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Floodplain Vegetation

While channel alteration has been extensive and ecologically detrimental in many reaches of the Willamette River, changing the native floodplain forest of the Willamette River was even easier than changing the channel. Early settlers used the cottonwood and ash forests as a source of lumber and firewood, and riverboat operators created log decks along the river to store fuel cut from the floodplain forests. Development of farms, towns, and cities along the Willamette River accompanied a clearing of the floodplain forest to create tillable fields and provide firewood. The narrow corridor of remaining forest along the Willamette River is now vulnerable to loss by channel migration or bank erosion during high floods. Historically, the wide floodplain forests were not sensitive to the local losses of forest by erosion and channel change, but today's narrow forest margins cannot withstand flood events as they did in the past.

Figure 179. *Floodplain forest along the mainstem Willamette River.*

The Data

As described on pages 40-43, maps of the river in 1850, 1895, 1932, and 1990 provide a scientifically quantitative measure of the types and extent of riparian plant communities along the Willamette River and its floodplain. We use the floodplain axis as a quantifiable context for tracking changes in floodplain vegetation just as we did for channel complexity on the preceding pages. Within each 1-km slice, we measure the length and area of floodplain vegetation and the percent of the floodplain occupied by forests. This longitudinal display of the vegetation within the floodplain creates a linear illustration of floodplain plant communities, a chart of the changing biological conditions of the river and its floodplain. We focus on the floodplain forest because this was the dominant riparian plant community prior to settlement. Prairies, non-forest wetlands, and oak savannas were a minor component of the mainstem riparian areas (see pp. 40-43).

Patterns

We compare the longitudinal patterns of floodplain forests along the Willamette River in 1850 and 1990 to determine the potential for restoration (Figs. 181-86). In the graphs on the facing page, it is important to note differences in the values along the vertical axis of the graph. Loss of forests was so extensive along the entire length of river that the bars of the histogram would be barely detectable for 1990 if we used the same values on the vertical axis that were used for 1850. The axis for area of forest in 1990 is one-fifth the scale of the axis for 1850, and the axis for length of forest in 1990 is the same as the scale of the axis in 1850.

The overall shape of the graph of area of forest along the channel in 1990 is similar in shape to 1850, but the values for area of 1990 forest are 75% to 90% lower than 1850 values (Figs. 181, 182). The broader floodplain of the upper river still contains the greatest area of forest, and the maximum area of forest in any single 1-km slice of floodplain is at the Santiam River and Luckiamute River confluences with the Willamette River.

In 1850, the pattern of the length of forested margins along the Willamette River was almost identical to the pattern of the area of forested margins (Figs. 181, 183). By 1990, the floodplain forest had been fragmented so that length of floodplain forest is greatly diminished and bears little resemblance to the pattern in 1850. Isolated patches near Eugene and downstream of Salem still show higher extents of forested length, but their values are less than 10% of the values observed in 1850.

In 1850, forests occupied roughly 20-80% of the total floodplain area (Fig. 181). The wide floodplains upstream from Albany had woody forests over 20-40% of their area ca. 1850. The middle reach from Albany to Newberg had variable floodplain widths, but forests occupied 40-80% of the floodplain area. The narrow floodplain below Newberg was variable, with 20-60% of the floodplain in woody forest. By 1990, less than 10% of the area inundated under historical floods is occupied by forests. Only the floodplains between Portland and Salem exhibit forests that approach 20-40%, and even that level is far less than historical extents in this section of the river.

Potential for Restoration

The potential for restoration efforts successfully to restore floodplain forests differs along the Willamette River. Historical patterns of forests provide a context for evaluating potential recovery of floodplain forests through restoration action. The difference between the graphs of channel complexity in 1850 and 1995 provides a longitudinal measure of the relative loss or gain in channel complexity (Fig. 174, p. 134). Figure 180 below depicts the change in forest patterns described above. In contrast to restoration of channel complexity, both the upper and middle river sections have the greatest potential for future recovery of floodplain forests. The middle reach of the Willamette River offers unique opportunities because it historically exhibited some of the most extensive floodplain forest and more of the floodplain was vegetated by forests than any other reach of the river (Fig. 185). Some of this land is managed by the Oregon Parks and Recreation Department, and park managers are actively restoring some of the side channels and floodplain features that have been modified over the last 150 years. Restoration of forest communities in the public parks is an important opportunity for ecologically sound restoration (p. 140).

