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CHAPTER 6-5

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6.5 Vegetation

The extent and growth of vegetation is dependent upon the interaction between land and water. Because of this interdependence, vegetative communities are often associated with specific types of physical processes. In this way, vegetation is an indicator of potential past and present river and tidal processes, and can be used to identify areas where those processes can be preserved or enhanced. In addition, the presence or absence of certain plant communities can guide decisions about what processes to preserve or enhance at a given location. This section describes vegetation zones in the Tillamook Basin, including the uplands, lowland valley floodplains, riparian areas, and tidal marshes. Historic forest and riparian conditions are reviewed, and characteristics of the large wood in lowlands are assessed.

6.5.1 Vegetation Zones of Tillamook Basin: Upland, Valley and Estuary

■ Objective

Using vegetation to coarsely categorize the landscape into zones provides a framework for understanding the processes at work in each zone, and for making spatially-specific planning-level recommendations. The objective of this assessment was to delineate the major plant communities in the Tillamook Bay Basin and assess the relative importance of the communities to fish and wildlife habitats.

■ Method

Written and mapped data were integrated to define meaningful delineations among the major vegetative communities in the Tillamook basin using GIS. The zones were designed to represent a correlation between vegetative community, slope, and the extent and duration of inundation by either fresh or salt water. In each instance, the zone represents a maximum spatial extent for each community (Figure 6-5-1).

■ Discussion

Two major upland vegetation zones occur in the Tillamook Bay Basin: the Sitka spruce (*Picea sitchensis*) forest zone and western hemlock (*Tsuga heterophylla*) forest zone. The Sitka spruce forest zone extends a few miles inland within the zone of tidal influence, and up the major river valleys to an elevation of about 500 feet (Franklin & Dyrness, 1988). The most common trees in this forest zone are Sitka spruce, western hemlock, Douglas fir (*Pseudotsuga manziesii*) western red-cedar (*Thuja plicata*), and red alder (*Alnus rubra*) (Franklin & Dyrness, 1988).

The western hemlock forest zone tolerates a mild, maritime climate, with a greater tolerance range of temperature and moisture than the Sitka spruce zone. In the Tillamook Bay Basin, the western hemlock/ Douglas fir forest zone occupies most uplands above approximately 500 ft. Major tree species in this zone include Douglas fir, western hemlock and western red cedar. Dominant early seral trees include red alder and big-leaf maple (*Acer macrophyllum*). These species typically occupy the zone near the channel because of their tolerance for high water table and for flooding. A diverse understory of shrubs, herbaceous perennials, annuals and grasses is complimented by high diversity in mosses, lichens and fungi for both forest types.

Lowland valley floodplain riparian forests are characterized by western red cedar, red alder, big-leaf maple and black cottonwood (*Populus trichocarpa*) (Franklin & Dyrness, 1988). A highly diverse understory of shrubs and herbaceous perennials is featured in floodplain plant communities. Topographic variation provides distinct habitat niches according to moisture regime and groundwater levels, from former channels such as oxbows and other floodplain wetland types to natural levees and alluvial terraces. These variations are important for fish and wildlife habitat.

Estuarine plant communities are distinguished by water regime. Tillamook Bay historically contained low salt (brackish) marsh below mean high water, high salt marsh above mean high water, swamp at higher tidal elevation, and wet meadows at the saltwater/freshwater interface. Brackish marshes support herbaceous plants such as pickleweed (*Salicornia virginica*), sedges (*Carex lyngbyi*), and bulrush (*Scirpus maritimus and americanus*). High salt marsh typically includes hairgrass (*Deschampsia caespitosa*), silverweed (*Potentilla pacifica*), Baltic rush (*Juncus balticus*) and meadow barley (*Hordeum brachyantherum*). Swamps have high water table and support woody plants such as willows (*Salix spp.*), alder, Sitka spruce, Douglas spirea (*Spiraea douglassii*) and herbaceous species. Wet meadows typically support grasses, sedges, and rushes, particularly slough sedge (*Carex obnupta*) and soft rush (*Juncus effusus*). Most of these have been converted to agricultural uses.

