# Climate-friendly forest management on AMC's Maine Woods Intitiative

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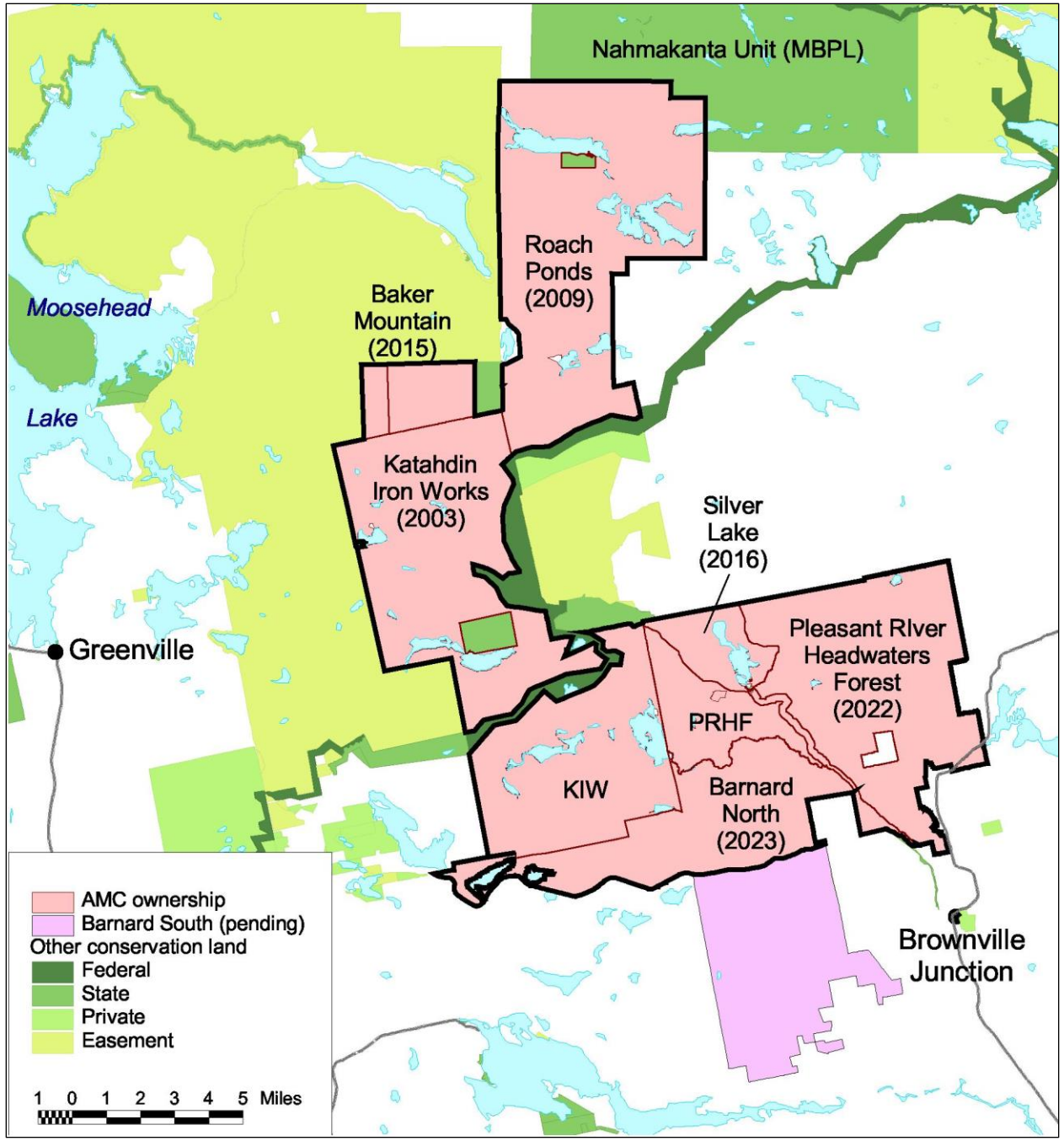
APPALACHIAN MTN CLUB


The mission of the Appalachian Mountain Club is to foster the protection, enjoyment and understanding of the outdoors.

# AMC's Maine Woods Initiative began over 20 years ago with four major goals:

- Establish a new backcountry recreational destination.
- Establish large ecological reserves.
- Practice sustainable forestry.
- Establish strong community partnerships.



