

Testing the Efficacy of Pond Buffers for Protecting Seasonal Ponds



“Ecology and Silviculture of Northern Lake States Forests”

A research work unit of the USDA Forest Service North Central Research Station

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Study Briefing

Established 2000, North Central Minnesota



Purpose:

There is growing interest nationally in small seasonal ponds (< 2 ac). This interest centers on understanding the contributions of seasonal ponds to biodiversity and regional ground-water recharge. There also is concern over the potential for impacts to seasonal ponds from management of adjacent upland forest. In theory, the potential for impacts is large because of high edge-to-area ratios for small wetlands. Buffering small ponds with residual trees is one option for protection. In general, we lack the research necessary to assess the efficacy of buffers for protecting seasonal ponds. Another issue surrounding seasonal ponds is whether pond buffers, within a matrix of heavily cut forest, meet the needs of mobile species like amphibians or migratory songbirds. Many of the amphibians that utilize seasonal ponds for breeding display biphasic life histories. Thus, recruitment and survival are dependent on characteristics of terrestrial habitats, not just pond breeding habitat. A similar multi-scale relationship between seasonal ponds and upland forest may exist for birds. Most seasonal ponds, because of their size do not provide sufficient habitat themselves for wetland associated breeding bird species. However, they are likely important as local food sources within the larger forest matrix. The question, for amphibians and birds is whether residual trees left in buffers around seasonal ponds meet habitat needs as effectively as do residual trees in the upland.

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We are using a replicated experimental study to test the efficacy of buffers at protecting seasonal ponds, and associated organisms. This work also compares breeding bird use of harvested stands having residual trees in the upland versus concentrating residuals around seasonal ponds.

Specific objectives include:

- 1) Testing the efficacy of buffers (uncut and partially cut) at protecting characteristics of seasonal ponds, including plant communities, invertebrates, particulate organic inputs, breeding bird habitat, and hydroperiod;
- 2) Assessing the use of ponds by breeding forest birds in the immediate years before and following harvest;
- 3) Comparing breeding bird use of forests managed with buffers around seasonal ponds, to provide residual trees, vs. forests with residual patches in the upland;
- 4) Monitoring post-harvest blowdown of residual trees in uplands and buffers.

Study Location

We are conducting our study in Cass County Minnesota, in collaboration with Potlatch Corp. and the Cass County Land Department. We have selected four blocks (two with Potlatch, two with Cass Co) of four stands each (16 stands total). Sixty to 70-year old aspen (*Populus* spp.) dominate each stand, with lesser amounts of northern hardwoods. Each stand contains at least one seasonal pond. Pond sizes range from 0.1-0.5 ac in size.

Study Design: The experimental design consists of four treatments, replicated in four blocks. Experimental units are stands (>15 ac) containing one or more seasonal pond. Buffer treatments are applied to all ponds in a stand, but only one pond in each stand is measured intensively. Treatments, assigned randomly to stands, include: 1) uncut forest; 2) upland clearcut, with 50-ft uncut buffers around ponds; 3) upland clearcut, with 50-ft, thinned (to 50 ft²/ac) buffers around ponds; and 4) upland clearcut, with no pond buffers, but including residual patches in the upland (following Minnesota guidelines) (Fig. 1).

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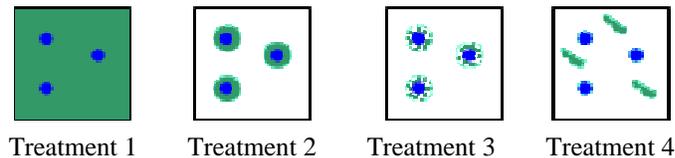
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SEASONAL POND BUFFER EXPERIMENT



Stylized depiction of harvest treatments including: 1) Uncut control; 2) Upland clearcut, uncut buffers around ponds; 3) Upland clearcut, partially cut buffers around ponds; and 4) Upland clearcut leaving residual trees in the upland, but no buffers around ponds. Treatments 2-4 are different approaches for satisfying Minnesota’s guidelines for residual tree patch requirements.

Study History:

Harvest Treatments were applied in winter 2000. Pre-Harvest measurement taken in summer 2000, with post-harvest measurements in 2001, 2002, 2003, 2004.

Publications:

Study is in progress, with publications to follow.

Investigators:

Primary: Brian Palik, NCRS

Others: JoAnn Hanowski, Natural Resources Research Institute, U. of Minnesota; Mark Hanson, Minnesota DNR

Cooperators: Michael Houser, Potlatch Corporation; Cass County Land Department, Mike Phillips, Minnesota DNR