PLANT SPECIES IN THE RIPARIAN ZONE AT THE EAST END OF BLUEBERRY LAKE, TEMAGAMI, ONTARIO: A PILOT STUDY

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Introduction

The nature of streamside or riparian ecosystems in eastern Canada is virtually unknown and the minimal protection from logging that they receive in Ontario will ultimately lead to their demise in that province. This lack of understanding and protection is somewhat surprising considering that they are typically one of the most productive and biologically diverse ecosystems in the forested landscape (Thomas 1979, Hunter 1990, Gregory et al. 1991, Naiman et al. 1993, Naiman and Decamps 1997). Because of this productivity and diversity, riparian ecosystems are extremely valuable to people by providing many goods and services such as aesthetic beauty, access to water, a source of food such as fish, etc. Unfortunately, however, these ecosystems have been heavily exploited and poorly conserved by humans. More than 80% of North America's original riparian ecosystems have disappeared due to this exploitation (Naiman et al. 1993).

In an attempt to minimize logging impacts to riparian ecosystems and their associated aquatic ecosystems in Ontario, the government's current *Code of Practice for Timber Operations in Riparian Areas* specifies that a three meter buffer zone must be left along stream banks (OMNR 1991). However, our observations in the field indicate that riparian (stream bank) ecosystems in central Ontario's forests are often wider than three meters. There is also mounting evidence from studies conducted elsewhere that much wider buffer zones are required to protect the full complement of biodiversity in riparian ecosystems. For example, Spackman and Hughes (1995), studying riparian ecosystems in Vermont, found that to include 90% of the riparian plant species, the stream buffer zone must range from 10 to 30 meters in width. The same study also showed that to include 90% of the bird species of the riparian ecosystem, the buffer width must vary from 75 to 175 meters. Another study examining six species of *Ambystoma* salamanders that depend on wetlands, primarily in northeastern and northcentral United States, found that to include 95% of the salamander populations, the buffer zone should extend 164 meters from the wetland edge into the terrestrial habitat (Semlitsch 1998).

According to these studies, buffer zones along streams in the forests of central Ontario may have to increase to at least 30 meters in order to protect plant species, and to at least 175 meters in order to protect salamander and bird habitat. In some cases, they may have to be as wide as 400 meters to protect all components of biodiversity (Brinson et al. 1981). This deficiency in the government's riparian guidelines does not come as a complete surprise, however, since careful scrutiny of the guidelines indicates that the results of scientific studies were ignored in the design of these guidelines. By leaving only three meters along streams, logging operations in central Ontario are most likely causing extensive damage to the productivity and biodiversity of riparian ecosystems. In some cases, the establishment of riparian buffer zones is being ignored causing greater damage to these ecosystems. For example, a recent study conducted in the Algoma Highlands, just north of Sault Ste. Marie, Ontario, found that 89% of the riparian buffers were violated by industrial logging activities (Sierra Legal Defense Fund and Wildlands League 1998). Similar findings were also obtained from the same type of study conducted in the Lower Spanish Pine Forest area, located just northwest of Sudbury, Ontario (DeMarco 1998).

The purpose of this pilot study was to examine plant species composition in a riparian zone that is typical of the Temagami region in preparation for more extensive riparian studies to be undertaken the following summer. Most importantly, it was necessary to get some idea about how long a transect should be to sample the slope gradient in the riparian zone.