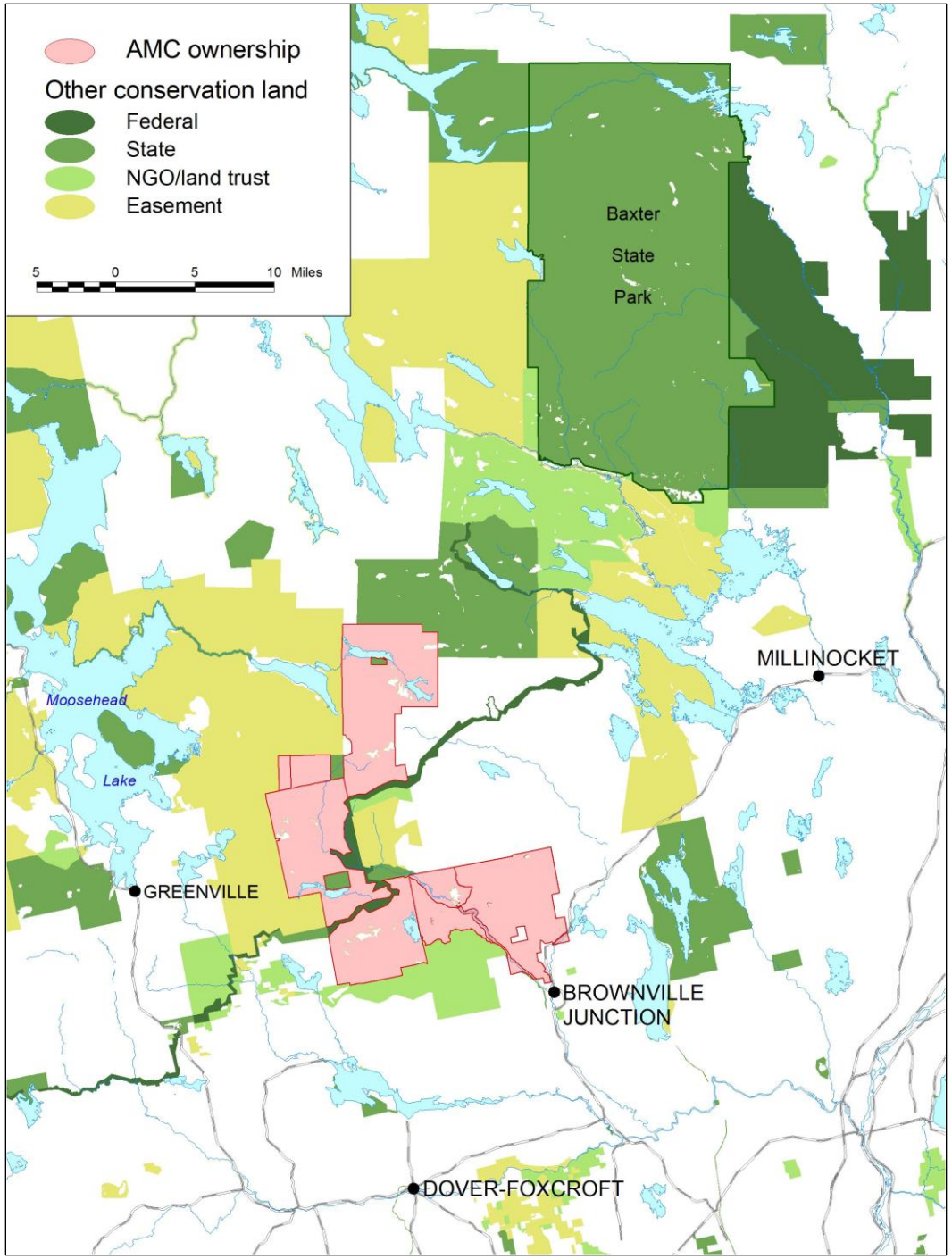

MWI now consists of over 114,000 acres in the 100-Mile Wilderness region acquired between 2003 and 2023, with an additional 15,000 acres pending.

The land was acquired from large commercial landowners; most has been heavily harvested.

Much of the property is encumbered by six conservation easements held by MBPL, TNC and FSM.

Forest management is certified by the Forest Stewardship Council® under TNC's group certificate (FSC®-C008922).

The property supports four forest carbon offset projects.

