

Use of survival data for planted woody stems to refine a vegetation monitoring protocol for restoration sites

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The Carolina Vegetation Survey (CVS), in collaboration with North Carolina's Ecosystem Enhancement Program (EEP), has developed a vegetation monitoring protocol for restoration sites. A goal of this protocol is to provide a consistent, efficient, and repeatable means for tracking performance of individual planted woody stems. CVS currently maintains data for woody stems from 662 permanent monitoring plots across 72 restoration projects. Dimensions measured annually for these stems include height, diameter at decimeter height (DDH), and diameter at breast height (DBH). In addition, each stem's coordinates within a monitoring plot are recorded, along with the stem source (live stake, bare root, ball and burlap, etc.). Annual updates are also recorded for stem vigor and damage observed. Monitoring firms requested that CVS review the protocol to determine if the number of stem dimensions measured could be reduced without loss of data utility. Because current regulatory requirements specify minimum survival rates of *planted* woody stems, CVS examined survival data for planted woody stems as functions of stem dimensions. Increasing DBH contributed to greater likelihood of survival for stems ≥ 5 cm DBH. Both larger DDH and greater height contributed to greater likelihood of survival for all stems. A model predicting annual survival rate for stems based on stem height alone performed nearly as well as a model based on both stem height and DDH. Because measurement of DDH requires more time and effort than measurement of stem height, EEP and CVS are considering modifying the protocol to eliminate DDH measurements, simplifying woody stem monitoring. The CVS-EEP restoration plots database offers the potential for a variety of other assessments, such as determining which types of woody plants (species, source) are best suited for particular site conditions.