

## Reference Stereograms

These CIR photographs and stereograms, preceding the body of the guide itself, provide context, amplify the necessarily limited number of photographic exhibits that a modular guide can contain, and accustom inexperienced interpreters to the range of color representation that can be expected from CIR products. These figures are designated by letters from A to W. Figures A-M are primarily examples of varying color qualities. Figures N-W provide further illustrations of the various forest types in the guide. The latter are referenced on the guide pages, and the types that appear on them are cross-referenced in the index that follows this section.

Color infrared film is highly sensitive to handling, processing and exposure. Figures A, B, and C, which show the same Red Oak (RO) site, illustrate the color shifts that may occur because of old or improperly stored CIR film, or because of overexposure. For users acquiring their own photography, two of the most significant variables that can be controlled in CIR photography are flight altitude and the speed difference between the infrared-sensitive and red/green sensitive emulsion layers, termed IR-balance. Fleming (1979) presents methods of corrective filtration to adjust for these factors.

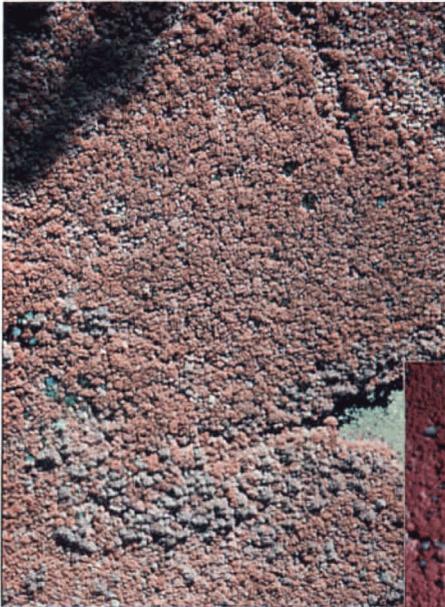


Figure A. The effect of old film on color. RO type has a much greyer appearance. Bear Brook State Park, NH. 8/21/86. 1:6000.



Figure B. "Normal" CIR color of RO: Bear Brook State Park, NH. 8/26/86. 1:6000.

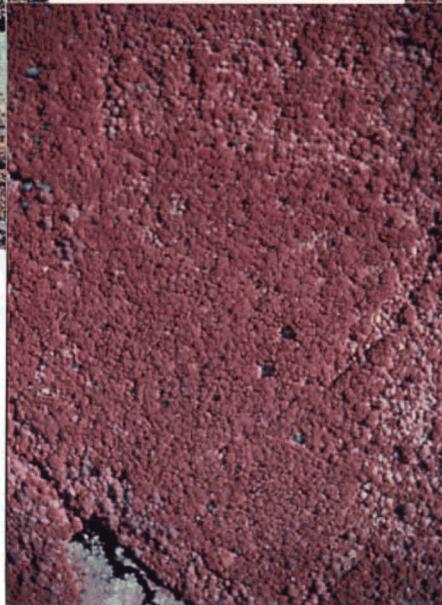


Figure C. The effect of exposure on color: 1 stop overexposed. Note loss of detail and some loss of color distinction. Bear Brook State Park, NH. 8/26/86. 1:6000.

Even more striking color discrepancies may arise in the printing process. CIR film is a reversal film, normally processed to a positive transparency. Making a positive print from a CIR transparency and making one from a normal color transparency are identical processes, but the "unusual" color combinations in CIR photos often give trouble to the automatic color analyzers that now control much of photo printing. Figures D and E were made from the same transparency.

Differential illumination and camera optical characteristics can cause color variations within single photographs. Topographic slope and aspect, which alter the angle of the canopy to incident light, are a source of differential illumination. The effects are subtle, but can be misleading. Figure F contains a fairly even distribution of SM/B/YB, yet sections of the stand are slightly different shades as a result of the hilly topography underneath.



Figure D. The effect of printing on color. RS/BF type; first printing. Twin Mountain, NH. 8/31/86. 1:6000.