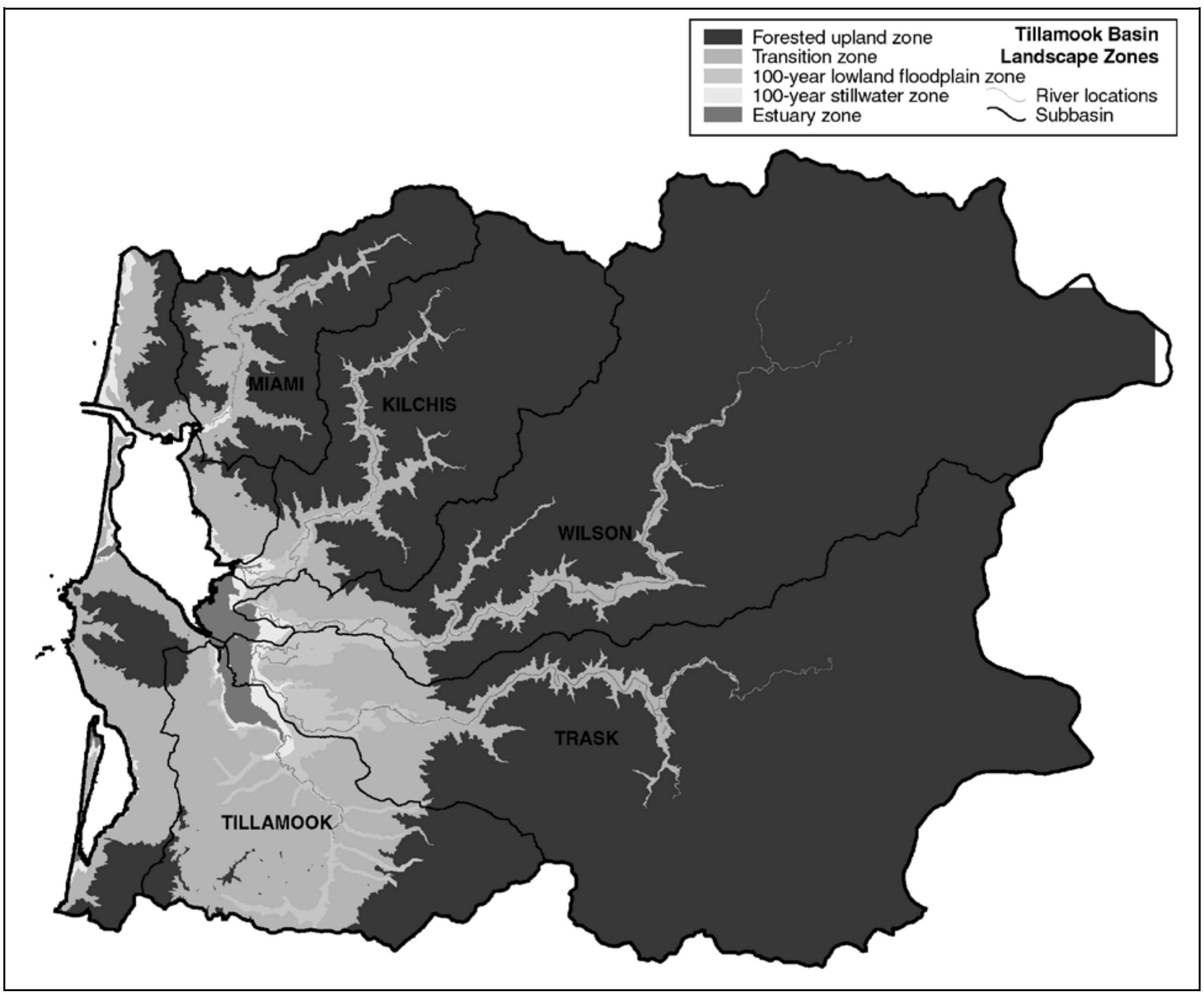

Figure 6-5-1. Vegetation Zones of the Tillamook Basin

6.5.2 Upland and Lowland Forest Historic Conditions

■ Objectives

Forest stand structure is important for landscape-scale processes, because large trees buffer the impacts of storms on the upland landscape, and moderate the force and speed with which rain and stormwater are delivered to the stream network. The structure and distribution of large wood in channels plays a key role in the stability of upland streams. Therefore, large trees are critical to the stability of the upland landscape and the rates of sediment delivery to the stream network. The objective of this assessment was to review available spatial data on landscape-scale vegetation structure and distribution, with special reference to human impacts on the historic landscape.

■ Methods

Available GIS data layers for the Tillamook Basin relevant to terrestrial analysis were reviewed. Few of the available data layers were reliable for site-specific analyses, but some did provide data for larger scale landscape analyses of historic change. The resulting maps provided a basic outline of forest cover changes in the basin uplands and lowlands from the 1850s to 1992, focusing on the presence or absence of forests and the distribution of mature forest (over 100 years in age).

