewhere and open new areas. See figure 28.

Figure 25–Excessive dispersed use has left the ground bare, soil compacted, and the banks eroding.

Figure 26–Visitors carved steps into the bank of an incised stream.

Figure 27–Toilet seat and box frame are actually in the stream.

Figure 28–The dispersed site is at the river's edge; the ground is compacted by overuse. A broken-off tree is visible. When this area floods in the spring, there is little undergrowth and dead and down material to protect the topsoil from washing away. This is one of several dispersed sites along this stretch of river.

On the Angeles National Forest, compounded wear and boundary extensions are apparent. Every major canyon of the forest empties into Los Angeles County, which has an estimated population of 9.5 million people. (Sixteen million people live in the Los Angeles/Orange/Riverside County area.) Hundreds of persons congregate at dispersed-use sites along shallow rivers and streams, most of which are no wider than 12 feet.

Use in San Gabriel Canyon is excessive. See figures 29, 30, and 31. The riparian ecosystem averages a width of 200 feet. In one 200-yard-long section, more than 200 persons can be counted on hot weekday afternoons, May through October. Weekend use is even higher. The 10-mile-long canyon receives more than 20,000 visitors on any given Sunday during the warm months. District personnel report that, because of soil compaction, the trees are dying, their canopies are deteriorating, and they will not reach maturity. As the canopy thins, the water temperature increases. Little opportunity exists for regeneration of tree and understory growth. The river is episodically very turbid from erosion during spring runoff/flows. Increased sediment load is also caused by visitors walking in the river and stirring up the bottom, and by dust settling on the water from banks denuded by overzealous and careless visitors (Duffy 2001).

Figure 29–A typical group outing in San Gabriel Canyon with hammock, shade structure, water play toys, coolers, and trash.

Figure 30–Highway parking from the air. The stream is to the bottom (San Gabriel Canyon)

Figure 31–Parking at ground level. (San Gabriel Canyon)

At the west fork of the San Gabriel River, which supports native trout, most visitors use the first quarter mile of the river from the road. As a result, most fish are displaced from this high-use area but are plentiful upstream.

Technological improvements in motorized vehicles have also accelerated and intensified the impacts to riparian ecosystems. More powerful off-highway vehicles (OHVs) have allowed visitors easier access to more remote forest areas. For example, the Newport Ranger District on the Colville National Forest in Washington (figure 32), the Lake George Ranger District on the Ocala National Forest in Florida

(figure 33), and the Yakutat Ranger District on the Tongass-Chatham Area National Forest in Alaska have at least two things in common: they have wetlands (that is, meadows and muskegs), and they are losing the wetlands to OHV use.

Figure 32–Mud and tracks on the Colville National Forest.

Figure 33–OHV traffic has run amuck through this wetland on the Ocala National Forest.

These powerful, versatile OHVs churn and tear up the landscape. Users make their own trails, and in drier seasons, camp on wetlands. Vehicle tire ruts destroy aquatic habitat and structural components of the wetlands ecosystem in Florida, and in Alaska, interrupt natural migration patterns for salmon and other fish species on the Yakutat.

At 10-Mile Bog on the Yakutat Ranger District, OHVs have cut one trail down the main stream, leaving multiple ruts in several areas through the bog, which has several salmon-spawning streams. See figure 34. Once hatched, the salmon fry grow in the shallow protected streams before traveling to the ocean. If the fry swim into the tire ruts (many of which are the depth of the stream), they can be cut off from the main channel, become trapped, and die as the water level drops and the tire tracks dry out.

Figure 34–Multiple ATV tracks on 10-mile Bog. (This situation was remedied by providing an ATV trail on high, dry ground and by reestablishing the stream edges using coconut logs, thus blocking access to the ruts.)