Figure E. The effect of printing on color. Second printing of the same transparency. Twin Mountain, NH. 8/31/86. 1:6000.

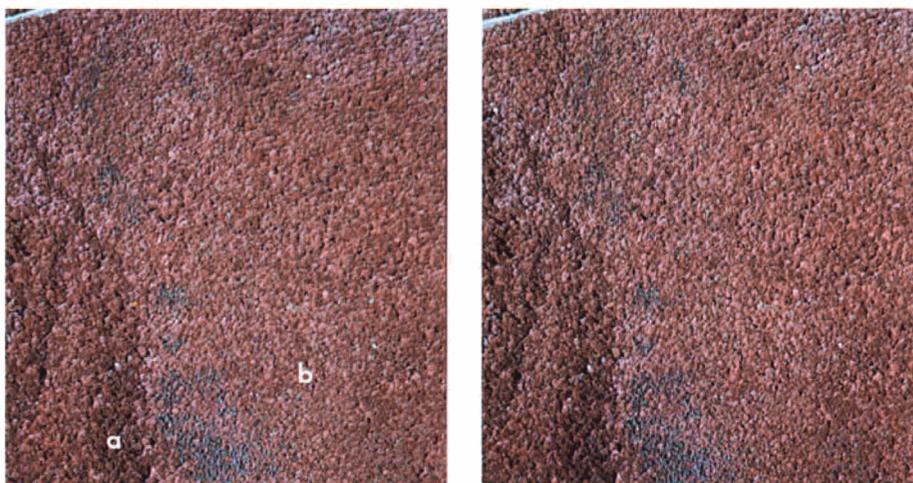


Figure F. The effect of slope on the appearance of stand color. As a result of being on the shady side of the slope, stand **a** appears slightly darker than stand **b**, which has a very similar species composition. Franconia, NH. 8/4/86. 1:8500.

Despite the variability of CIR color, relative colors remain consistent. WP and RP occur together often and demonstrate this feature well. Where RP is a deep rust, WP is a grey pink (Figure G); where RP is a dark blue-magenta, WP is a light blue-grey

purple (Figure H); and where RP is a dark rust magenta, WP is a grey magenta (Figure I). In short, WP is just a lighter, slightly greyer version of the color of RP.



Figure G. Consistency of relative color. Pawtuckaway State Park, NH. 8/21/86. 1:6000.

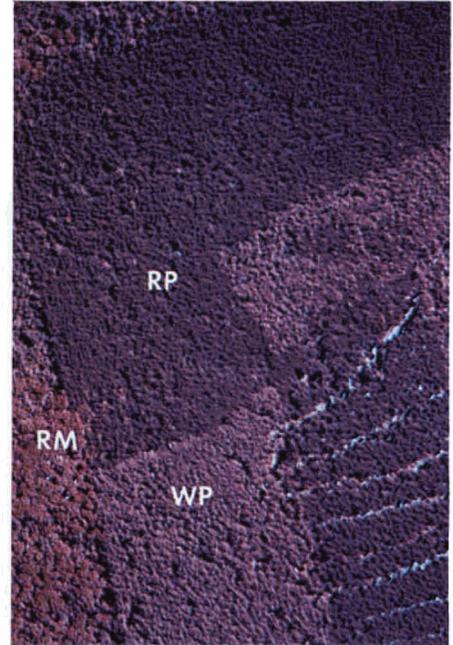


Figure H. Consistency of relative color. Wolfboro, NH. 8/31/86. 1:6000.