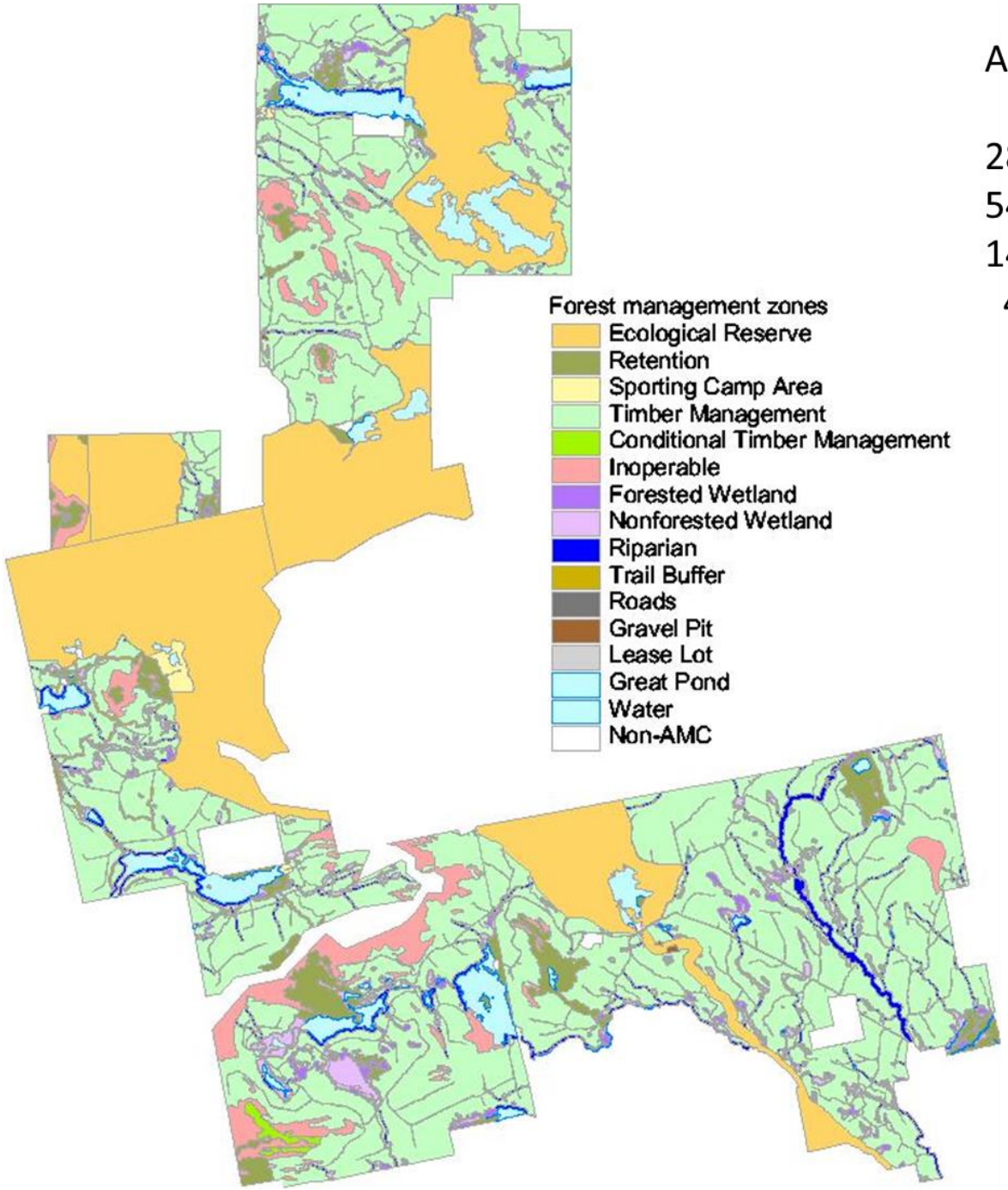



MWI lands are the southern anchor of a 60-mile-long corridor of conservation lands extending north to Baxter State Park.

While we acquired some areas that looked like this:

There were a lot more that looked like this:

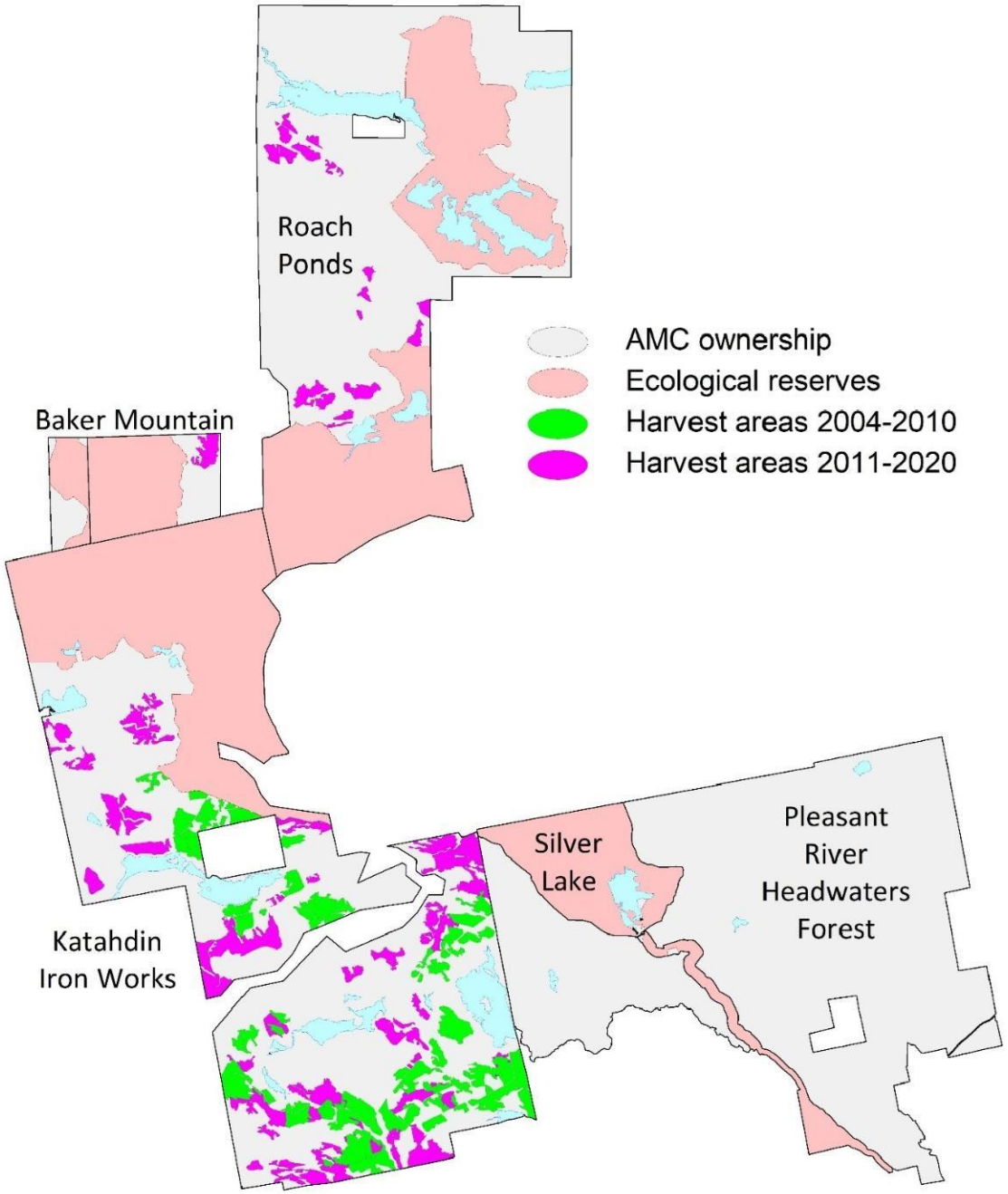
**This is a long-term ecological restoration project!**




AMC's management zones:

28% Ecological Reserve
54% Timber Management
14% No-harvest protection zones
4% Nonforest/Developed