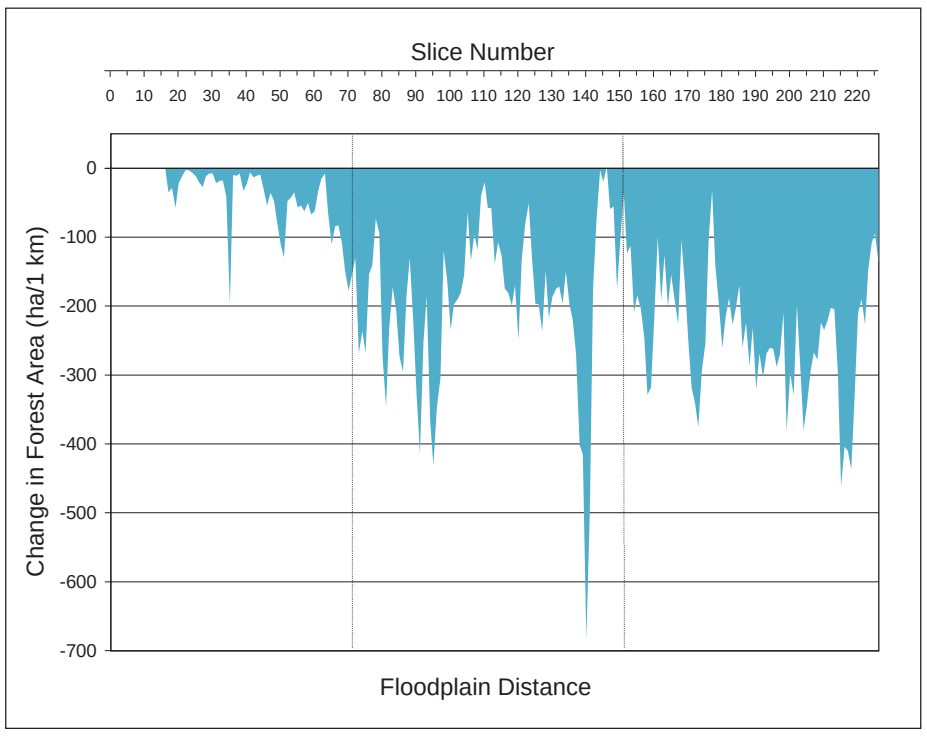

Figure 180. *Net increase or decrease in area of floodplain forest per 1 km of floodplain distance between 1850 and 1990.*

Figures 181-186 (facing page). *Longitudinal patterns of floodplain forests along the mainstem of the Willamette River. Note change in scale of vertical axis in Figures 181-84.*

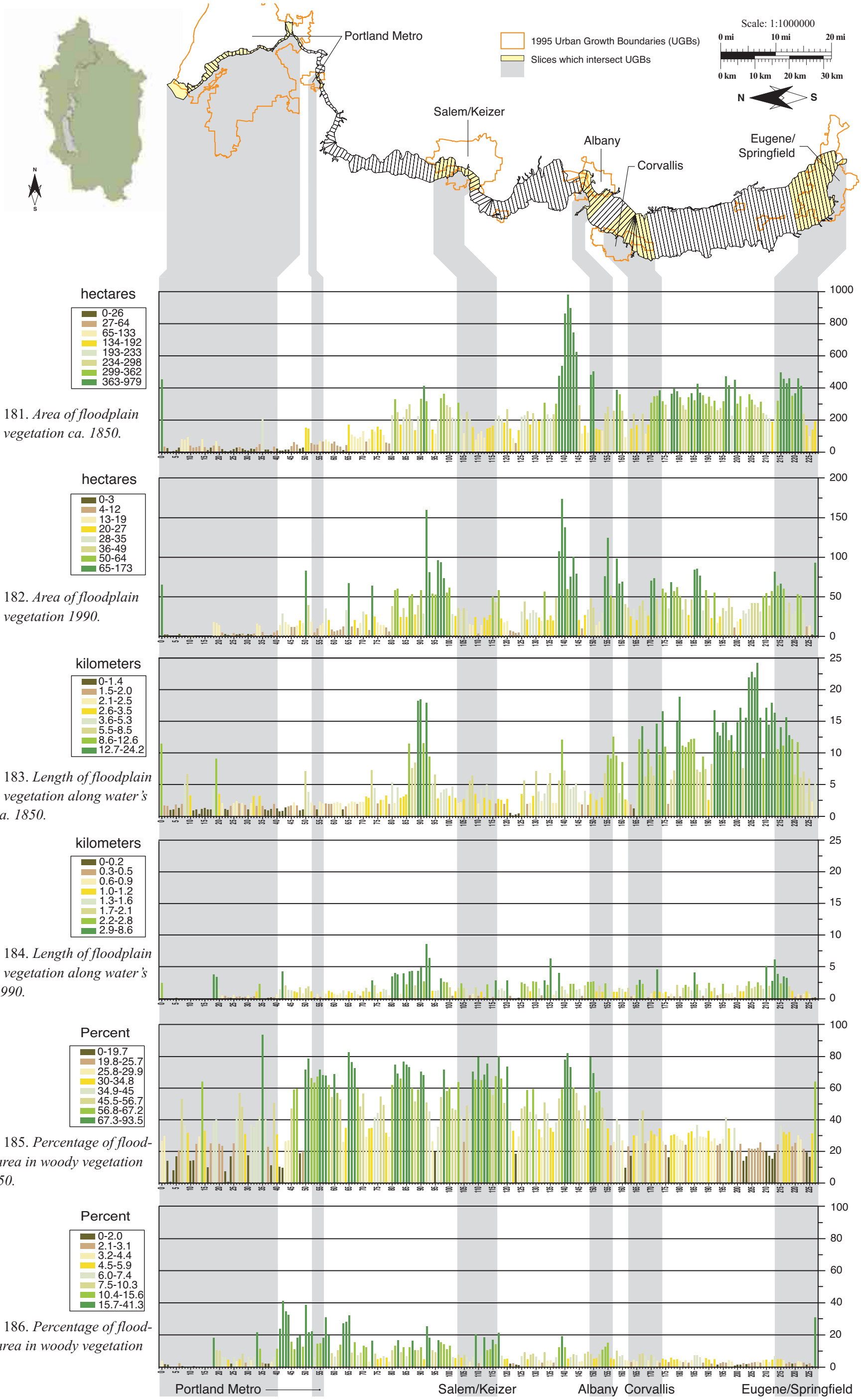

Figure 181. *Area of floodplain woody vegetation ca. 1850.*

Figure 182. *Area of floodplain woody vegetation 1990.*

Figure 183. *Length of floodplain woody vegetation along water's edge ca. 1850.*

Figure 184. *Length of floodplain woody vegetation along water's edge 1990.*

Figure 185. *Percentage of floodplain area in woody vegetation ca. 1850.*

Figure 186. *Percentage of floodplain area in woody vegetation 1990.*

Note: *1 hectare equals 2.47 acres, 1 kilometer equals .62 mile*