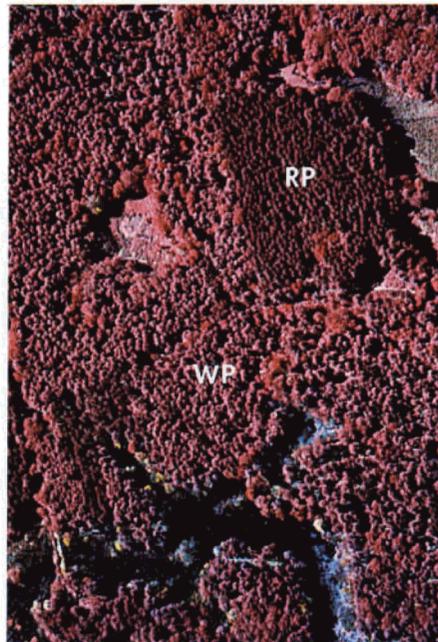


Figure I. Consistency of relative color. Pawtuckaway State Park, NH. 9/8/86. 1:6000.

Sapling stands of any forest type do not have the developed crowns, stand density and thus the texture that is typical of a mature stand. Even-aged sapling stands, in particular, often have a very uniform and finely textured appearance as a result of their consistently small crowns. Figure J is an example of an old clearcut that is now very densely occupied with saplings 8 to 12 feet in height. In this example, there are quite a few tree species involved, but the only change visible to the interpreter across the

expanse of saplings is the color, which varies from lighter pink to darker purple.

Midsummer is a season of relative stability in the appearance of tree species on aerial photographs. Individual species will display different color characteristics on photography taken early or late in the summer season. Figure K is an example of the effect of red maple beginning to take on its fall colors--in CIR, this translates to yellow and gives a mottled appearance to the cover type as a whole.



Figure J. Usefulness of color to determine species when there are no texture clues. The stand delineated is an old clearcut. Notice the consistent texture of the even-aged saplings within the clearcut area, but also the shifts in color with respect to the shifts in species composition. Unfortunately, the predominance of "other" species (for example, pin cherry) in this sample means that these stands cannot be assigned to one of the types in this guide. Franconia, NH. 8/4/86. 1:8500.

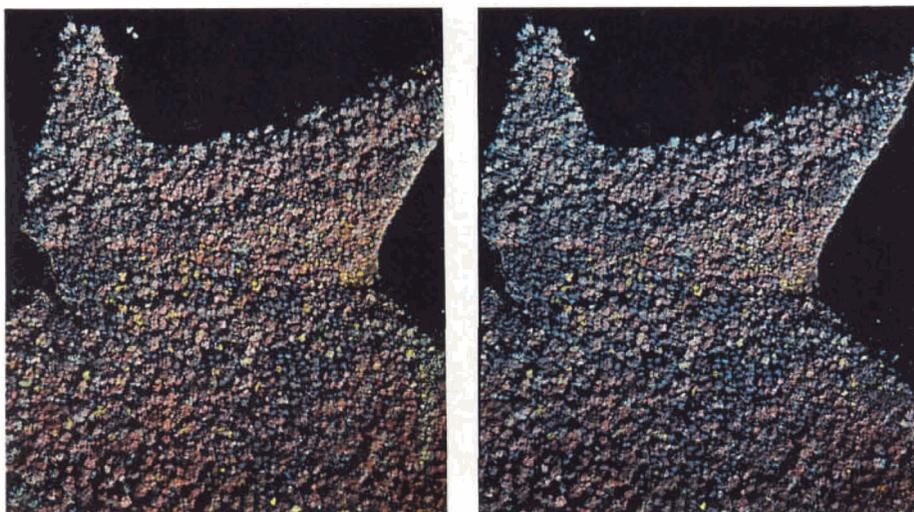


Figure K. Effect of changing autumn colors in CIR photography. The yellow crowns of red maple give this RS stand a variegated appearance in a photo taken in late summer. Pillsbury State Park, NH. 9/8/86. 1:6000.

A dead and leafless stem has a distinctive, almost bright turquoise color in CIR. A large proportion of dead stems in any stand can change the overall impression of color of the stand. In general, dead stems scattered evenly throughout a stand add a lighter, more turquoise quality to the entire stand. Figure L contains an open RS stand with both large mature individuals and large dead red spruce stems.