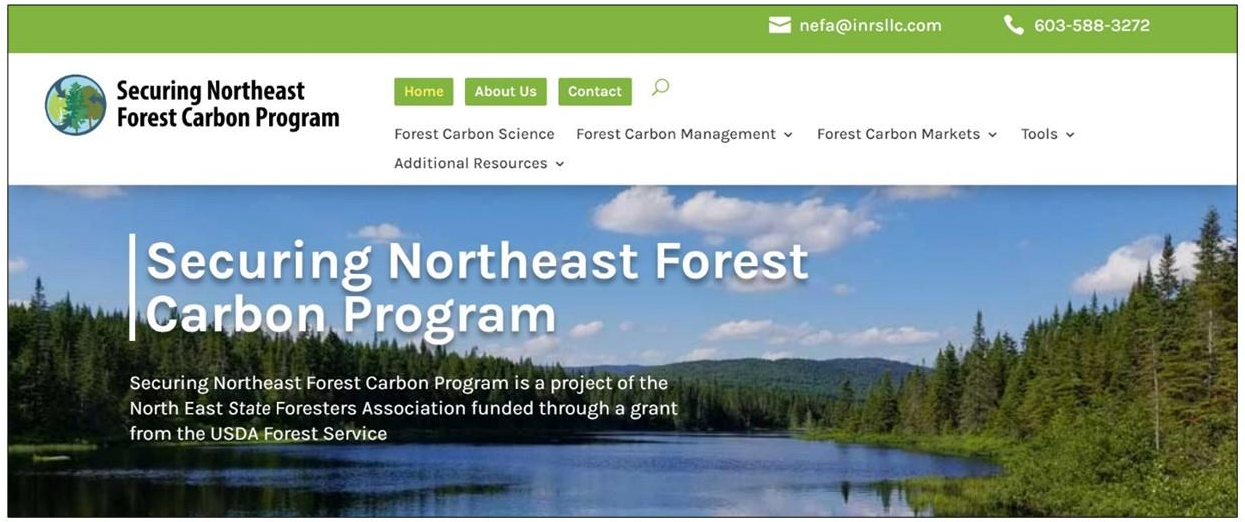
AMC's management is aimed at the long-term restoration of this young, heavily-harvested forest to a more mature, higher-carbon, more structurally complex forest (i.e., a more "natural" forest) through a combination of reserves and conservative timber management.

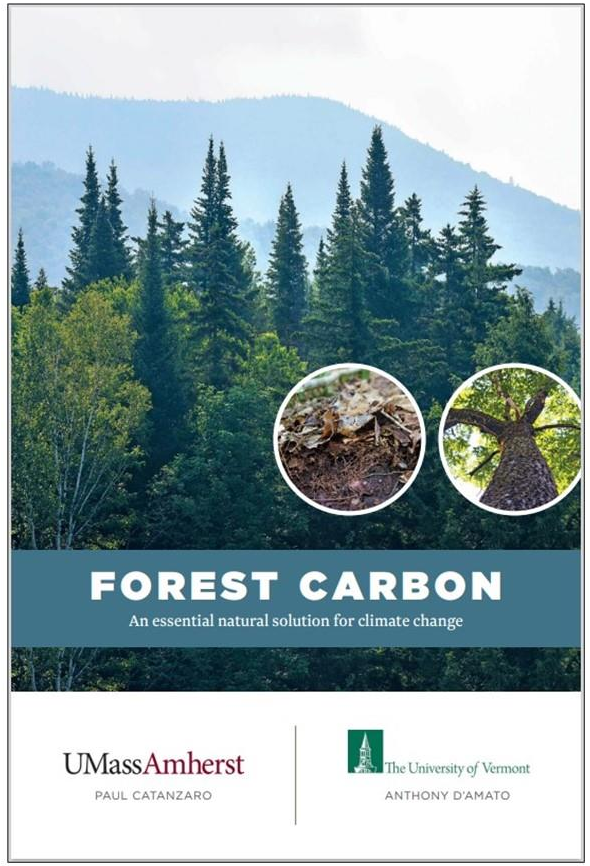


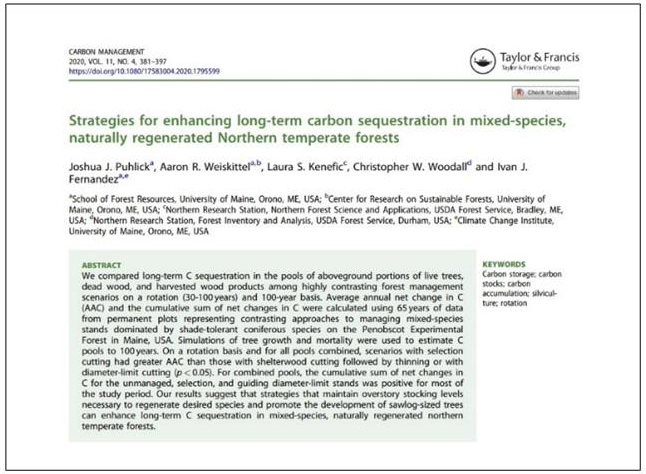

AMC has conducted timber harvests every year since 2004 on our first property, the Katahdin Iron Works (acquired in 2003).

The Roach Ponds property (acquired in 2010) had very low stocking due to very heavy harvesting by the previous owners, and we did not begin timber harvests there until 2017.

Timber management under AMC ownership is just beginning on the Pleasant River Headwaters Forest, acquired in 2022.



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Taylor & Francis

Strategies for enhancing long-term carbon sequestration in mixed-species, naturally regenerated Northern temperate forests

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ABSTRACT

We compared long-term C sequestration in the pools of aboveground portions of live trees, dead wood, and harvested wood products among highly contrasting forest management scenarios on a rotation (30-100 years) and 100-year basis. Average annual net change in C (AAC) and the cumulative sum of net changes in C were calculated using 65 years of data from permanent plots representing contrasting approaches to managing mixed-species stands dominated by shade-tolerant coniferous species on the Penobscot Experimental Forest in Maine, USA. Simulations of tree growth and mortality were used to estimate C pools to 100 years. On a rotation basis and for all pools combined, scenarios with selection cutting had greater AAC than those with shelterwood cutting followed by thinning or with diameter-limit cutting ($p < 0.05$). For combined pools, the cumulative sum of net changes in C for the unmanaged, selection, and guiding diameter-limit stands was positive for most of the study period. Our results suggest that strategies that maintain overstory stocking levels necessary to regenerate desired species and promote the development of sawlog-sized trees can enhance long-term C sequestration in mixed-species, naturally regenerated northern temperate forests.