■ Discussion

In the 1850s the Tillamook basin uplands were almost entirely covered by mature forest. Extensive burns (Figure 6-5-2) and human land use in the 1900s caused a changing mixture of mature and young forest in the uplands (Figure 6-5-3) (Williams/Cushman, 1999).

In the uplands by the 1890s a non-forest area increased in the west along upland/lowland border, while the small southern area that was non-forest in 1850 closed in. By 1890, most of the basin uplands remained mature forest. In 1920, young forests encroached even further on the last remaining non-forested areas. The portions along the shore of the border area remained non-mature forests. By 1945, drastic upland landscape changes included massive fires, which burned most of the basin's forest starting in the 1920s (Figure 6-5-3). Salvage logging operations began in areas affected by fires. Burned trees were seen as "wasted wood" and forests that were already damaged by fires were further devastated by salvage logging operations. By the 1950s, most of the mature forest was gone, and that which remained was in the southern portion of the basin. An area to the South and an area to the East along the border between the uplands and lowlands remained forested. By 1974-75, forests regenerated in a patchy, fragmented network. Young forests dominated the landscape with numerous small patches of mature forest throughout. In 1986, forest land cover was similar to 1974-75, and a high degree of fragmentation remained. 1992 maps showed most of the basin covered in young forest, with small patches of mature forest fragments throughout. The historic trends in upland forest cover show the dramatic reforestation that occurred in the latter half of the 1900s, as forest lands were allowed to grow back from the devasting fires. This growth potential in the uplands is encouraging for the development of timber harvest management plans that seek to balance ecological and economic interests.

Lowland forest cover maps were created only for the 1974-75 and 1986 time periods from available GIS data, and thus do not provide significant historical information (Figure 6-5-3). A 20 percent coverage of the lowlands by forest in 1857 was assumed based on estimated conversion of lands to pasture at that time. The lowland estimates provide a reasonable landscape-scale view of forest cover during those periods. Unlike the uplands, it is evident that lowland forest cover has not had the opportunity to increase due to established

