

## Executive Summary

Staff with the N.C. Forest Service (NCFS) Water Resources Branch conducted detailed visual assessments of North Carolina's forestry Best Management Practices (BMPs) implemented on 216 forestland tracts across the state between December 2018 and November 2020. This report summarizes the percentages of BMP implementation and potential risks to water quality observed during these tract examinations. Additionally, this report contains recommendations for improvements by ecoregion and reviews our actions to address previous survey report recommendations. This is the second report following the 2006 amendments to the North Carolina Forestry BMP Manual, which was used to generate our survey questions.

We used standardized methodology set by the Southern Group of State Foresters (SGSF) to determine a sample size of 216 sites statewide, stratified by the four ecoregions within North Carolina: Mountains, Piedmont, Southeastern Plains, and Mid-Atlantic Coastal Plain (MACP). To identify many of the sites included in this survey, we used the Southern Forest Area Change Tools (SouthFACT), which analyzes periodic remote sensing data to locate areas of dramatic vegetation change. When SouthFACT was not practical, we identified potential sites by randomly selecting from recent NCFS records, or by assessing sites we came across while traveling. Examined tracts met the following conditions: 1) the tract was greater than five acres; 2) the tract bordered or partially contained an intermittent or perennial stream; 3) the tract contained no evidence of changing land use; and 4) tracts were operationally active or the operation had concluded within six months of our site visit.

We completed 216 surveys in 98 of North Carolina's 100 counties. When a BMP implementation opportunity was encountered, we assessed whether the BMP had been properly implemented, and whether the situation presented a risk to water quality. We surveyed some BMPs on an individual basis, aligning with the 2012-2016 BMP implementation survey report but differing from the approach used in the 2006-2008 BMP implementation survey project. For example, each waterbar was assessed by answering nine specific BMP implementation questions relative to waterbars. If there were 10 waterbars on a tract, and all BMP questions were applicable, evaluators would record 90 BMP opportunities. In total, two evaluators assessed 31,472 BMP implementation opportunities statewide, including 8,855 in the Mountains, 13,717 in the Piedmont, 4,005 in the Southeastern Plains and 4,895 in the MACP. Overall, proper BMP implementation rate was 83% statewide, 76% in the Mountains, 84% in the Piedmont, 89% in the Southeastern Plains and 87% in the MACP. Many of the surveys were collected on non-industrial private lands (69%) on an average tract size of 61 acres. Most stands (54%) were mixed hardwood and pine timber. Most of the surveyed tracts (79%) were of clearcut harvests and were identified and assessed after completion (82%).

Evaluators associated a potential water quality risk to roughly 2% of the BMP implementation opportunities. Statewide, when BMPs were not properly implemented, risks to water quality were more likely in the categories of stream crossings (38%), rehabilitation of the project site (36%) and streamside management zones (SMZs) (21%). Bridgemats were the most frequently observed crossing type (66%) followed by culvert crossings (24%). This is an encouraging observation as many efforts to promote bridgemat use have occurred over the past several years. The ratio of risks to water quality to stream crossing type show that bridgemats are a preferred crossing method, although other crossing types can also be effective in protecting water quality with proper BMP implementation. Continued education, outreach and other supporting programs that encourage the use of BMPs at stream crossings are needed to sustain high performance. Rehabilitation of project sites could be improved by proactively identifying and stabilizing critical bare soil areas away from the stream that can funnel runoff into the SMZ. Another way would be to prevent or remove logging debris from entering streams at the stream crossings. Evaluators observed many narrow SMZs that effectively shaded streams and restrained visible sediment throughout the state. However, it appears that a narrower SMZ without appropriate BMP application upslope creates a greater risk scenario compared to that of wider SMZs.

The lowest BMP implementation levels for the Mountain and Piedmont ecoregions was in the skid trail category (58 and 74%, respectively). Evaluators observed greater skid trail-to-harvest area ratios and steeper sloping skid trails in the Mountain ecoregion compared to other ecoregions. Continued preharvest assistance, education and research on selecting road, trail location (reopening legacy trails or avoiding them) and trail stabilization remains a need for both ecoregions. The lowest BMP implementation level for the Southeastern Plains ecoregion was in the rehab of the project site category (81%). Evaluators observed areas away from the stream edge in all ecoregions that could benefit from stabilization. Attention to minimizing large areas of bare soil and taking efforts to ensure that these bare soil areas are disconnected from waterways would improve implementation in this category. The lowest BMP implementation level for the MACP ecoregion was in the site preparation and reforestation category (69%). Although few site preparation sites were surveyed, evaluators observed ground disturbance between bedded rows, a lack of staggered openings for surface water to flow among bedded rows and high potential for sediment transport in some areas. A focus on BMP efforts for site preparation should be emphasized in outreach and education efforts in the coastal areas.

The highest rates of BMP implementation were found in the Chowan, White Oak, and Pasquotank river basins, while lowest were in the Little Tennessee, Watauga, and New River basins. Tracts within “Outstanding Resources Waters” and “Nutrient Sensitive Waters” had high BMP implementation rates as well.

Our findings support the conclusion that operators across the state properly BMPs to protect water quality. Continued efforts to educate operators and landowners on the importance and ease of BMP implementation should continue to be a focus. This report adds to the list of efforts to monitor and report BMP implementation in the state. Our results will be used to target training efforts, inform forestry researchers, and provide transparency on the status of BMP implementation for the forestry community and others in North Carolina.

### **Acknowledgements**

The Forestry Best Management Practices Implementation Survey was made possible through funding from the U.S. Environmental Protection Agency (USEPA), N.C. Forest Service (NCFS), and U.S. Forest Service (USFS). The USEPA funds were awarded through a grant for nonpoint source pollution management under Section 319(h) of the Federal Clean Water Act (CWA). The N.C. Division of Water Resources serves as the state administrator of the Federal 319(h) Grant Program in North Carolina. Additional funds awarded from a USFS Landscape Scale Restoration Grant also supported data collection efforts in this project. The primary agency involved in this project is the NCFS.

We are grateful to the landowners and forest operators who allowed us to visit their tracts, gave us insight on their forest operations and warned us of safety hazards. This survey would not have been possible without the cooperation of NCFS staff at the region, district and county offices. Staff from every area of the state assisted with this survey by giving us background information on tracts, escorting evaluators to sites and making introductions. The field work was conducted by two staff members of the NCFS Water Resources Branch.

### **Recommended Citation**

Lang, A.J., W.A. Coats, T.A. Gerow, M.A. Polizzi and W.A. Swartley. 2022. “An Assessment of Forestry Best Management Practices in North Carolina, 2018-2020.” NCDA&CS-North Carolina Forest Service. Raleigh, N.C.