

REGIONAL BIOMASS STORES AND DYNAMICS IN FORESTS OF COASTAL ALASKA

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Abstract—Coastal Alaska is a vast forested region (6.2 million ha) with the potential to store large amounts of carbon in live and dead biomass thus influencing continental and global carbon dynamics. The main objectives of this study were to assess regional biomass stores, examine the biomass partitioning between live and dead pools, and evaluate the effect of disturbance on live and dead biomass pools. Data collected by the Forest Inventory and Analysis program between 1995 and 2003 across all ownerships in Coastal Alaska were used to estimate live tree, snag, and log biomass pools in forest types, and ecoregions (Boreal versus Temperate). The regional average combined (live and dead) biomass was 76.7 ± 3.8 Mg/ha in the Boreal ecoregion and 277.5 ± 5.4 Mg/ha in the Temperate ecoregion. Biomass of snags and logs comprising Coarse Woody Debris (CWD) pool was 35.1 ± 3.1 Mg/ha in the Boreal ecoregion and 58.6 ± 2.1 Mg/ha in the Temperate ecoregion. Total regional biomass was 45.4 ± 3.0 Tg and 1001.9 ± 20.6 Tg, whereas CWD biomass was 20.8 ± 2.1 Tg and 211.4 ± 7.7 Tg for the Boreal and the Temperate ecoregions, respectively. In the Boreal ecoregion, the recent spruce bark beetle outbreaks greatly increased CWD stores, with damaged stands containing 82% of total CWD biomass. Decomposition rate-constants for beetle-killed spruce in the Boreal ecoregion were 0.02 yr^{-1} (from chronosequence) and 0.04 yr^{-1} (from decomposition-vectors) for logs and 0.001 yr^{-1} for snags. The complexity of temporal pattern of C stores and fluxes was influenced by the form of mortality (snags vs. logs). In the Temperate ecoregion, undisturbed stands contained 76% of total CWD, indicating disturbance had less impact on CWD stores. In Coastal Alaska, average live biomass (194.0 ± 4.1 Mg/ha) was 4–23 percent higher and average snag biomass (29.5 ± 1.0 Mg/ha) was approximately twice as high as that found in Washington and Oregon, states considered to have high biomass stores.

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