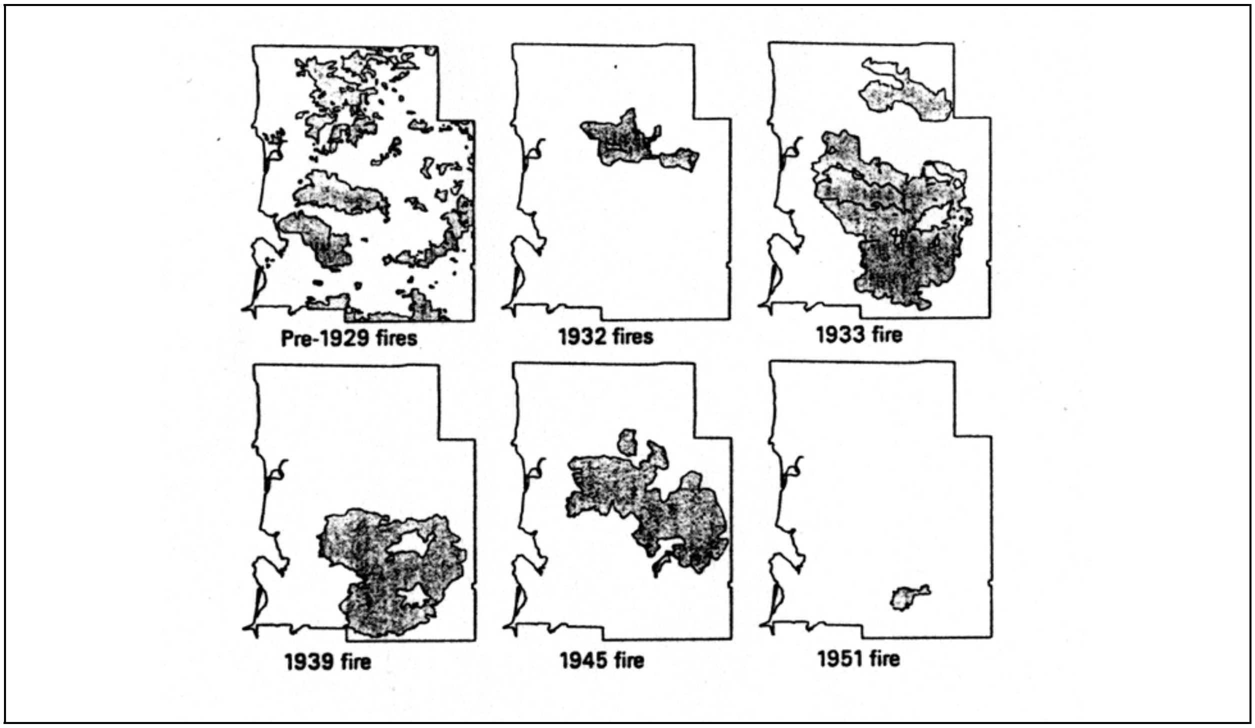

Figure 6-5-2. Historic Burn Areas in Tillamook County Source: Chen, 1997

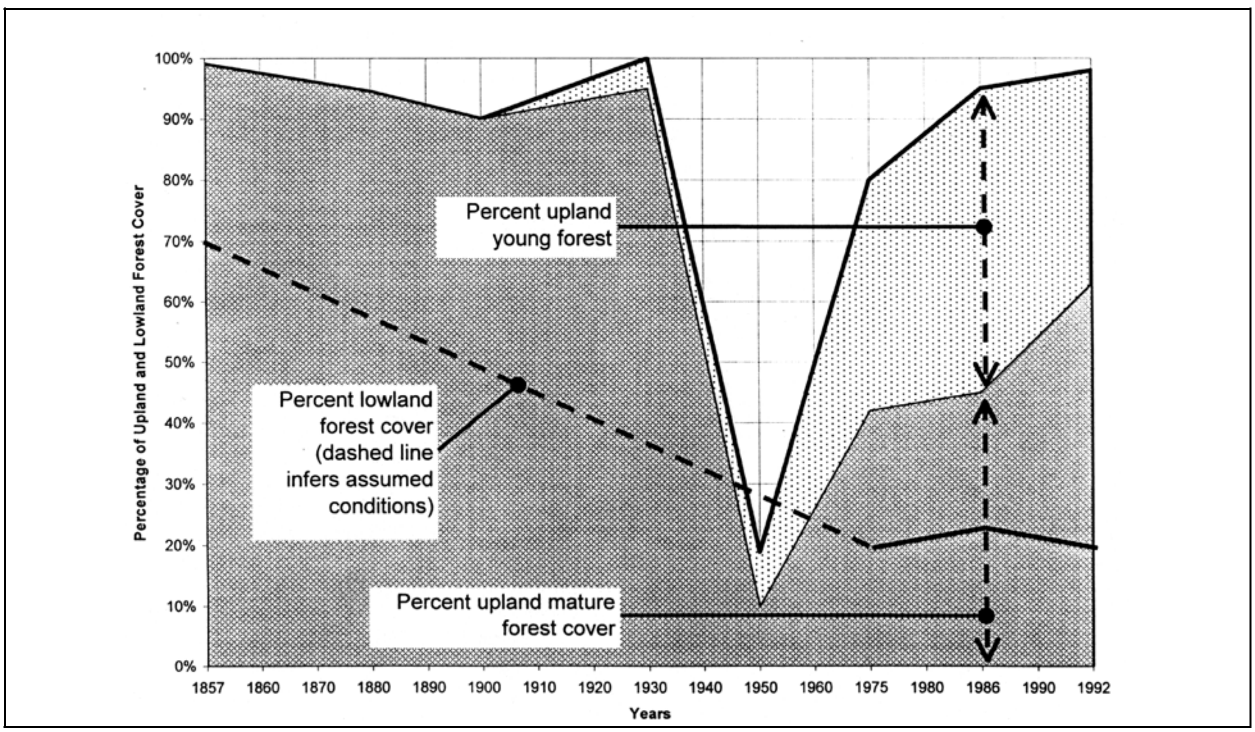

Figure 6-5-3. Historic Trends in Tillamook Upland and Lowland Forest Cover

agricultural and urban land uses. Restoration and integration of riparian corridors along the lowland rivers and sloughs would add to ecological diversity in the lowlands and create fish & wildlife habitats.

In many cases, GIS data layers used in this assessment were not compatible, did not have the same resolution, or did not have the same accuracy and could not be used to analyze terrestrial ecology at less than a landscape scale. In some cases, it could not be determined if these differences occurred within a single data layer. These are typical limitations to GIS-based ecological analyses. Since the Tillamook project is potentially a pilot for such studies throughout the region, protocols should be based on methods feasible in areas where GIS data are not available.