EMEND

ECOSYSTEM-BASED MANAGEMENT EMULATING NATURAL DISTURBANCE

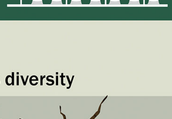
The Ecosystem-based Management Emulating Natural Disturbance (EMEND) project has a long history of collaborative and innovative research. At a time when many ideas were being suggested about the benefits of retention harvesting, this massive project was undertaken to put them to the test. Covering over 1,000 hectares and with two decades of research, EMEND is contributing key insights about the role of retention harvesting.

What is Ecosystem-Based Management?

Forest ecosystems are complex. Plants, wildlife, water, soils, microbes, carbon and climate all interact and affect each other, which in turn affects the functioning—and health—of the forest. Ecosystem-based management requires us to manage the forest for more than any single value. By using communities as indicators of these ecological connections, EMEND provides key insights into ecological processes and their responses to disturbance.

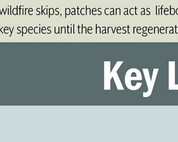
What is Retention?

Traditional forest harvesting favoured clear-cutting, but retention has become more common since the 1990s. Retention harvesting is a strategy that leaves trees standing in the harvested area and is often inspired by the patterns of trees left behind following wildfires. Retention trees may be dispersed—spread evenly across the harvested area—or clumped into retention patches.



Why Retention?

Lifeboats for forest species



Like wildfire skips, patches can act as lifeboats for key species until the harvest regenerates.

Increase complexity

Higher complexity may better emulate natural disturbances and provide a wide range of habitat conditions.

Species diversity

By emulating key ecological processes, species can return to the managed landscape over time.

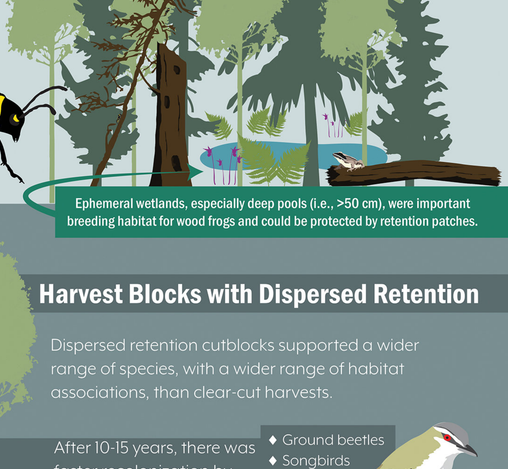
Key Learnings from the Last Five Years

Retention Patches Acted as Lifeboats

Retention patches helped maintain species and habitats typical of unharvested forest, and larger patches were generally more effective.

- Deadwood-associated beetles
- Shade-tolerant plants
- Coarse woody debris

Spruce zebra beetle (*Xylotrechus undulatus*)



Ephemeral wetlands, especially deep pools (i.e., >50 cm), were important breeding habitat for wood frogs and could be protected by retention patches.

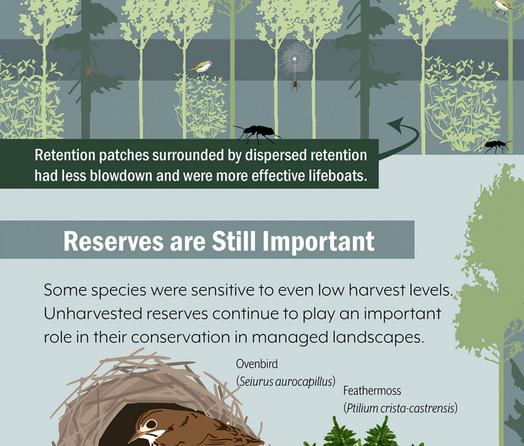
Harvest Blocks with Dispersed Retention

Dispersed retention cutblocks supported a wider range of species, with a wider range of habitat associations, than clear-cut harvests.

After 10-15 years, there was faster recolonization by...

- Ground beetles
- Songbirds
- Spiders

Red-eyed vireo (*Vireo olivaceus*)



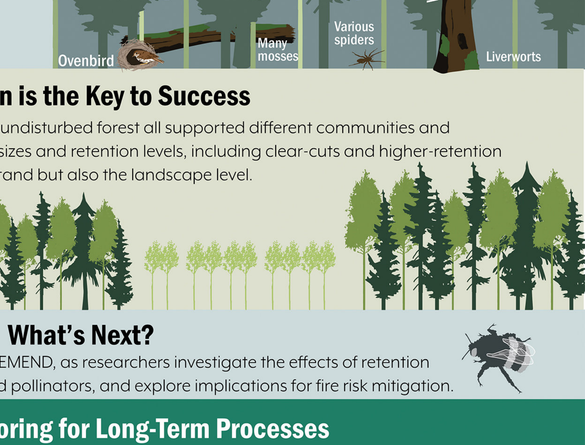
Retention patches surrounded by dispersed retention had less blowdown and were more effective lifeboats.

Reserves are Still Important

Some species were sensitive to even low harvest levels. Unharvested reserves continue to play an important role in their conservation in managed landscapes.

Ovenbird (*Seiurus aurocapillus*)

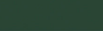
Feathermoss (*Ptilium crista-castrensis*)



Variation is the Key to Success

Clear-cuts, retention harvests, burned forest, and undisturbed forest all supported different communities and ecological processes over time. A range of patch sizes and retention levels, including clear-cuts and higher-retention stands, can maximize complexity at not just the stand but also the landscape level.

What's Next?



Several projects are still underway at EMEND, as researchers investigate the effects of retention harvesting on fur-bearing species and pollinators, and explore implications for fire risk mitigation.

Long-Term Monitoring for Long-Term Processes

EMEND was established in 1998, but its journey is just beginning. While many studies end after a few years, EMEND is forecast to continue for a full stand rotation (80–100 years). Already, we are detecting patterns of community change that would not have been evident in a short-term project. What will the next decades have in store?

Collaboration and Partnership: A Cornerstone of EMEND

Research at EMEND is made possible by our many partners and funders.

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