Assessing mortality and regeneration of larch (Larix laricina) in Alaska.

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INTRODUCTION

This project was inititally to better assess the causes of mortality of Eastern larch or ‘tamarack’, Larix laricina (Du Roi) K. Koch, between 1999 and 2004, associated with a landscape-scale infestation of the larch sawfly, Polystigma elongata (Hartig) (Lep.). Tamarack is a minor component in most of Interior Alaska, associated with black spruce in the lowland floodplain stands and white spruce on the better sites. Prior to the early 1970s it was largely assumed that severe sawfly defoliation predisposed larch to attack by its primary mortality agent, the larch beetle (Dendroctonus simplex LeConte). Based on aerial survey data, this insect has implicated an estimated 900,000-2,000,000 acres. Mortality of larch within the sawfly defoliated stands has been documented by aerial surveys to reach 80% or more. With fossil-planes being the most practical means to reach fully 85% of Alaska's interior larch areas, cost, and logistical considerations for gathering ground plot data in these remote areas has resulted in very little historical data.

METHODS

RONOS imagery was used to find larch stand with mortality in the Fairbanks area (Fig 1 & 2). Seven larch stands were surveyed in 2008 near roads leading from Fairbanks (Fig 3). In 2009, six larch stands were surveyed 60+ mi. west of Fairbanks (via floatplane) and one stand 65+ mi SE of Fairbanks (Fig 3). Tree species, shrub cover, seed & tree site classes, and mortality (e.g. larch beetle) and other insect and disease agents (e.g. wood borers and fungal mycrosis evidence of Armillaria on all dead larch) tallied along the plot transects. Site conditions were noted within and between sites visited. Inspector, and assessment of general soil/surface vegetation, and overstory vegetation groups/classifications were noted. Regeneration potential of larch and other trees, understory composition (shrub cover/plexus), presence/absence of tamarack cones, and wildfire evidence were also recorded. Basal wood discs were also collected from dominant and co-dominant spruce and larch (dead and healthy) at all sites for post-mortem-examination and stand aging.

RESULTS

Data from the 13 study sites suggests a strong, inverse relationship between site productivity and larch regeneration estimates (> 1 in. stem diameter at breast height (DBH), at least on an area basis along the transects (see table). Using the relative abundance of paper birch as an indicator species for more ‘productive’ sites, the 13 sites were divided into two groups: more and less productive. Compared to the less productive site, the more productive sites contained three times the number of larch habitat per acre. Both groups had a comparable number of stems per acre. However, the DBHs for the higher productivity sites are about 20% larger than those from lower productivity sites. Larch mortality was 3% greater for more productive than less productive sites. Approximately 28% of the dead larch were found to be killed by larch beetle.

Figure 3. Larch sites evaluated on the ground during 2008 and 2009.

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Fig. 1. Airport RONOS photo.

Fig. 2. Northern Lambert RONOS photo.

Fig. 3. Airport RONOS photo.

Fig. 4. Northern Lambert RONOS photo.