Mosaic Landscapes
For wildlife habitat, carbon storage, and climate adaptation in the Northeast and Upper Midwest

Management concern: Balancing carbon storage and habitat quality

Takeaways:
• Forests are a critical natural climate solution because they store carbon.
• Management strategies prioritizing carbon storage are not always beneficial to the wildlife species most vulnerable to climate change.
• Improving habitat for sensitive wildlife species can mean decreasing carbon storage in trees within a single stand or small group of trees.
• At the landscape scale, managing for a diversity of forest and woodland habitats for imperiled species creates a mosaic landscape. This heterogeneity supports biodiversity, increases resilience, and may ultimately store more carbon over time by resisting carbon loss from disturbances like fires and floods.

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In each of these ecosystems, focusing on managing for mature stands of trees fails to provide critical habitat, but managing a landscape to include each of these habitats increases resilience and carbon storage.

1. Early successional conditions in northern hardwood stands provide breeding habitat for the Golden-winged Warbler, which has experienced one of the steepest declines of any North American songbird.

2. Maintaining Minnesota’s tallgrass aspen parklands via mowing, harvest openings, and prescribed burns have supported the return of elk populations after extirpation in the early 20th century.

3. Midwestern oak savanna with wild blue lupine is key habitat for the federally-endangered Karner blue butterfly, which lays eggs almost exclusively on lupine.

4. Restoration of low severity fire in pitch pine-scrub oak barrens provides habitat for many invertebrates including the barrens buckmoth, which has been in decline.

Restoring these habitats often involves reintroducing disturbances that were historically present – naturally and through Indigenous practices such as controlled burning.

Some strategies may have unintended harmful consequences for climate change adaptation, wildlife protection, or carbon storage:

- If forest carbon markets incentivize maximizing carbon storage in every forest stand, pursuing the maximum carbon storage may inadvertently sacrifice biodiversity by decreasing the diversity of habitats.

- If management strategies aim to increase carbon storage by limiting timber harvests on public lands, they may inadvertently stall habitat restoration for at-risk wildlife.

- When developers target forestland for green energy construction, habitat for wildlife, carbon storage in trees, and resilience in the face of uncertainty are sacrificed. By one estimate, one quarter of natural land conversion in Massachusetts over five years was due to solar development.

White Paper: Trade-offs and Opportunities for Forest Carbon and Wildlife Using a Climate Adaptation Lens