IMPACTS OF LAKE SHORE RESIDENTIAL DEVELOPMENT ON COARSE WOODY DEBRIS IN NORTH TEMPERATE LAKES

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Abstract. Coarse woody debris (CWD) is a critical input from forested watersheds into aquatic ecosystems. Human activities often reduce the abundance of CWD in fluvial systems, but little is known about human impacts on CWD in lakes. We surveyed 16 north temperate lakes to assess relationships among CWD, riparian vegetation, and shoreline residential development. We found strong positive correlation between CWD density and riparian tree density ($r^2 = 0.78$), and strong negative correlation between CWD density and shoreline cabin density ($r^2 = 0.71$) at the whole-lake scale. At finer spatial scales (e.g., between sampling plots), correlations between CWD and riparian vegetation were weaker. The strength of relationships between CWD and riparian vegetation was also negatively influenced by the extent of cabin development. Overall, there was significantly more CWD in undeveloped lakes (mean of 555 logs/km of shoreline) than in developed lakes. Within developed lakes, CWD density differed between forested sites (mean of 379 logs/km of shoreline) and cabin-occupied sites (mean of 57 logs/km of shoreline). These losses of CWD will affect littoral communities in developed north temperate lakes for about two centuries. Because CWD is important littoral habitat for many aquatic organisms, zoning and lake management should aim to minimize further reductions of aquatic CWD and woody vegetation from lakeshore residences.

Key words: coarse woody debris; lakeshore; littoral zone; residential development; riparian; shoreline development; snag.