Where the canopy is less dense or patchy, the understory species and/or ground conditions (for example, dry vs. swampy) are visible from the air and will affect the visual impression of stand color in an aerial photograph. Figure M illustrates this with the WB type. Stands **a** and **c** are WB with an understory of red spruce, and stand **b** is WB with a beech understory.



Figure L. Effect of a high proportion of dead stems on color. Stands **a** and **b** are both mature RS stands, but stand **b** has a high proportion of large dead stems and as a result a lighter more turquoise color. Franconia, NH. 8/4/86. 1:8500.

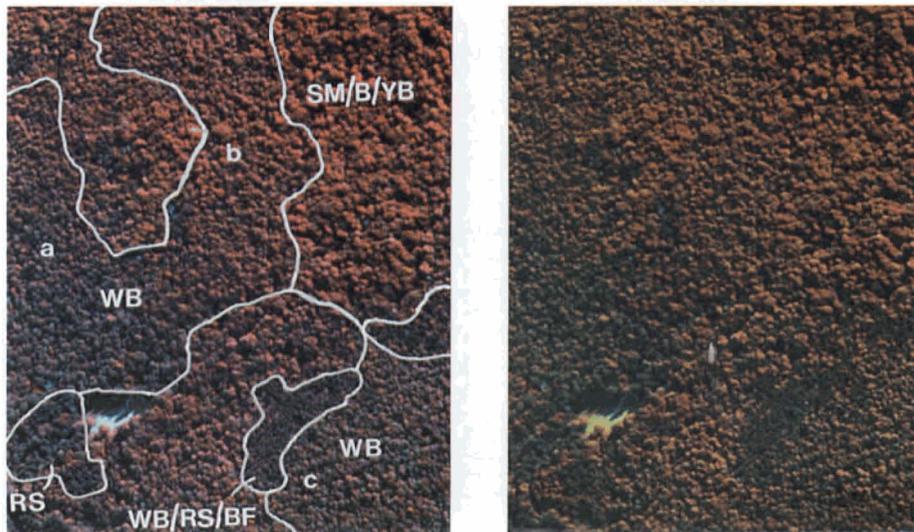


Figure M. Effect of understory species on stand color. In this example, a WB stand with an understory of red spruce (stand **a**) appears much darker than a similar stand with a beech understory (stand **b**). Even with a relatively pure and dense canopy of WB (stand **c**), red spruce in the understory can still affect stand color. Cardigan State Park, NH. 8/31/86. 1:6000.

The following stereo pairs demonstrate variations of the types that an interpreter may come across, and help the interpreter distinguish between similar or potentially confusing species and types.

PP can quickly be distinguished from RP and WP by its color. Figure N contains stands of all three types for easy direct comparison. Describing again in relative terms, WP is the lightest and most grey (stand **a**), RP is a darker, more intense version of

the same color (stand **b**), and PP, while also a dark color, is much more green than either of the other two (stand **c**).

Two stands with the same species composition may appear slightly different because of different spatial distributions of those species. Figure O is a more evenly distributed (less patchy) version of the WP/RO/RM type. The smaller stands are non-plantation examples of the RP type.

