Measuring, Reporting, and Verification: **How NCX uses models, data, and local inventory to deliver and verify real climate impact.**

Overview $\longrightarrow$

Robust measuring, reporting, and verification (MRV) is critical to ensuring that forest carbon offset projects are generating high-quality, additional carbon credits and delivering the real climate benefits they were designed to produce.

NCX uses a data-driven, hybrid approach to MRV, combining boots-on-the-ground forest inventory data with fine scale remote sensing and cutting edge statistical modeling. Our system uses a machine-learning approach, in which predictive models guide our plot sampling and these data are fed back in to improve model performance every cycle. We also use property-level data to refine initial assessments and verify that the credits we issue produce real climate benefits. This approach builds on our decade of experience working at the forefront of research and development for advanced forest measurement technologies.

Basemap, Baseline models, and inventory data: an integrated approach to MRV

Our MRV begins even before an eligibility report is issued to a landowner, and continues through the entire project cycle until carbon credits are reported to our landowners, buyers, and verifiers. For more on how the process works from the landowners' perspective, see our **NCX Carbon Program Building Block** article.

The first step in our MRV system is Basemap, our custom inventory of tree species and sizes on every acre in the continental US, generated at a 30x30m resolution. To produce Basemap, we combine satellite imagery and national forest inventory data with scientific knowledge about how forest composition changes across space and time. We are constantly updating Basemap with new data and methodological improvements.

The next step is to generate predictions of *carbon at risk* using our Baseline model. Baseline predictions integrate Basemap data with other data about landowner harvest behavior, including ecological, economic, and social dynamics across the landscape. See our Building Block article, "**Our Baseline model of harvesting behavior**" for more on this step.

Both of these steps happen before a landowner commits to program participation (i.e., the project cycle). After a landowner has committed to enrolling their property in a harvest deferral cycle, we use

Basemap to develop an efficient approach to field sampling of enrolled properties.

We use remote sensing and on-the-ground plot sampling to monitor the property throughout the activity period (i.e. the time during which a landowner has agreed not to harvest). We collect a first round of plot data at the start of the harvest deferral commitment, and use it to refine our initial predictions of carbon at risk. We then collect a second round of plot data after the harvest deferral has occurred, to assess the change in carbon from the beginning to the end of the activity period.

The difference between the final "deferred carbon" estimate and our initial estimate of carbon at risk determines the final number of credits generated, in the form of *harvest deferral credits (HDCs)*. HDCs quantify the amount of deferred carbon created by each property during one activity period, and are measured in units of tonne-years (one metric tonne of carbon dioxide equivalent stored for one year). We report the HDCs deferred in units of tonne-years generated to landowners and buyers through our web portals and impact reports. The final step is verification of issued carbon credits. As of March 2022, our harvest deferral methodology is under review by Verra, so details on the verification process are pending.

We have designed all our MRV methods to match our overall goal: generating *robust carbon credits* with a *trustworthy assessment* of *additional climate impact*. Since our early days as a technology-based forest inventory provider, we have been developing advanced data tools that integrate remote sensing and local forest measurements to help landowners make better management decisions. After a decade of refinement, we are now deploying this technology to create real, verifiable carbon credits in a market that works for landowners of all sizes.

FIGURE 1: **NCX's process for measuring, reporting, and verification**
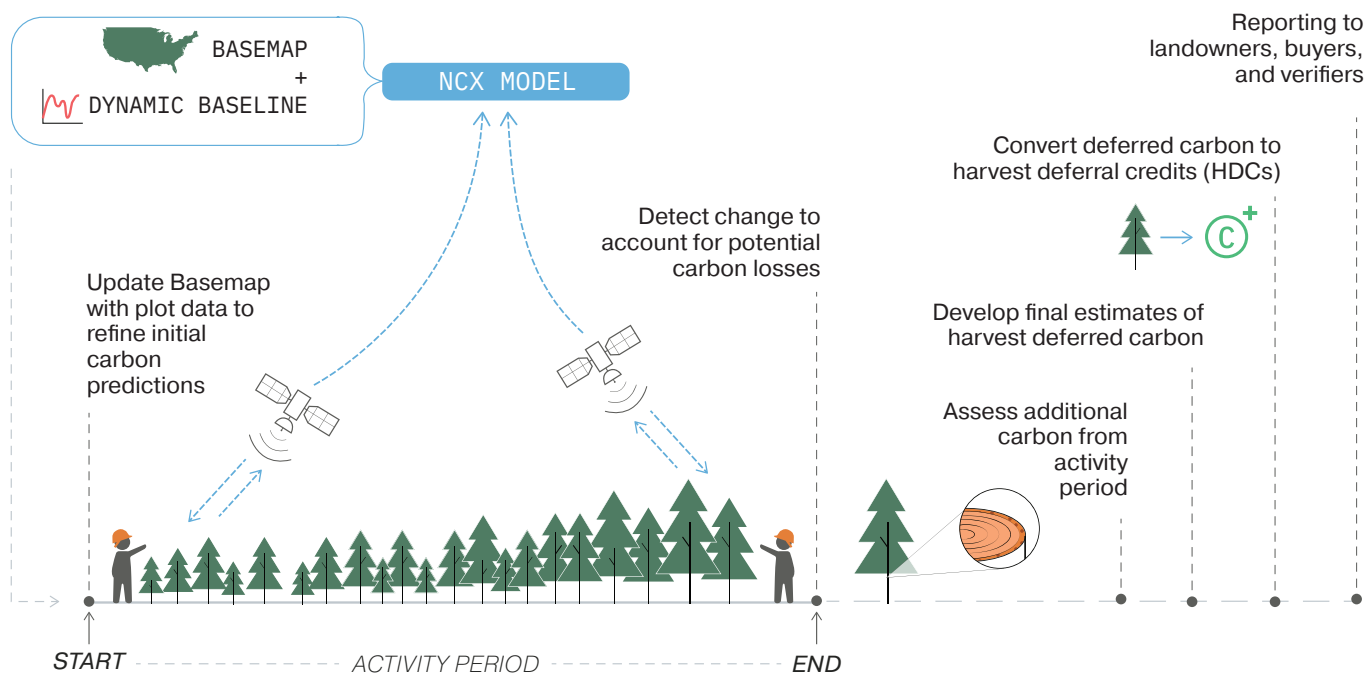
For more details see: **NCX Carbon Guide**