Vegetation cover at right of way locations

L.C. Hopkinson *, E. Davis, G. Hilvers

Department of Civil and Environmental Engineering, West Virginia University, Morgantown, WV, USA

ABSTRACT

This research evaluated the status of vegetation cover at right of way locations. Site factors that contributed to low and high ground cover along roadsides and medians were identified. Twenty-nine roadside and median study sites incorporated variability in soil type, elevation, vegetation establishment and cover, seed mixture, slope, aspect, time since planting, and climate. Vegetation cover was measured, and species distribution was identified. Slopes, aspects of the sloping face, and elevations were recorded. Soil samples were tested for nutrients, minerals, texture, and pH. Approximately 50% of the test sites met the 70% cover criteria. Locations of the worst cover (<50%) had soils with high soluble salt content (0.36–1.54 mmhos/cm) or low organic matter values (<1.7%). Vegetation cover was dominated by tall fescue (*Festuca arundinacea*) and crownvetch (*Coronilla varia* L.), two species that were included in the current seeding mixture and are considered invasive. To further promote revegetation success and persistence, both maintenance and site specific seed mixtures are needed.

© 2015 Elsevier Ltd. All rights reserved.

Introduction

Vegetation is an important reclamation practice for right of way locations, but the disturbed conditions of reclaimed slopes often present challenges for vegetation establishment and persistence. Limiting conditions at the time of planting include the presence of highly acidic soils, slope length and gradients, compaction, low nutrient content, inadequate rainfall and elevated levels of soluble salts (Hargett et al., 1982; Coppin and Richards, 1990; Babcock and McLaughlin, 2011; Salon and Miller, 2012; Haan et al., 2012). Soil amendments (e.g. lime, fertilizer, and organic matter) are used to overcome some of these challenges at the time of planting immediately following construction (Hargett et al., 1982; Salon and Miller, 2012). Often, there is minimal follow-up maintenance, and long-term deterioration may occur without additional fertility plans (Booze-Daniels et al., 2000).

Currently, the West Virginia Division of Highways (WVDOH) utilizes a variety of mixtures of grasses for permanent cover. Seventy percent ground cover of the disturbed area is needed to terminate the National Pollutant Discharge Elimination System (NPDES) general water pollution control permit (WVDOH, 2003; USEPA, 2007). The two most commonly utilized grass mixtures are defined for: (1) medians, shoulders, waterways, and mowable areas of interchange; and (2) cut and fill slopes (WVDOH, 2010, Section 652). Both mixtures include varying levels of tall fescue (*Festuca arundinacea*); red fescue (*Festuca rubra* L.); and, annual ryegrass (*Lolium multiflorum* Lam.) or weeping lovegrass (*Eragrostis curvula* [Schrad.] Nees). White Dutch clover (*Trifolium repens*) is included in the median mixture, and crownvetch (*Coronilla varia* L.) is prescribed for cut/fill slopes. These species as well as those used in temporary applications are generally non-native (WVDEP, 2006; WVDOH,

* Corresponding author at: PO Box 6103, Morgantown, WV 26506, USA. Tel.: +1 304 293 9932.
  E-mail address: Leslie.Hopkinson@mail.wvu.edu (L.C. Hopkinson).

2010). The advantages of using these species include the proven success in erosion control, ability to establishment in poor conditions, availability, and low cost (WVDEP, 2006).

This research evaluated vegetation cover at right of way locations in West Virginia, USA and identified site factors that were present at low and high cover areas. Our hypothesis was that common factors (e.g. slope, pH values, organic matter levels) would be present at poorly covered sites and that this information would help with future management approaches. Much research exists on the germination of grasses in roadside locations, but the grasses are typically only monitored for up to three years (e.g. Booze-Daniels et al., 2000; Babcock and McLaughlin, 2011; De Oña et al., 2011; Storey et al., 2011; Dunifon et al., 2011; Dexin et al., 2012). Little follow-up exists that document how the ground cover functions over the long term. Our research is unique in that we returned to sites following establishment, some locations as long as 15 years post-planting.

Material and methods

Roadsides and medians of highways in West Virginia, USA were sampled between 17 June and 8 August 2014 (Fig. 1). Vegetation, soil, and physical characteristics were measured as discussed in the following sections.