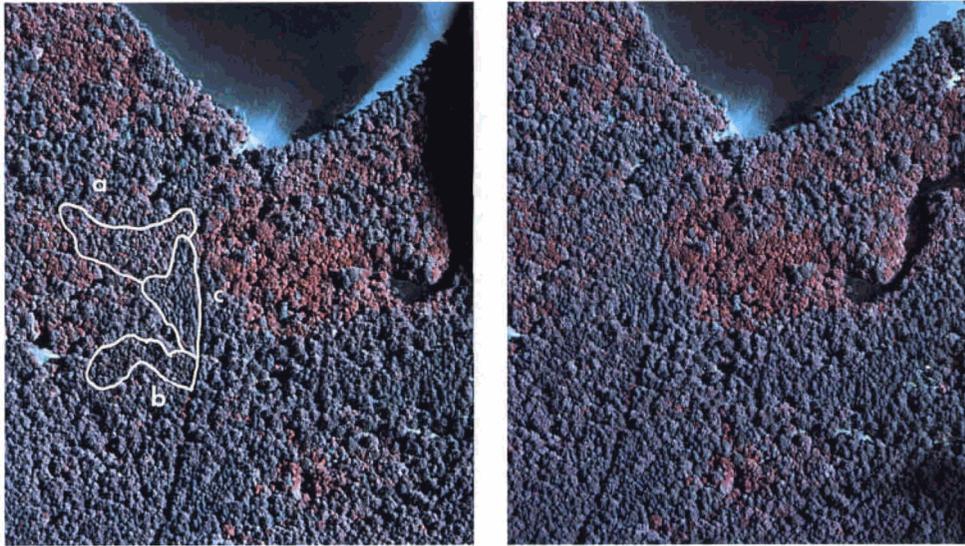


Figure N. A comparison of the relative colors of PP, RP, and WP. White Lake State Park, NH. 8/4/86. 1:6000.

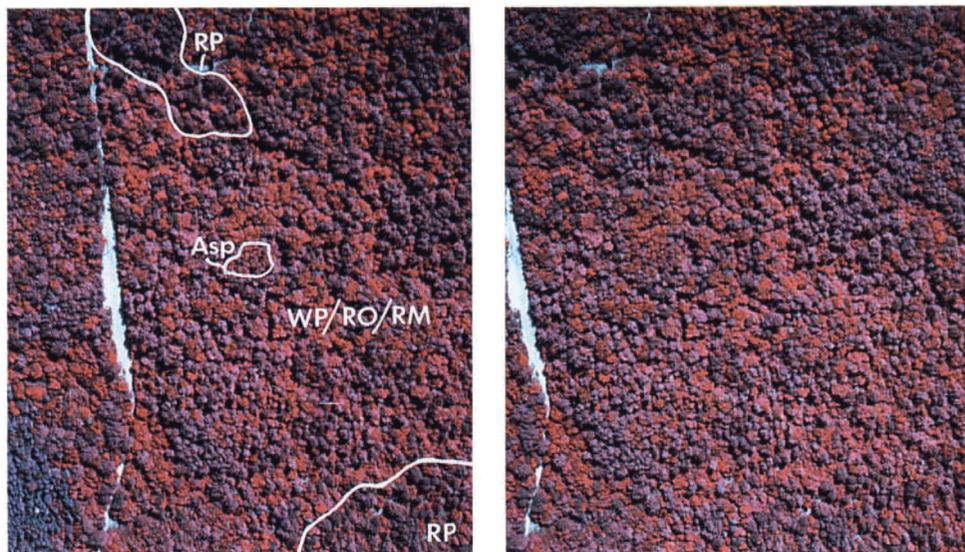


Figure O. Effect of patchiness on overall stand appearance. The examples here can be compared to the examples of each type provided on the WP/RO/RM and RP pages in the body of the guide. For reference, also labeled is a clump of aspen, identifiable by its smaller crowns and slightly sandier color. Near Wolfboro, NH. 8/12/86. 1:6000.

Usually, the distinction between hardwoods and softwoods on CIR airphotos is easy to make. Eastern Hemlock, however, has a broad fuzzy crown and pink color that can easily be mistaken for a hardwood. In Figure P, the high proportion of hemlock could easily be missed. With careful examination, however, the hemlock crowns can be distinguished from the red oak by their softer, less well-defined crowns and slightly more pink and less orange color. Of the hardwoods, beech crowns in particular are very similar to hemlock.

Any cover type definition will include a certain range of species composition, each of which can appear slightly different. For example, in three-species types, there are instances where one of the species may be hardly present or missing altogether. A stand of white pine and red maple (Figure Q) is such an example of a variation of the type WP/RO/RM.

