

Forest Plan Revision Comments - Assessment Phase - Submitted by Rita Apanius, 23071 State Route 327, Laurelville, Ohio 43135

The comments below are relevant to several planning categories/components including ecosystem integrity and diversity, ecosystem services, nutrient cycling, and carbon storage.

Previous studies have demonstrated that “ an important linkage exists between salamander abundance, prey species diversity, trophic cascades, nutrient cycling, and the detritus– litter food webs of forest, grassland, and associated aquatic environments. “ Terrestrial salamanders, including red–backed salamanders, can have 1) substantial effects on components of the forest floor ecosystem such as nutrient cycling and leaf litter decomposition and; 2) an important role in the regulation of the carbon and nitrogen cycle in forest ecosystems. Terrestrial salamanders can also be considered indicators of overall forest ecosystem integrity because of their high densities, sensitivity to natural and anthropogenic disturbances, physiological restrictions, etc. (Welsh and Droege 2001) (Davic and Welsh 2004).

It is well recognized that extreme declines in abundance and/or surface activity of terrestrial plethodontid salamanders, which do not require stream habitat during life cycles, can occur following clear cutting and other even – aged harvesting practices in the short – term (1–4 years postharvest). Average salamander abundance generally declined within 3 years of harvesting with increasing canopy removal. Other harvesting practices were similar with clear cuts in terms of negative effects. It has been suggested that recovery rates of salamanders under other harvesting practices may be similar with recovery rates observed in clear cuts (Harpole and Haas 1999) (Knapp et al 2003).

In addition, observed decreases in abundance of red-backed salamanders and other forest interior amphibian species, have been linked to negative effects of “ edges “ caused by silvicultural practices. Cumulative effects of creating large amounts of edge habitat, including hard silvicultural edges, may significantly affect these species (DeMaynadier and Hunter 1998).

More recent studies have documented significantly and persistently lower abundance of terrestrial salamanders, up to 13 years postharvest for a wide range of oak/hickory regeneration practices. Similar reductions in terrestrial salamander abundance and/or surface activity have been observed between clear cuts and other harvesting practices which included 1) shelterwood harvests; 2) mid-story herbicide applications; and 3) prescribed fire. Cumulative effects can be stronger for silvicultural practices with multiple re-entries. Prescribed fire, most often applied in the spring and fall, may result in direct impacts to species active at that time, especially those active in leaf litter. Due to low population growth rates (3%), > 60 years may be needed for all life stages to reach pre-disturbance population levels (Homyack and Haas 2009) (O'Donnell et al 2015).

The abundance of terrestrial salamanders, especially red-backed salamanders, can also be significantly lower next to forest roads, including abandoned or decommissioned logging roads that are only 5.4 meters wide. Negative effects of roads can be long – lasting; may persist > 40 and up to 80 years after abandonment; and may be just as severe as other edge effects or edge contrasts created by clear cuts and other harvesting practices. Forest roads may also act as partial barriers to movements of red-backed salamanders. Reduced dispersal may affect salamander reproduction or survival rates and the long– term persistence of populations. These factors may contribute to a loss of function and diversity of

forest ecosystems (deGraaf and Yamasaki 2002) (Marsh and Beckman 2004) (Marsh et al 2005) (Semlitsch et al 2007) (Homyack and Haas 2009).

More recent estimates of abundance and density of terrestrial salamanders may be 2-4 times greater than those reported from the 1970's, thus highlighting an even greater role these organisms may have in the trophic transfer of energy, nutrients, and carbon retention in forest ecosystems. Population declines or extinctions may likely have a cascading trophic effect that may currently be under appreciated (Semlitsch et al 2014).

The chronic depletion of terrestrial salamanders due to silvicultural practices, as documented in previous and more recent studies, can result in cumulative negative effects and a possible decline in the general health of Appalachian forest communities (Petranka et al 1993) (Homyack and Haas 2009) (O'Donnell et al 2015).

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