The Yaak River Watershed as a Climate Refuge

A Summary for General Audiences Prepared by Forest Refuge Alliance*

Based on the scientific publication by: DellaSala, D.A., Africanis, K., Baker, B., Rogers, M., & Six, D. (2025). *An Ecoregional Conservation Assessment for the Northern Rockies Ecoregion and Proposed Climate Refugium in the Yaak River Watershed, USA.* Forests 16(5), 822.

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What Is This Study About?

A team of ecologists, led by Dr. Dominick DellaSala of the Wild Heritage Project, published a major scientific assessment of the Northern Rockies ecoregion — one of North America's most intact and biologically rich wild landscapes. Their study focused especially on the Yaak River Watershed of northwestern Montana, arguing that this remote, rain-soaked valley deserves formal recognition as a National Climate Refuge: a place where nature can ride out the worst impacts of climate change.

The paper appeared in the peer-reviewed journal Forests in 2025. It draws on decades of climate data, satellite mapping, and field surveys to make the case that the Yaak is not merely a beautiful corner of Montana — it is a scientifically-confirmed, irreplaceable anchor for biodiversity in a rapidly warming world.

Why the Yaak? The Science of a Climate Lifeboat.

The Yaak River Watershed sits at the convergence of three majestic mountain ranges — the Selkirk, the Cabinet, and the Purcell Mountains — and receives more precipitation than almost any other similar-elevation region in the interior Northwest. Ancient inland rainforests of western red cedar, western hemlock, and western larch — many centuries old — blanket the Yaak Valley. Gray wolves, Canada lynx, bull trout, and wolverine call it home, as does the imperiled Yaak grizzly bear population.

The study's central finding is that the Yaak exhibits the hallmarks of a true climate refuge — a geographic area that buffers wildlife from rapid environmental change. There are four key attributes that qualify it for this status:

- **High precipitation and persistent snowpack.** The Yaak receives among the highest annual precipitation in the U.S. Northern Rockies, and a larger fraction of that moisture falls as snow. Snow that accumulates slowly and melts gradually keeps streams cool and full through summer drought — exactly what wild trout and other animals need as temperatures climb.
- **Topographic complexity.** The watershed's rugged terrain creates a mosaic of north-facing slopes, shaded hollows, and cold-air drainages that act as natural refrigerators, allowing cool-adapted species to persist even as surrounding lowlands warm.
- **Forest structural integrity.** The Yaak's remaining old-growth and mature forests regulate local temperature, retain soil moisture, and provide year-round habitat that younger, logged forests simply cannot replicate. The Yaak's landform and maritime weather system provide conditions for a return to a more historic range of variability — more old-growth, and more carbon storage — than do most other ecosystems in the Northern Rockies.

> ***Editorial note (Rick Bass):*** *Historically, the Yaak may have been comprised of as much as 50% old-growth forest. Today, owing to decades of industrial logging, only about 10% of that old-growth remains. This dramatic loss underscores both the urgency to protect what remains and its regenerative potential.*

- **Connectivity to Canada and important east–west ecosystems such as Glacier–Waterton National Parks.** The Yaak connects directly to British Columbia's wildlands — an unobstructed corridor — allowing wide-ranging species like grizzly bears to move north as conditions change.

What the Climate Data Show.

The authors analyzed historical climate records from 1950–2010 and projected conditions through 2099 using widely-accepted climate models for intermediate and high greenhouse gas emission scenarios. Their findings paint a sobering picture for the broader region but underscore why the Yaak stands apart.

Across the Northern Rockies, annual precipitation is projected to decline, particularly in the mid- and late-21st century under high greenhouse gas (GHG) emission scenarios. The Yaak, by contrast, benefits from persistent Pacific moisture delivered by westerly storm tracks and may retain comparatively high precipitation levels through 2099 — though no place will be totally safe if high GHG emissions persist.

The most striking finding involves the rain-to-snow ratio. Across the Northern Rockies, the proportion of precipitation falling as rain rather than snow is projected to increase substantially over the coming decades. This "rain-on-snow" shift reduces snowpack, accelerates spring runoff, and leaves late-summer streams dangerously low and warm.

In the Yaak, the shift still occurs, but from a higher baseline of snowfall and at a slower rate. The Yaak is projected to retain a substantially greater snowpack fraction than the broader regional average through the end of the century — a difference that could mean the survival or extinction of cold-water species like bull trout and westslope cutthroat trout.

The Scientific Case for Increased Protection.

Perhaps the study's most urgent finding is this: despite the Yaak's extraordinary ecological and climatic value, **overall designated protection from logging covers only 1% of its total area, and only 0.25% of its mature forests. Similarly, crucial wildlife habitat has strikingly low protection. Most of this irreplaceable landscape and its wildlife is still very vulnerable.**

The study also identifies the Yaak as a vitally important carbon sink. Its old forests store enormous quantities of carbon in wood and soil — carbon that will mostly be released to the atmosphere as GHG if these forests are logged — making the Yaak simultaneously a biodiversity stronghold, a climate adaptation asset, and a carbon sequestration reserve of regional significance.

Forest Refuge Alliance believes these findings make a compelling scientific case for immediate and formal protection of the Yaak as a National Climate Refuge — a new protected-lands designation that would prioritize climate resilience alongside traditional conservation values. The window is closing to save the Yaak's old forests and rare wildlife. But there's still time to act. Science tells us what's at stake.

Why This Matters.

This peer-reviewed study provides independent scientific validation for a National Climate Refuge in the Yaak. Forest Refuge Alliance is asking Montanans to unite in seeking designation of this federally-protected Climate Refuge. The study makes the scientific case for why this is the best place for a refuge.

The findings reinforce what writer and FRA co-founder Rick Bass discovered decades ago — this is a highly unique place. The Yaak is a true climate lifeboat. Protecting it is one of the most important conservation actions we can take for the future of Montana, its wildlife, and its people. And for our country.