Methods

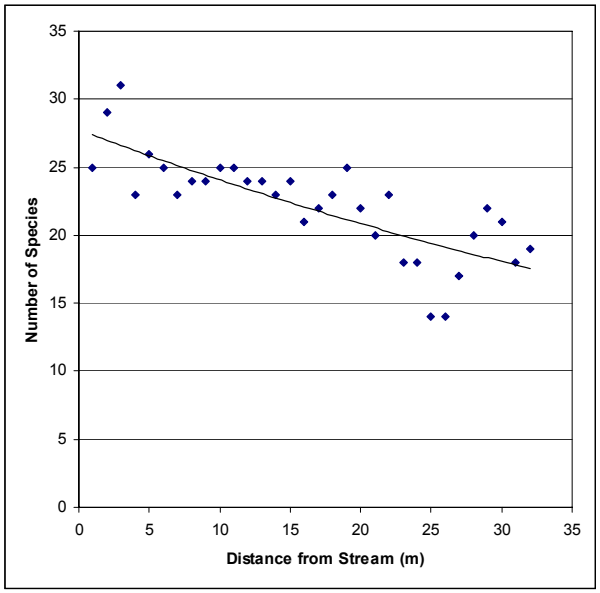
The stream flowing into the end of the east bay of Blueberry Lake was chosen for this study. Blueberry Lake is located approximately 8 km east of the Town of Temagami, Ontario. According to the Forest Resource Inventory map for the area, the composition of the forest stand was white cedar (40%), poplar (20%), yellow birch (20%), white pine (10%), and balsam fir (10%). The slope varied from 11 to 16% and of the six transects sampled, three had

a west-southwest facing slope and three had a east-northeast facing slope. Each transect was 32 m in length, 1 m wide, and positioned at a random location perpendicular to the stream bank. Within each transect, 32 1 x 1 m contiguous quadrats were sampled during the summer of 1998 for %cover of (1) understory vascular plants by species, (2) mosses and liverworts as a group, and (3) lichens as a group. Plant taxonomy was based on Chambers et al. (1996) and Newmaster et al. (1997). Data were analyzed by correlating (Pearson product-moment) distance from the stream with the abundance of each species, total abundance (all species), and species richness (number of species). In addition, frequency distributions were plotted for four species associated with the stream bank and four species that were not associated with the stream bank.

Results

A total of 63 plant species were found in 192 1 x 1 m quadrats. Of these 63 species, the abundance of 25 species (40%) was significantly correlated with distance from the stream bank (Table 1). Of these significant correlations, 18 species (29%) showed an decrease in abundance with increasing distance from the stream bank. Of these 18 species, the presence of 14 species terminated prior to the 32 m point. Seven species (11%) showed increasing abundance with increasing distance from the stream bank. Understory plant biomass (total abundance) was not significantly correlated with distance from the stream bank (r=.2131; p=.242), however, species richness decreased significantly as distance from the stream increased (r=-.7775; p=.000; Fig. 1).

Figure 1. Species richness in the riparian zone at Blueberry Lake



Discussion

The purpose of this pilot study was not to characterize the riparian zone in the Temagami region, but to get some sense of the plant species composition within the zone and to use this information to design future studies. The high number of significant correlations between species abundance and stream proximity (25 species or 40%) supports the assertion that a riparian zone does exist. The width of the riparian zone can be very roughly estimated by identifying the region of the transect where the stream bank species (e.g. Fig. 2) reach their lowest abundance just before disappearing and where the upland species (e.g. Fig. 3) begin to appear before reaching greater abundance further towards the upland portion of the transect. This transition between stream bank species and upland species tends to range roughly between 10 and 20 m. In addition, it appears that the species richness curve (Fig. 1) may continue to decline beyond 32 m. Until more is known about the riparian zones in Temagami, it is recommended that at least a 30 m transect be used to begin characterizing this community. For this study, slopes less than 11% were not sampled and, in general, the width of the riparian zone increases as the slope of the stream bank decreases. Thus, it is critical that sampling in riparian ecosystems be distributed across the range from gentle to steep slopes.