KEYWORDS

Carbon storage; carbon stocks; carbon accumulation; silviculture; rotation

In recent years many studies and guidance documents have provided recommendations for enhancing climate change resilience and forest carbon sequestration.

The recommendations include:

- Grow trees for longer before harvesting (i.e., extend rotations).
- Thin stands to concentrate growth on the best trees.
- Promote prompt regeneration.
- Restore degraded or understocked stands.
- Increase the proportion of harvest in sawlogs.
- Increase size, age and species diversity within stands.
- Develop and retain big trees.
- Increase the amount of dead wood.
- Protect soil.
- Maintain or restore habitat connectivity.

AMC is implementing many of these practices on our land.

In the early years, the priority was on salvaging diseased beech and low-value trees from badly degraded stands while retaining an overstory component.

Candidates for retention included:

- Higher value or longer-lived species (primarily sugar maple, yellow birch, and red spruce).
- All white pine (a projected "climate change winner“).
- Good growing stock.
- Trees at least 18" in diameter.
- Standing dead trees.
- Rotten or cavity trees (“wildlife trees”).
- Healthy beech.

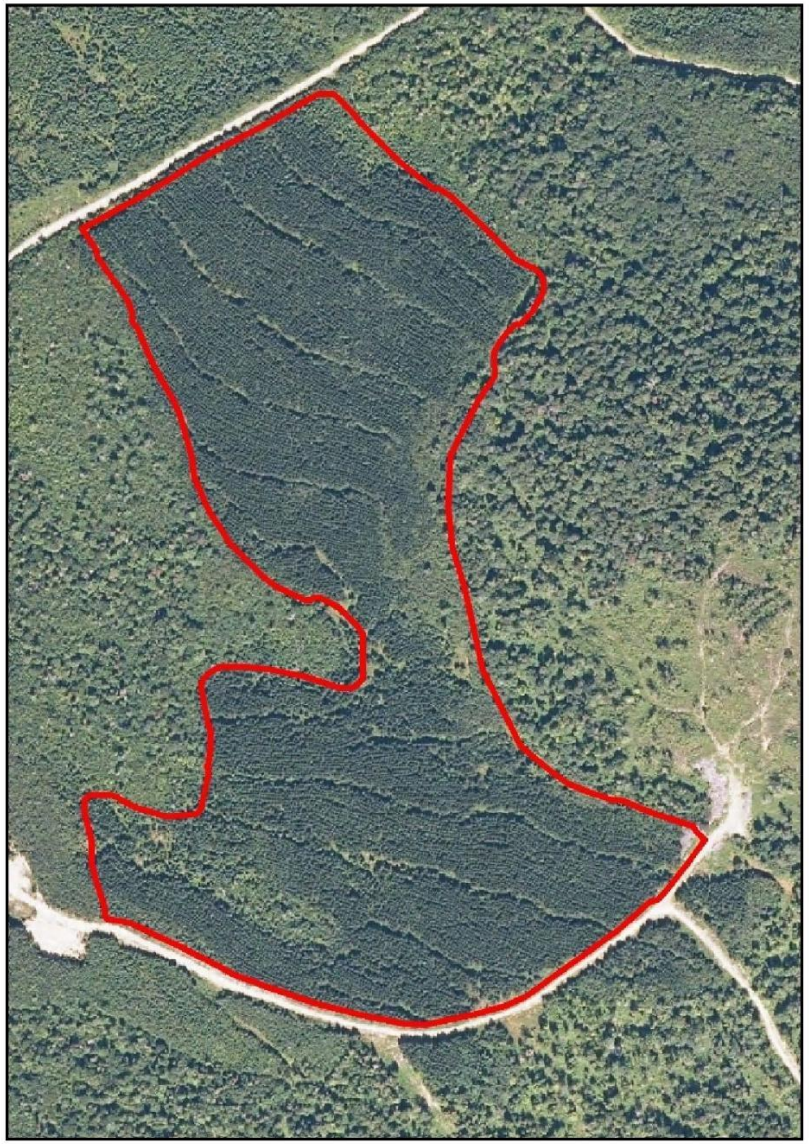
Yellow birch retention over a released sapling understory.

Yellow birch and red spruce retention.

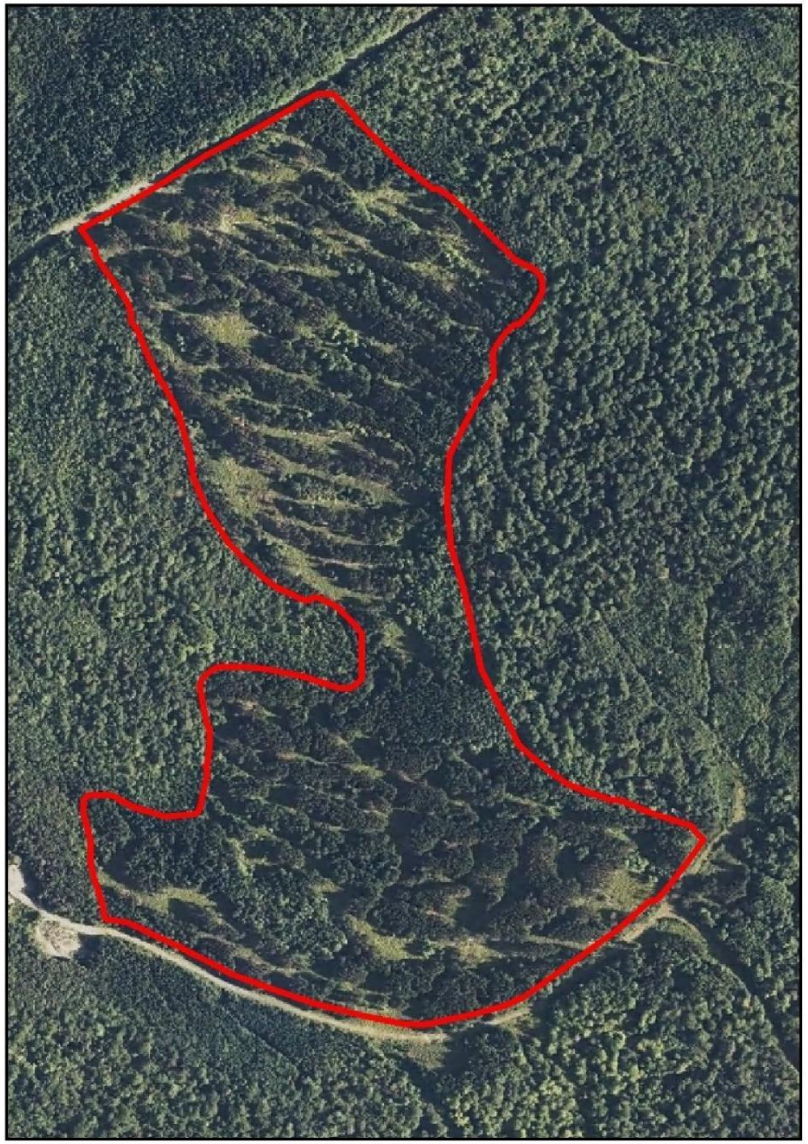
As a result of the low quality of these stands and our focus on retaining good quality trees for future growth, nearly 90% of the harvest in our first five years consisted of hardwood pulpwood.