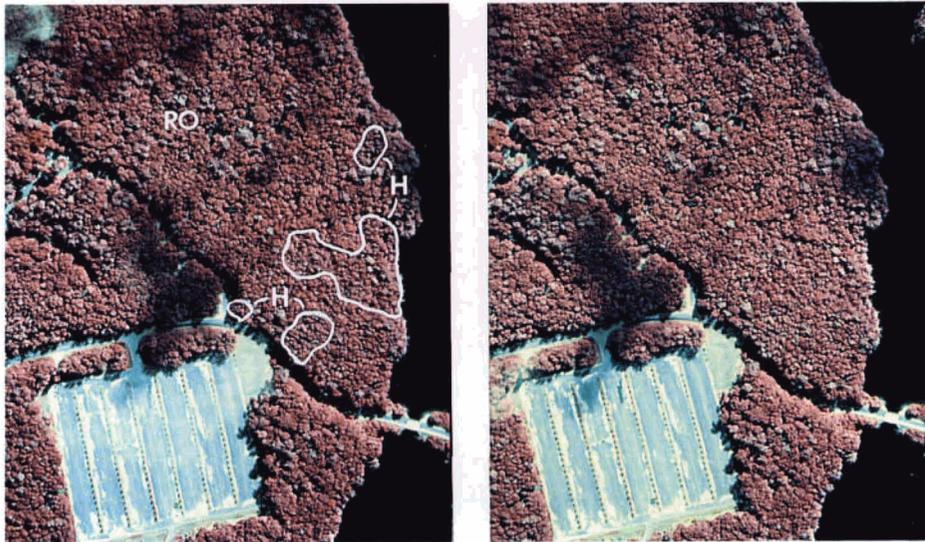


Figure P. Differentiating Hemlock from Red Oak. Most of the forested area in this photo is RO. The smaller areas delineated, however, identify local concentrations of hemlock. Note the slightly softer and less well-defined crowns of the hemlock. The large dark splotches are shadows from patchy cloud cover. Pawtuckaway State Park, NH. 8/21/86. 1:6000.

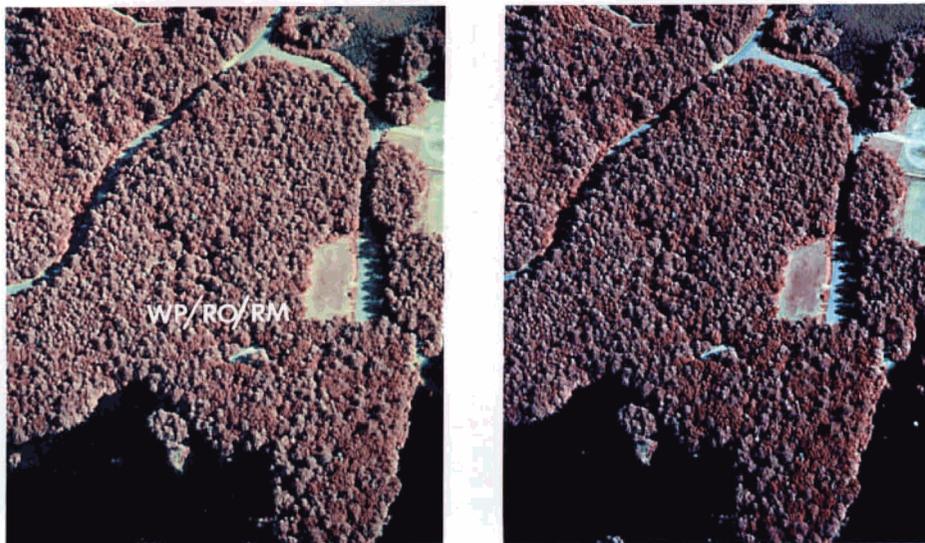


Figure Q. Appearance of a three-species type when one species is hardly present. In this example of a WP/RO/RM type, red oak is hardly present. Bear Brook State Park, NH. 8/21/86. 1:6000.