REGENERATION STRATEGIES OF JAPANESE BARBERRY (*BERBERIS THUNBERGII* DC) IN COASTAL FORESTS OF MAINE

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Invasive exotic plant species have been shown to threaten biodiversity, habitat quality, and ecosystem functions, as well as agricultural and silvicultural economics via loss of revenue and high costs of invasive control programs. Invasion into intact closed-canopy forest ecosystems is less common than in open (e.g. grassland) habitats. However, one invasive species that has successfully invaded forests is the introduced ornamental shrub Japanese barberry (*Berberis thunbergii* DC.) in the family Berberidaceae. Japanese barberry was introduced over 125 years ago and is becoming a major threat to native systems, but relatively little has been published about the basic biology or ecology of the species. Gaps in knowledge include shortages of published information about regeneration dynamics and seedbanks. This study addresses the questions: (1) What is the density and origin of regenerating Japanese barberry and other species before and after removal of the Japanese barberry overstory? (2) Does a portion of Japanese barberry seeds remain viable for at least a year under natural conditions? (3) Do varying temperature and moisture regimes affect the germination success of seeds with and without the presence of Japanese barberry fruit pulp?

These questions will be addressed by two separate studies. The first study encompasses questions 1 and 2 and consists of a field study and greenhouse study. Monhegan Island, ME, and Wells National Estuarine Research Reserve in Wells, ME, have been chosen for study sites due to high levels of barberry invasion. A continuous stand of Japanese barberry will be delineated at each site, and transects will be cut through each stand to allow access to sample plots. A maximum of thirty 1m radius plots will be cleared and sampled on Monhegan Island in late summer 2004 before the current year's fruits ripen. Measurements will include percent cover of Japanese barberry, percent overstory shade, Japanese barberry regeneration counts, and the presence of other species. A pair of soil samples (14cm x 14cm x 10cm) will be collected from one half of each plot. One soil sample will be placed in a greenhouse setting, and Japanese barberry seedlings will be counted as they emerge. The other soil sample in each pair will be kept in cold storage over the winter and will be processed using the same methods in spring 2005. One soil sample in up to 30 additional sample plots will be collected in spring 2005 on Monhegan Island and from another 30 plots on the Wells Research Reserve. The undisturbed halves of all sample plots will be sampled in late summer 2005 to gather additional regeneration data for Japanese barberry and other species.

Study Two consists of collecting ripe fruits from the two sites and germination of intact fruits, extracted seeds, and commercially collected control seeds in growth chambers. Replicates of 25 control seeds and 25 extracted seeds will be incubated in growth chambers to identify the optimum temperature and moisture regimes for germination. An additional 25 seeds in berries will be used in each replicate to evaluate the influence of the fruit pulp on germination.