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Mountain Pine Beetle Outbreaks in the Rocky Mountains: Effects on Fuels and Fire in Lodgepole Pine Forest (Abstract)

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ROMME, W. H., D. H. KNIGHT, and J. FEDDERS. Fort Lewis College, Durango, CO 81301, USA, University of Wyoming, Laramie, WY 82071, USA, and West Virginia University, Morgantown, WV 26506 USA.
Mountain pine beetle outbreaks in the Rocky Mountains: effects on fuels and fire in lodgepole pine forest.

Changes in fuels were studied in northwestern Wyoming by sampling a sequence of ten stands that had been heavily damaged by beetles from 1 to 20 years earlier. Leaf litter increased only slightly (3–6%) for six years, and large woody fuels (which contribute much less to flammability) increased steadily and substantially (up to 16×) for at least 20 years. Other fuel categories did not change significantly. While flammability may be increased during the first year or two after a beetle infestation because dead leaves are still on the trees, the risk of destructive fire during years 2–20 may be lower, primarily because 1) the continuity of canopy fuels is reduced and 2) the proportionate increase in forest floor fine fuels is small. Accelerated growth in understory trees may increase fuel continuity and fire risk after 20 years. Other factors such as drought, the proportion of the trees killed and the probability of lightning strikes are important variables.

ROOT, T. Princeton University, Princeton, NJ 08544, USA. **Energetic constraints on avian distributions.**

On a continent-wide scale, temperature is the major factor influencing the northern range boundary of birds wintering in the United States and southern Canada. Using distribution and abundance maps plotted from ten years of the National Audubon Society's Christmas Bird Count data and physiological information gleaned from the literature, I was able to quantify the energetic demands placed on birds by the colder climates present at their northern range limits. At these limits, passerines elevate their metabolisms roughly 2.5 times their basal metabolic rates. Ecologically this means that the northern distributional boundaries of species can be predicted from their basal metabolic rates, and that species with higher rates will have ranges extending proportionally farther north than those with lower rates.

ROSE, K. A., R. L. DWYER, and M. A. TURNER. Martin Marietta Environmental Systems, Columbia, MD 21045, USA. **A water quality model of the Bush River, MD: Monte Carlo analysis of the effects of increased nutrient loadings.**

A water quality model consisting of a one-dimensional hydrodynamic module coupled with a water quality module was used to assess the effects of increased nutrient loadings on the water quality of the Bush River, MD. The hydrodynamic module represented the water movement (and physical transport of associated constituents) among 12 spatial segments. The water quality module represented the biological processes affecting nitrogen, phosphorus, chlorophyll *a* and dissolved oxygen in each segment (e.g., photosynthesis, nutrient uptake, decomposition). The hydrodynamic module was calibrated and validated using observed salinity gradients, tide heights and measured current velocities. The water quality module was calibrated to data from a 9-month survey and validated using data from three 36-hour surveys and estimates of water column oxygen production and consumption rates. Monte Carlo analyses (using Latin hypercube sampling) enabled estimation of the uncertainty of model predictions.

Program of the

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