



Monitoring Vegetation Along the St. Croix Riverway

How We Monitor

- We revisited 35 permanent vegetation monitoring plots that were installed in 2007 and established an additional 15 permanent plots (*see map*).
- Extensive data are collected at each plot, including tree species composition and size, the composition of the understory layer, and browse impacts.

What We're Finding

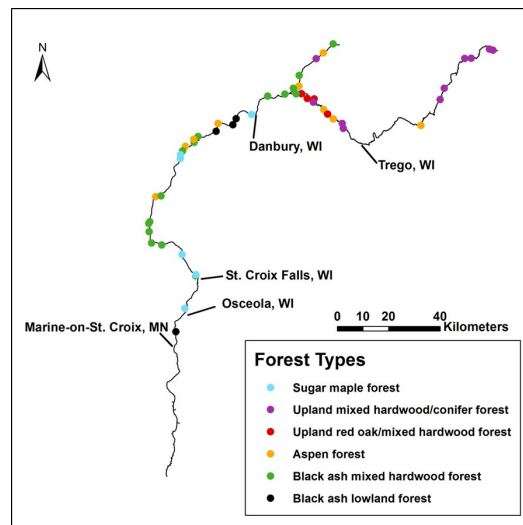
- Sugar maple forests—a climax forest type in the region—were generally healthy, with tree density, size, and composition not expected to change in the coming decades.
- Mixed hardwood/conifer forests—a type adapted and formerly exposed to ground fires—appear to be succeeding toward a red maple type (*see graph*). This process, common in the region in the absence of fire, is known as “mesophication.”
- Upland red oak/mixed hardwood forests support numerous large individuals of red pine, jack pine, and black spruce, all of which are fire-dependent species. In the absence of fire here, red oak is becoming increasingly common, and that will likely continue in the coming decades.
- Black ash/mixed hardwood forests support numerous overstory species; while black ash itself will be lost in the next 10–15 years due to emerald ash borer, the high species richness in these forests will likely ensure that ecosystem functions remain intact.
- Black ash lowland forests are dominated by only three overstory species: black ash, American elm, and silver maple. It is unlikely that native species will replace black ash here due to the unique hydrology. Changes in ecosystem function may be apparent in black ash lowland forests over the next two decades.

Management Implications

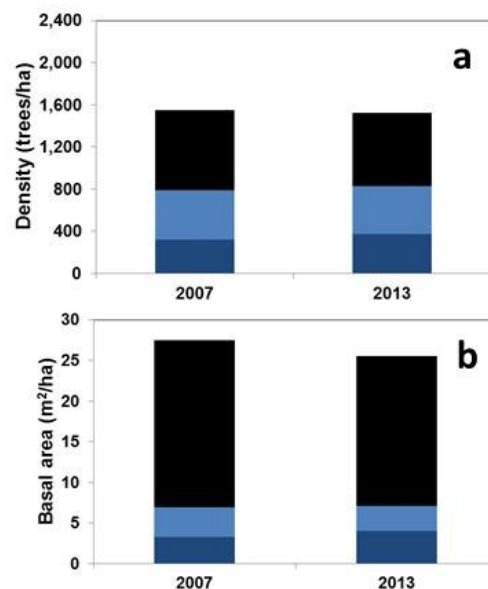
The arrival of emerald ash borer and subsequent loss of ash, particularly black ash, poses a threat to the entire land–water interface of the riverway. As ash trees begin to die, the loss of stems will result in less river flow impedance and reduced evapotranspiration; increased flow velocity and water yield (i.e., volume) will result. Anticipated abiotic impacts include altered nutrient cycling and increased sediment transport. Habitat for mussels, juvenile fish, and macroinvertebrates will likely also be impacted.

Fire suppression within the fire-adapted ecosystems, particularly along the Namekagon River, is leading to dramatic changes. Fire-dependent species, including red pine, jack pine, and black spruce are gradually being lost from park forests and replaced with fire-intolerant species, including red maple and balsam fir. Efforts to restore fire-dependent species by mechanical measures (e.g., cutting, seedbed prep) could facilitate the restoration of these desirable species in select areas.

While terrestrial invasive species, including buckthorn and honeysuckle, are evident at landings and campsites, their presence is only minimal in the forest interior and largely limited to the lower portions of the riverway. Efforts to control these species should continue.



Monitoring plot locations at St. Croix. Colors indicate the different forest types that were sampled.



Tree density (a) and basal area (b) in mixed hardwood conifer forests. Dark blue represents red maple, light blue represents balsam fir, and black represents all other species. Panel (a) shows an increase in red maple from 319 to 373 trees/ha, while panel (b) shows an increase in basal area from 3.28 to 3.98 m²/ha.