Study sites

Study locations were selected in collaboration with WVDOH to capture the variability of conditions at roadside sites in the state. The majority of locations were cut sites, and three median locations were included (Table 1). A range of soil types, elevations, vegetation establishment and cover, seed mixture, slopes, aspects, time since planting (<15 years), and climate were represented (Figs. 1 and 2). The study locations were distributed among the three main ecoregions of West Virginia: Western Allegheny Plateau, Central Appalachians, and Ridge and Valley (Fig. 1).

An experimental plot (⩽0.4 ha) was identified at each roadside site (listed in Table 1). The experimental plots were divided into two plots at South Mineral Wells (SMS and SMN), 47 Interchange (47INT and 47INTb), and Corridor H-2 (CH-2a and CH-2b) due to separation by a bridge, separation by a road, and separation by a road, respectively. Two plots
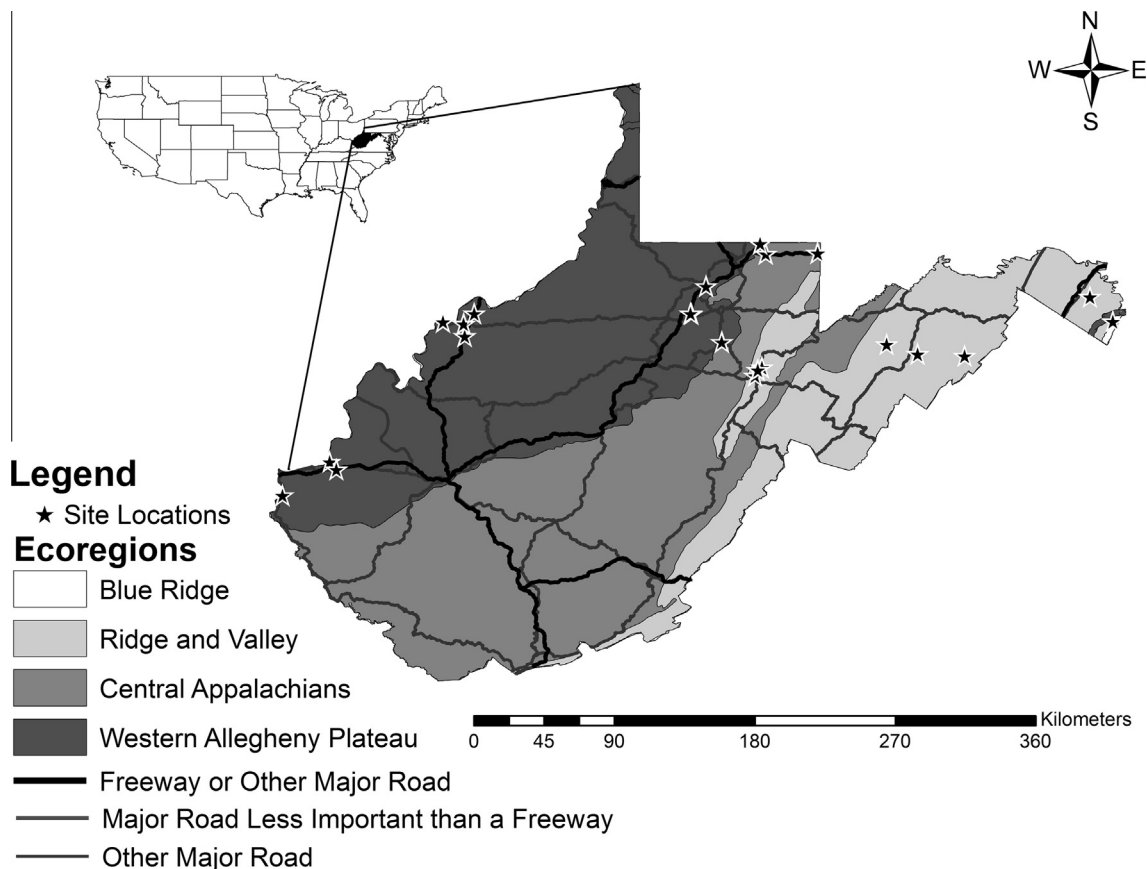

Fig. 1. Locations of study sites (stars) in the State of West Virginia.