

ABSTRACTS

BIOLOGICAL SCIENCES - AQUATIC

EFFECT OF ROTENONE ON DIATOM VIABILITY ^{MAS}

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Diatoms play an important role in stream ecology, but their viability may be compromised by rotenone. Rotenone is a compound used by government agencies to control unwanted fish. I am using a diatom as a model organism to predict the impact of rotenone on stream ecology. I have devised a way to measure the effects of this compound on diatoms, which, if negative, have the potential to affect the entire ecosystem. Two methods were employed for this purpose. Motility has been shown to be a good indicator of cell health, so this was examined first. Cells were grown in a defined medium and prepared in a cell suspension. This suspension was divided, treated with rotenone for tests, left untreated for controls, and dispensed into test tubes. Cells were videotaped on a microscope slide at one, four, and twenty-four hour intervals to calculate percent motility. A reduction in percent motility compared to healthy cells indicated an effect of the rotenone. The second method employed was an adhesion assay. It has been shown that diatoms contribute to sediment stability, which requires adhesion. To measure the percent adhesion, a cell suspension of 400,000 cells was placed in a beaker containing a cover glass. Triplicates are made of each test and control. The number of diatoms attaching to the cover glass is measured by determination of chlorophyll a and the results presented as a percent of the control.

BIOLOGICAL SCIENCES - BOTANY

DO STRIP BARK CONIFERS REFLECT CO₂ FERTILIZATION IN THE 20TH CENTURY? ^{MAS}

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I propose to investigate the potential for CO₂ fertilization of high elevation conifers in the Tobacco Root Mountains. At upper tree-line, it has been traditionally thought that tree growth is governed by growing season temperature. However, in the past several decades new research evidence has demonstrated unprecedented growth rates in upper tree line forest that have been ascribed to enhanced CO₂ fertilization. Strip bark trees in particular show this accelerated growth rate. Trees with the strip bark morphology are characterized by their

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partial cambial dieback, which may be directly related to their rapid growth rates. There remains a controversy pertaining to the geographical extent of this phenomenon and its physiological interpretation. The objectives of my research were to: Determine if white bark pine trees at upper tree line in the Tobacco Root Mountains exhibit anomalous growth rates during the 20th century. Assess the evidence for CO₂ fertilization as a cause of differential growth rates. My results will speak to the issue of whether increased atmospheric CO₂ concentrations during the 20th century has significantly altered tree growth, and thus serves as one of the first indications of the impacts of global change on terrestrial ecosystems.

BIOLOGICAL SCIENCES - TERRESTRIAL

QUANTITATIVE MOTION ANALYSIS AND SPATIAL DYNAMICS OF SNOWSHOE HARES IN DIFFERENT HABITAT TYPES ^{TWS}

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Snowshoe hares (*Lepus americanus*) are the primary prey of a threatened carnivore—the Canada lynx (*Lynx Canadensis*). A pressing management question in lynx conservation is how snowshoe hares respond to the pre-commercial thinning occurring across the northern U.S. I studied this habitat issue using quantitative motion analysis. Primary movement data provides a window into an animal's relationship with its landscape, and its behavior with detail. During winters from 1999-2001, I back-tracked radio-collared hares across snow on four forest thinning treatments in Northwestern Montana. I measured turning angles every 5 m for up to 70 m of path, distance and direction to shelter at each point, described habitat conditions and noted the behavior of the hare as evidenced by the tracks. I quantified the tortuosity (lack of directional bias) of hare paths in each of the forest treatment types. I also elicited realistic predator-avoidance behavior using a domestic dog to flush the hares. Baseline data indicate that hares in areas with high secondary growth exhibit higher tortuosity compared to the relatively "straight line" movements of hares in open areas. Interestingly, hares in open canopy young forest regularly move like hares flushed by a predator in closed cover. Thus, movements may reflect fitness consequences.

WINTER, SUMMER, DIURNAL, AND NOCTURNAL HOME RANGES OF SNOWSHOE HARES IN WESTERN MONTANA ^{TWS}

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Snowshoe hare (*Lepus americanus*) home range is an important parameter in mark-recapture density estimation, and could affect interactions between hares and the Canada lynx (*Lynx canadensis*). We estimated winter and summer snowshoe hare home range size in