Photos Series for Quantifying Dead and Downed Forest Fuels

In 1974, Wayne Maxwell and Frank Ward, researchers with the Pacific Northwest Forest and Range Experiment Station and working out of Seattle, WA, developed the initial versions of a photo series for determining forest fuel "loadings" (volumes). Their focus was on residual slash following forest stand treatments, such as clear cuts, partial cuts and precommercial thinning. I worked with them for two years during my graduate studies in forest fire science and technology at the University of Washington. So shortly after I began work as the fuels management specialist for the Zigzag Ranger District (Mt. Hood NF, R6), they sent me a test version of their as yet unpublished photo series for coastal Douglas-fir forests for my assessment.

I was skeptical at first. All of my previous studies and work were based on Dr. James Brown's laborious system of "counting sticks" to inventory dead and downed forest fuels, then running the data through a complex mathematical formula to derive the fuel loading by fuel particle size class. In the summer of 1975, I hired a three-person crew to inventory fuels for environmental analyses, fuel treatment planning and prescribed burn plan development. At each site to be evaluated, they first used the test photo series Maxwell and Ward had sent me. Then they implemented the tedious and time-consuming, but state-of-the-art inventory process described by Brown in his "Handbook for Inventorying Downed Woody Material (Gen. Tech. Rep. INT-16, 1974). After they returned to the office each day, the crew ran their collected inventory data through the mathematical formulae to get the calculated fuel loadings. My intent was to include a comparison of the two methods, photo series and stick counting, as part of my response to Maxwell and Ward.

To my surprise and delight, the photo series provided fuel loading results that were virtually identical to the stick-counting inventory method, and took one-eighth the time (and therefore, cost). Brown's method was still the standard for scientific studies, but the photo series was to become the preferred method for hands-on, fuels management fieldwork.

Maxwell and Ward published their first photo series in 1976 (Gen. Tech. Rep. PNW-51 and PNW-52). They followed with photo series for other forest types. In 1980, they showed how to construct photo series in their "Guidelines for Developing or Supplementing Natural Photo Series" (Res. Note PNW 358). An avalanche of photo series for other US vegetation types soon followed from numerous other authors. The publication of hard-copy photo series culminated in 2014 with a "Stereo Photo Series for Quantifying Natural Fuels. Vol. XII: grasslands, shrublands, oak-bay woodlands, and eucalyptus forests in the East Bay of California" (Gen. Tech. Rep. PNW-GTR-893) by Clinton Wright and Robert Vihnanek.

Today a web-based digital photo series provides access to all of the photos and data contained in the earlier hard-copy publications. Its existence and use by current forest managers is testament to the continuing value of Maxwell and Ward's concept and products from nearly 50 years ago.

John Swanson
April, 2021