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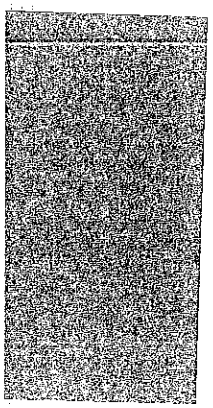
californica californica), and overwintering bald eagles (*Hallaeetus leucocephalus*). The IPM plan outlines an approach for monitoring thresholds of pest activities to determine when pest control is necessary. The IPM plan emphasizes the use of cultural, biological, and mechanical control measures thus minimizing the potental for primary and secondary poisoning of non-target species associated with chemical control measures.

MACKLIN, ERIC A. and JAMES S. CLARK. Duke University, Durham, NC 27708, USA. Local vs. regional time scales: a synthesis of life-history and physiological trade-offs leading to species coexistence.

Classical models of competition predict conditions required for coexistence based on the assumption of spatial homogeneity. This assumption is generally invalid, especially in the case of plants and other sessile organisms. In models of plant competition, interactions are local rather than regional. Metapopulation models incorporate this structure but traditionally have assumed that the time scale for local dynamics are fast relative to the regional dynamics. We develop a tractable metapopulation model that allows local and regional time scales to be varied independently. We use this model to generalize the results obtained from a simulation model of plant competition that incorporates space explicitly. The effects of growth, competition, and dispersal on population growth and spread in the forest simulator are reduced to two terms describing the local and regional time scales of population regulation. This coupling of analytical and numerical modelling provides a tractable approach for extracting the effects of specific physiological and life-history traits on coexistence of trees in a forested landscape. Using this approach, we provide a synthesis of existing models of coexistence dependent upon trade-offs between a suite of physiological and life-history traits. We demonstrate that conditions for coexistence expand when the relative regional time scales of competing species is large (as from differences in dispersal ability) relative to the local time scales (as governed by growth and competition parameters).

MADSEN, JOHN D., JAMES W. SUTHERLAND, JAY A. BLOOMFIELD, LARRY W. EICHLER and CHARLES W. BOYLEN. US Army Engineer Waterways Experiment Station, Lewisville, TX 75056-9720 USA, New York State Department of Environmental Conservation, Albany, NY 12233-3502 USA and Rensselaer Polytechnic Institute, Troy, NY 12180-3590 USA. Salinity and sediment effects on the growth of six aquatic macrophytes for potential revegetation of Onondaga Lake, New York.

Onondaga Lake has residual salinity and highly altered sediment characteristics resulting from inputs of $CaCl_2$, a byproduct of a century of industrial processes impacting the lake. Since water chemistry became saline, few aquatic plants have been observed in the lake. A study of the effects of historically high salinity and highly altered sediments was undertaken to determine which of these factors restrict plant growth more, and to predict the prospects for revegetation as water chemistry improves. Six plant species were tested under a range of six water chemistry regimes ranging from 0.08 to 3.0 ppt salinity utilizing Onondaga Lake and reference sediments. They included *Myriophyllum spicatum*, *Nymphaea odorata*, *Potamogeton nodosus*, *P. pectinatus*, *Sagittaria latifolia*, and *Typha latifolia*. All six species exhibited reduced growth on the Onondaga Lake sediments, while the emergent and floating-leafed species also exhibited significant growth reductions at higher salinities. The effects of these treatments on plant macronutrient and sodium content also is discussed.



MAENZA-GMELCH, TERRYANNE E. New York University, New York, NY 10003 USA. The role of fire in the development and maintenance of Quercus forest in the Hudson Highlands, lower Hudson Valley, southeastern New York.

A pair of AMS radiocarbon-dated plant macrofossil, pollen, and charcoal records spanning from the late-glacial - Holocene transition to the present reveals the apparent role of fire in the development and maintenance of Quercus forest in the Hudson Highlands, southeastern New York. Charcoal concentrations ($\mu m^2/cm^3$) in sediments from Sutherland (41°23'29"N, 74°02'16"W) and Spruce Ponds (41°14'22"N, 74°12'15"W) suggest that fire may have been more important during the Holocene than between ~12,500 and 10,000 radiocarbon years B.P. Charcoal concentrations and Quercus pollen frequency and influx values rise after 12,500 yr B.P., drop between roughly 11,000 and 10,000 (Younger Dryas age), then expand after 10,000 yr B.P. A temporary decrease in charcoal concentrations after about 9500 yr B.P. is associated with slightly decreased Quercus and increased Tsuga frequency and influx values and earliest occurrence of Tsuga needles. This is followed by re-expansion of charcoal concentrations, an increase in Quercus and a decrease in Tsuga suggesting that fire was possibly a factor restricting Tsuga. Consistently high values of Quercus correspond with high charcoal concentrations for the following nine millennia.

MAGEE, TERESA K.[1], KATHLEEN A. DWIRE[1], TED L. ERNST[1], and MARY E. KENUTLA[2]. [1]ManTech Environmental Research Services Corporation. Corvallis, OR 97333. [2] U.S. Environmental Protection Agency. Corvallis, OR 97333. Plant species richness and distribution in naturally occurring and restored and created wetlands in an urban environment.

Wetland restoration and creation projects required under the Clean Water Act are often intended to replace the functions of naturally occurring wetlands. We evaluated plant species richness, composition, and distribution in naturally occurring (n=48) and project (n=49) freshwater, emergent wetlands within the urban growth boundary of Portland, OR. Naturally occurring wetlands and projects clearly separate in canonical correspondence analysis along axes related to wetland type (marsh or pond) and land use. A total of 365 species (54% native, 46% introduced) were found across all sites. Comparisons between projects and naturally occurring wetlands showed: 1) neither had species accumulation curves that levelled, 2) similar ratios of occurrences of native and introduced taxa, 3) different species distributions ($p<<0.001$), 4) greater species richness on projects ($p<<0.001$), 5) more frequent occurrence of obligate wetland taxa on projects, and 6) 86 species unique to projects and 66 species unique to naturally occurring wetlands. Our results show that projects (up to ten years in age) and naturally occurring wetlands differ in species richness and composition. The dilution of the native flora by introduced species may indicate degraded condition due to the location of naturally occurring wetlands and projects in an urban setting.