Higher-quality stands allowed for the initiation of a deferred (or continuous cover) shelterwood regime. The goal is to establish and release regeneration and concentrate growth on the best trees while maintaining a mature overstory component.

This multi-aged stand with a good amount of white pine was thinned in 2010. This stand will be managed to maintain this uneven-aged condition while creating openings to regenerate white pine.



Before (2009)



After (2021)

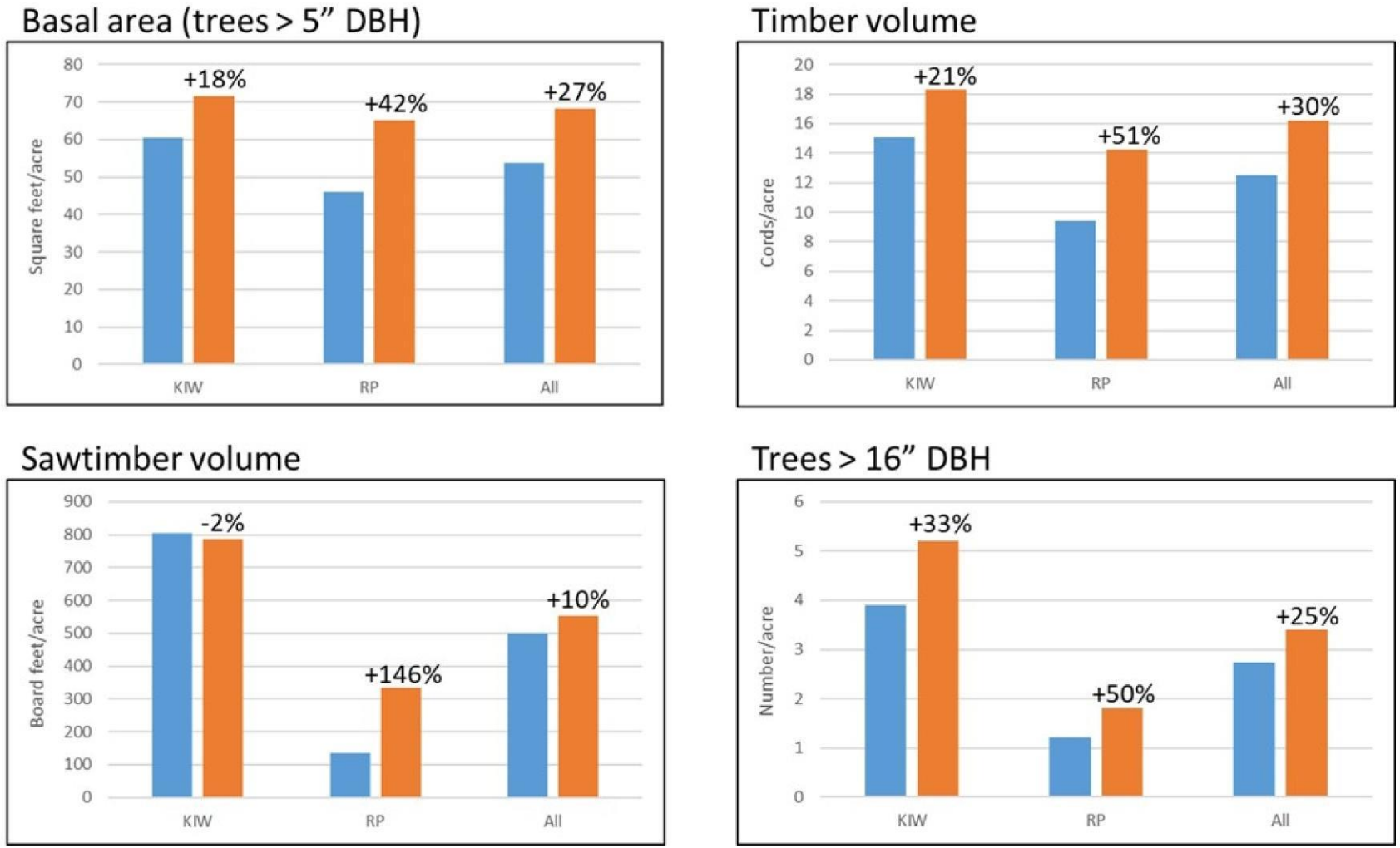
Restoration also includes removal of off-site plantations. About 50% of this red pine plantation was removed in 2016. The remainder will be removed once natural regeneration is well-established.

