Accuracy Assessment

Of the 724 accuracy assessment sites originally collected, we dropped 36 from the analyses (for reasons discussed earlier in the Accuracy Assessment Methods section). A total of 688 accuracy assessment sites were used for the final analysis. Our initial run of the analysis revealed an overall accuracy of 73%, well below the acceptable program standard of 80% accuracy. Overall accuracy improved to 80% with subsequent analyses once the adjustments were made to better aligning map and vegetation classification concept (Discussed in detail in the Accuracy Assessment Methods section of this report). A Kappa index was applied to the overall 80% to adjust for chance agreements, resulting in an index of 79%.

The accuracy assessment contingency matrix can be found in Appendix G: Accuracy Assessment Contigency Table. The matrix is an array of numbers set out in rows and columns which reveal the number of polygons assigned to a particular vegetation association(s) relative to the actual vegetation association as verified on the ground. The columns represent the vegetation associations, and the rows represent the map class codes. The accuracies of each map class are described along with the users' accuracy reflecting errors of inclusion (commission errors) and producers' accuracy reflecting errors of exclusion (omission errors) present in the mapping. To reiterate what was written in the Methods section of this report, with users' accuracy, the number of correctly classified samples of a map class is divided by the total number of field samples that were classified in that map class. The emphasis here is on the *reliability* of the map, or how well the map represents what is really on the ground. With producers' accuracy, the number of correctly classified samples of a map class is divided by the total number of field samples of that map class. The emphasis here is on the *probability* that the ground field samples have been correctly classified. Confidence intervals are also given. The width of the confidence interval is affected by the sample size used to derive the point estimate. An example of how to use the matrix follows: map class White Pine – Red Pine Forest (WPC) has a producers' accuracy of 83%, meaning that 83% of the accuracy assessment points were also found to be classified as WPC. Users' accuracy is 79%, meaning that 79% of the polygons classified as WPC in the data can be expected to be WPC when visited on the ground.

Errors in the mapping occurred for a variety of reasons, and we attempted to group these reasons into 4 broad categories. Although some errors could be placed in more than one category, we nevertheless found that a quick estimate of the percent error by category provided a better understanding of the mapping problems.

About 20% of the errors were related to disagreements of percent canopy cover. The photo interpreter sees canopy crowns from above at a relatively small scale and large area, and the field crew has a relatively narrow view looking up from the ground. These different perspectives frequently lead to different estimates of percent cover, which in turn leads to different conclusions on determining the vegetation type. Canopy cover disagreements occurred most often when the actual cover of a site was closest to the percent that determines one vegetation type from another, such as conifer versus a deciduous type, or between the relative proportions of species present. For example, the difference between two closely related types, White Pine - Mixed Conifer Forest (WPC) and White Pine - Hardwood Forest relies on the estimate of the relative canopy of the deciduous tree species. When judging percent canopy cover, it is difficult to say which perspective provides the most accurate cover estimates. Regardless, this is a difficult problem to eliminate because major breaks within the classification are based on percent cover.

Approximately 25% of the errors were due to mapping mistakes. The majority of these errors were related to unmapped stands of minimum map unit size (0.5 ha). These unmapped areas were ecologically similar to the surrounding polygon's vegetation, but still should have been mapped in accordance to standard

minimum map unit. Other mistakes included drawing polygon boundaries that disagreed with the ground calls so that a small portion of a polygon where an assessment point fell should have been mapped with the adjacent polygon. Another type of error occurred when a polygon was mapped as a single association when it should have been mapped using one of the complex map classes. For example, some polygons were mapped as the Sweet Gale Mixed Shrub Fen, and the accuracy assessment team found other associations present within the same polygon.

More than 35% of the errors were related to photo limitations. In hindsight, the use of spring photography likely increased the error rate. Many deciduous types had little or no canopy at the time of photography, affecting our ability to discriminate within forest, woodland, and shrub alliances (e.g., birch-red maple and red oak woodlands) and in our ability to determine percent cover and tree height. Distinguishing vegetation types on the photographs is dependent on relative coverage, so where underdeveloped canopies existed, the interpreter needed to extrapolate to an expected full canopy. For example, oak trees in many places were lacking canopies so that the ground cover was easily viewed rather than the forest or woodland strata. We often attempted to extrapolate the percent canopy cover to later in the growing season, assuming we would be more successful identifying the vegetation type correctly. Unfortunately, we still had difficulty in mapping some stands; especially determining the percent canopy cover of deciduous trees to evergreens in mixed stands. Wetland vegetation types (e.g., tall-saturated grasslands, hydromorphic vegetation) were not discernable on the photos because it was too early in the growing season. Neither were other wetland types clearly expressed on the photos, confusing interpretation between several types. Cattails, bulrushes, and other emergent species were barely starting their seasonal growth, thus the photography revealed only the previous years' dead stalks. In addition, water lilies and submersed aquatic species such as pondweeds had not reached the surface of ponds and thus were not picked up on the photographs.

Other errors were simply problems inherent with the scale of the photography such as determining one species from one another. For example, short red maple trees in a wetland were confused with the alder signature. Jack pine and pitch pine had similar signatures, and we mapped these based on limited knowledge of their distributions. Cedar was especially difficult to tell from other conifers in most situations, but especially on angled slopes, in shadowed areas, and when mixed with other conifer species.

Some errors (~20%) were conceptual differences between map classes and vegetation associations. Conceptual differences occurred because the map classes were developed before the vegetation classification was completed, and although we adjusted many of the map classes to better fit the classification, we were still not able to reach complete compatibility. Several of the vegetation associations are highly variable in terms of their canopy closure and species composition and "stretch" beyond our map class definitions and beyond conventions of the USNVC hierarchy. We didn't anticipate some of the variability when we created the map classes. Thus, some of the map classes use narrower cover classes to separate physiognomic groups (e.g., shrub versus woodland) that are not consistent with the ecological perspectives. Appendix F: Map Class Descriptions and Visual Guide, presents results of the accuracy assessment for each map class, includes the percent of polygons mapped in agreement with the accuracy assessment calls, and report the types of errors.