Table 1. Plant species significantly correlated with distance from the stream bank at Blueberry Lake, Temagami (r=correlation; p=probability; included only those species with presence in 6+ quadrats; bold=species presence that terminated prior to the 32 m point)

Decrease with Distance Away from the Stream		
Species	r	p
black ash	-.5725	.001
blue bead lily	-.7913	.000
Canada mayflower	-.4820	.005
dwarf raspberry	-.5366	.002
false Solomon's seal	-.4466	.010
fly honeysuckle	-.4669	.007
grasses	-.4563	.009
ground pine	-.6114	.000
lady fern	-.4101	.020
nodding trillium	-.4596	.008
northern beech fern	-.6169	.000
oak fern	-.4673	.007
sedges	-.5141	.003
shining club-moss	-.4933	.004
spinulose wood fern	-.3528	.048
upright wood-sorrel	-.6701	.000
violets	-.4529	.009
wild red raspberry	-.5133	.003

Increase with Distance Away from the Stream		
Species	r	p
balsam fir	.3769	.033
common ploypody	.4707	.007
interrupted club-moss	.5655	.001
lichens	.4858	.005
mosses	.7731	.000
starflower	.4183	.017
white birch	.3846	.030

Figure 2. Four plant species associated with the stream bank at Blueberry Lake

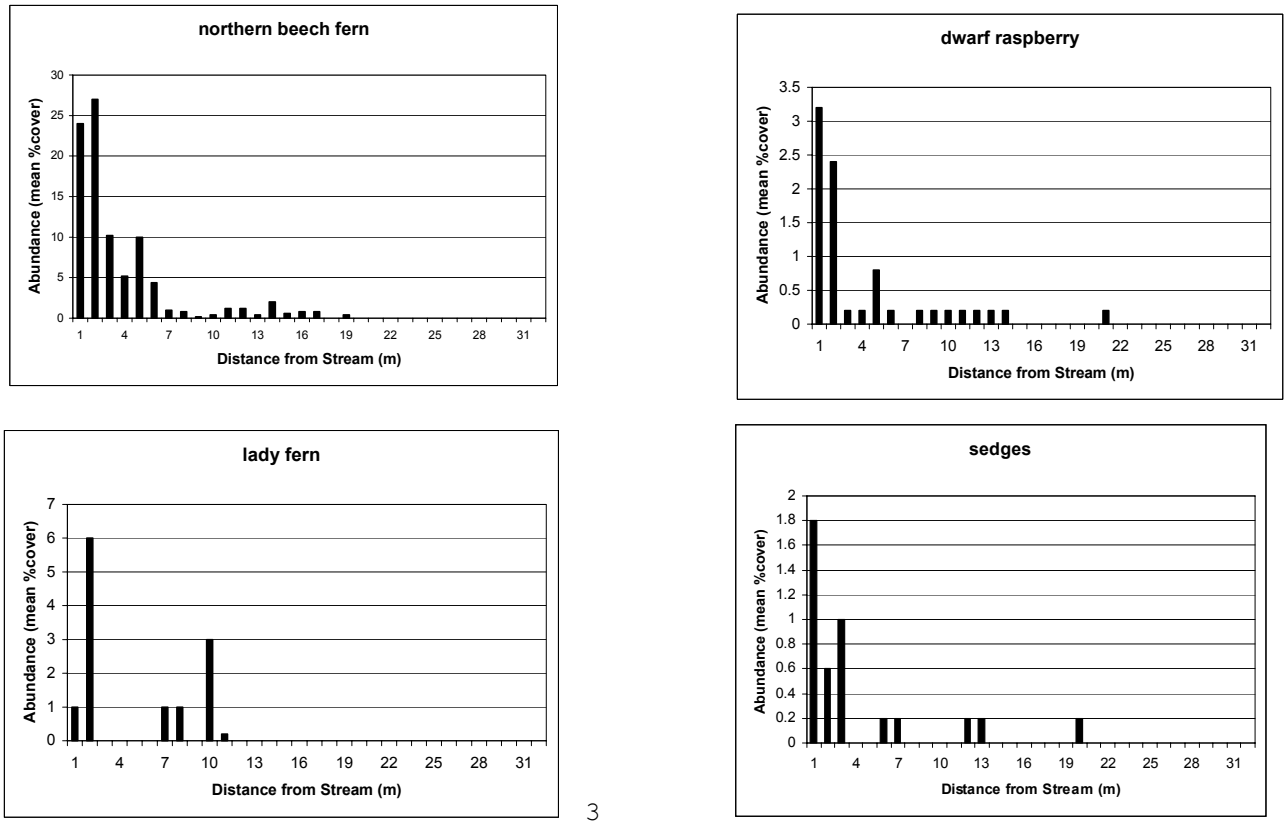
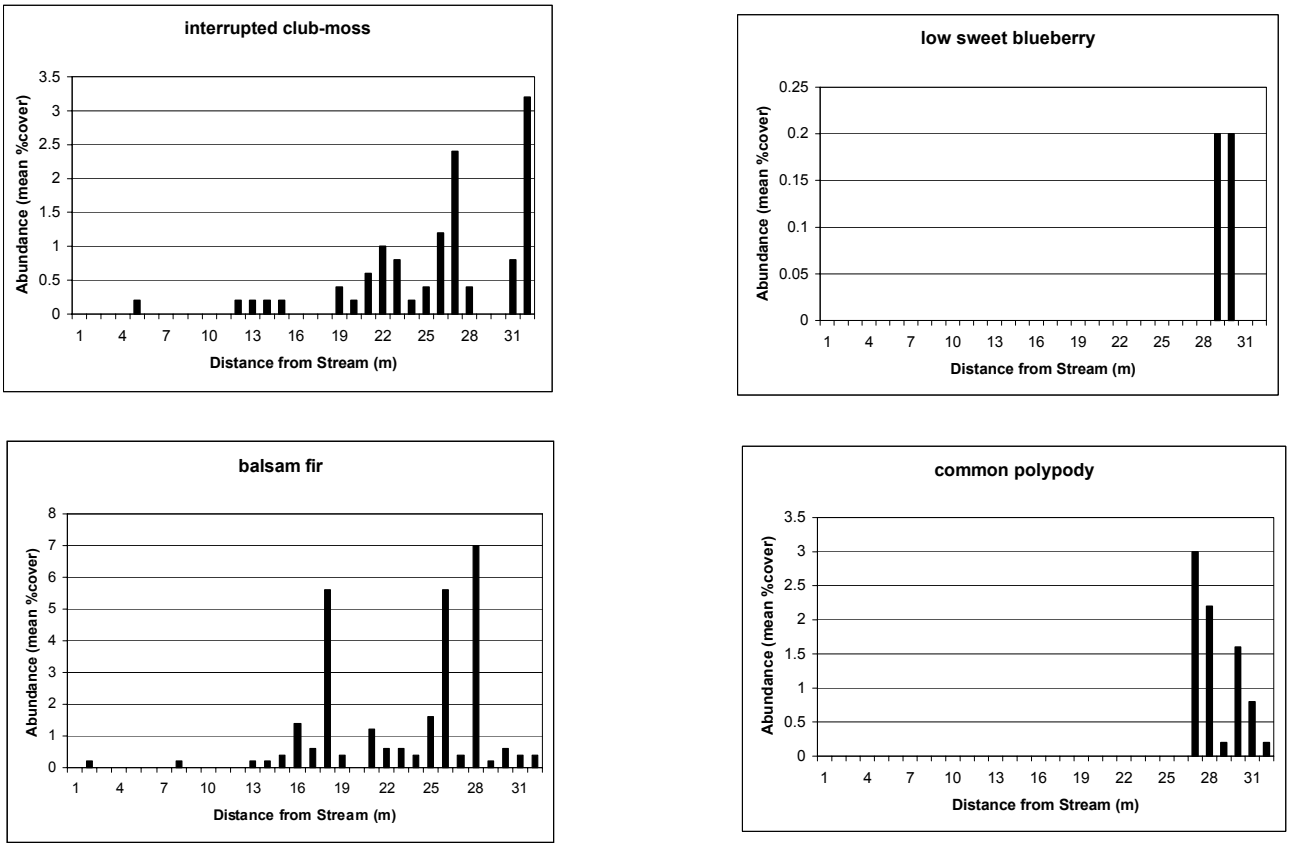


Figure 3. Four plant species not associated with the stream bank at Blueberry Lake



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