An emerging focus of AMC management is “early intervention” silviculture to address the extensive areas of young even-aged stands (both hardwood and softwood). The goal is to concentrate growth on the best stems while minimizing carbon losses from self-thinning mortality as the stand ages.

Precommercial and early commercial thinning of even-aged spruce-fir stands.

Precommercial crop tree release in young even-aged hardwood stands.

## Inventory results for timber management area.

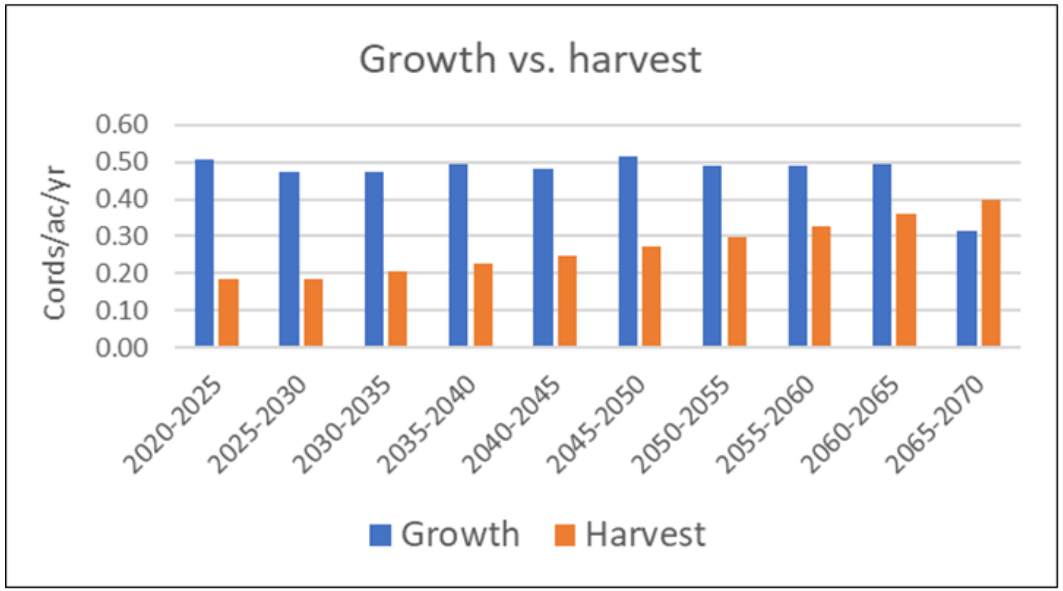


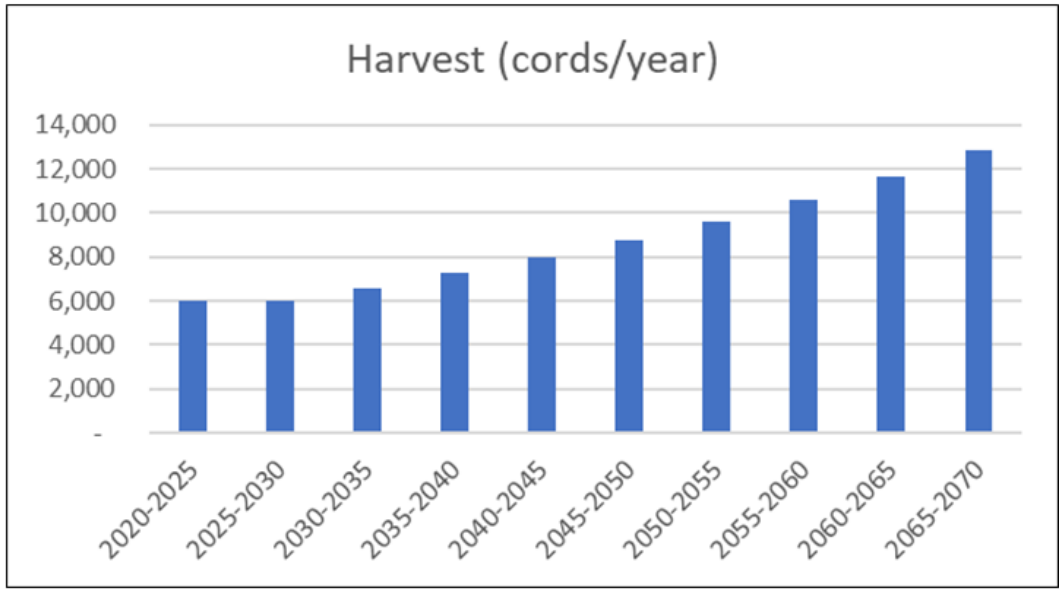

## How are we doing?

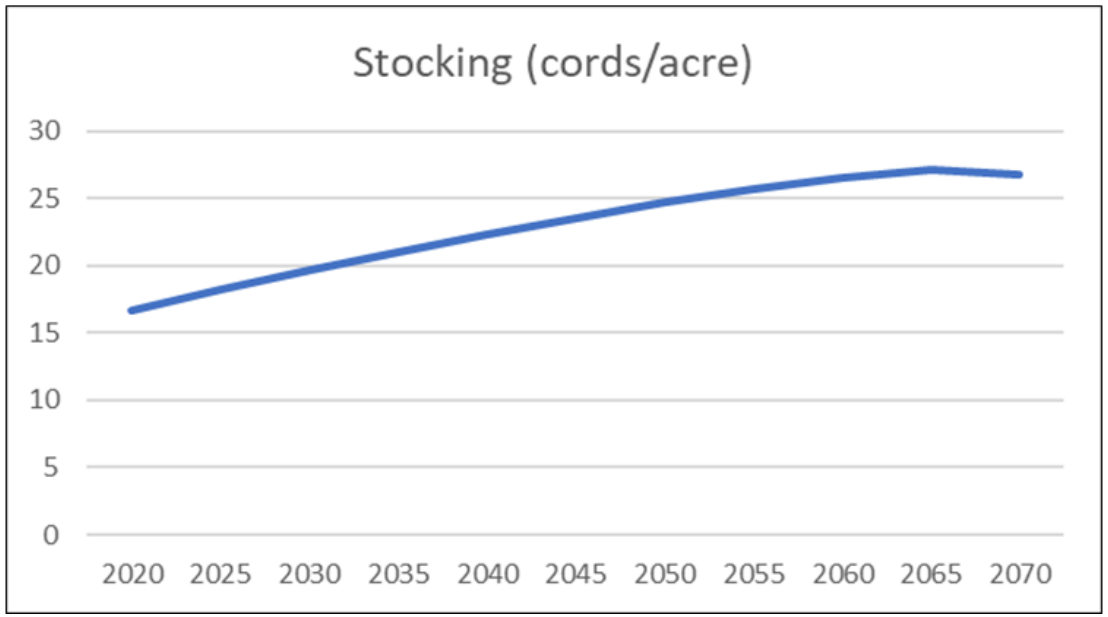
Comparison of 2010 and 2020 timber inventories of KIW and RP properties showed increases of between 10% and 30% in several measures of forest maturity. Carbon stocking is estimated to have increased 17%.

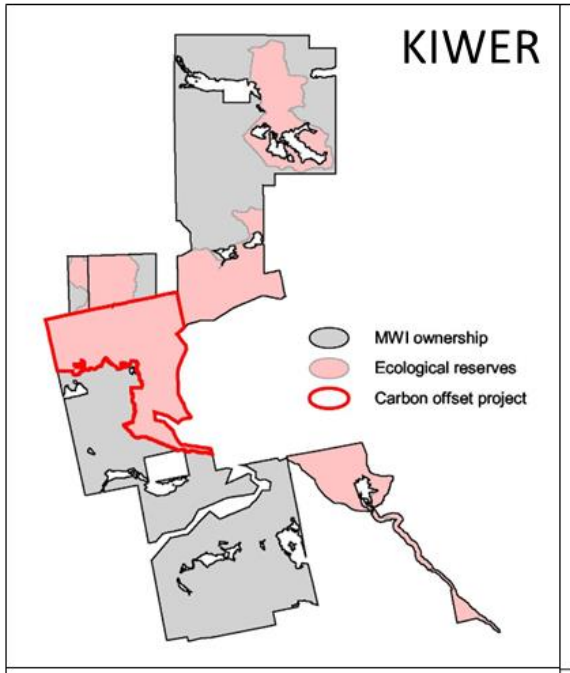
Carbon inventories of the KIW ecological reserve in 2011 and 2021 showed carbon stocking increased nearly 19% (about 2.2 mT $CO_2$e/acre/year).

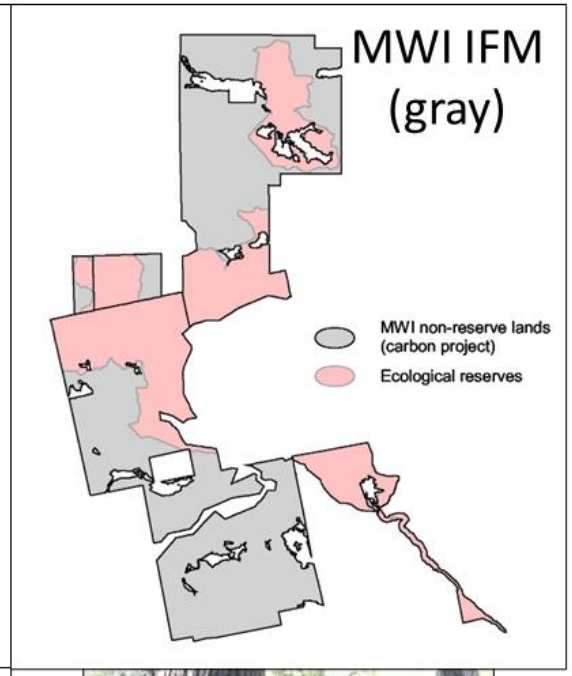
# What does the future hold?

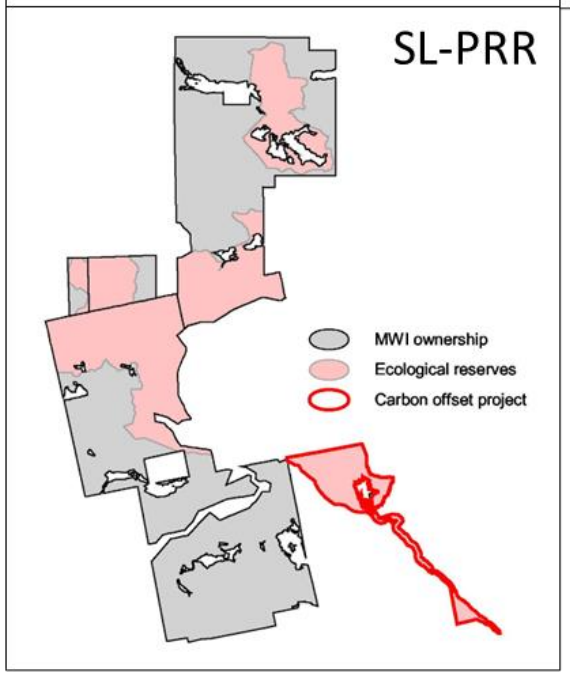





AMC has “monetized” our conservative management into three forest carbon projects (plus one on Barnard North developed by previous owner.) Credits generated by these projects serves multiple purposes:

- Revenue to support land stewardship (esp. important for ecological reserves); partially compensates for lower timber harvest revenue.
- Revenue to support land acquisitions.
- Revenue to support emissions reductions projects at AMC facilities.
- Retired credits to offset AMC organizational emissions (net zero).

# Questions?