

At the 3x3 homogeneous filter level (Table 44) the assessable area was 45.1% of the every-pixel area. The assessable area was reduced to 21.8% percent of the original area following the 5x5 filter (Table 45). Mixed forest, wetland, and shrub were the three categories of greatest impact (i.e., most heterogeneous cover types). To assess the accuracy, 36 reference points were used (Table 46). Only 13 (Table 48) and 10 (Table 50) points were available for the 3x3 and 5x5 level assessments respectively. Overall accuracy increased dramatically from 36.1% at the every-pixel level (Table 47), to 76.9% at the 3x3 homogeneous level (Table 49), and finally to 90% at the 5x5 homogeneous level (Table 51). All of the individual class accuracies increased. However, several accuracies could not be calculated due to lack of reference data. The Kappa statistic also showed a large increase, starting at 0.237 at the every-pixel assessment, and increased to 0.844 after the 5x5 filter procedure was used.

Scene 1633

Shenandoah National Park lies in the center of scene 1633 (Figure 16). This study site was the primary training area for the mountainous supervised classification. The majority of this scene is comprised of deciduous forest, followed by herbaceous and coniferous forest (Table 52). The other land cover types account for less than 8% each.

After using the homogeneity filters, I found that I could assess 51.9% of the area, following the 3x3 filter (Table 53), and 28.7%, following the 5x5 filter (Table 54). Herbaceous, deciduous forest, and coniferous forest were the categories least affected by the filters. One hundred and sixty four reference points were used in the every-pixel assessment (Table 55). Only 80 (Table 57) and 47 points (Table 59) were usable for the

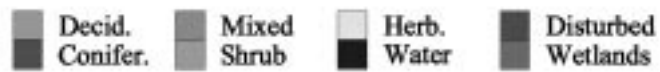


Figure 15. Classification output for scene 1535 full, 3x3 homogeneous, and 5x5 homogeneous.

Table 43. Total area and proportion of each land cover type for scene 1535 when analyzed at the every-pixel level.

| | Pixels | Hectares | Acres | Proportion of Total Area |
|-------------------|-----------|-----------|-----------|-----------------------------|
| Deciduous Forest | 2,324,187 | 209,176.8 | 516,875.9 | 0.383 |
| Coniferous Forest | 1,219,270 | 109,734.3 | 271,153.5 | 0.201 |
| Mixed Forest | 170,726 | 15,365.3 | 37,967.8 | 0.028 |
| Shrub/Scrub | 585,370 | 52,683.3 | 130,180.4 | 0.096 |
| Herbaceous | 1,240,895 | 111,680.6 | 275,962.6 | 0.204 |
| Open Water | 224,244 | 20,182.0 | 49,869.6 | 0.037 |
| Disturbed | 307,067 | 27,636.0 | 68,288.6 | 0.051 |
| Coastal Wetland | 0 | 0 | 0 | 0.000 |
| Total | 6,071,759 | 546,458.3 | 1,350,298 | 1.000 |

Table 44. Results of the 3x3 homogeneous filter on land cover types within scene 1535 in area, proportion of total area, and proportion remaining from the 1535 every-pixel level.

| | Pixels | Hectares | Acres | Proportion of Total Area | Proportion of Every-Pixel |
|-------------------|-----------|-----------|-----------|-----------------------------|------------------------------|
| Deciduous Forest | 1,226,968 | 110,427.1 | 272,865.4 | 0.448 | 0.528 |
| Coniferous Forest | 538,215 | 48,439.4 | 119,693.6 | 0.196 | 0.441 |
| Mixed Forest | 11,262 | 1,013.6 | 2,504.6 | 0.004 | 0.066 |
| Shrub/Scrub | 129,083 | 11,617.5 | 28,706.8 | 0.047 | 0.220 |
| Herbaceous | 624,266 | 56,183.9 | 138,830.5 | 0.228 | 0.503 |
| Open Water | 168,554 | 15,169.9 | 37,484.7 | 0.061 | 0.752 |
| Disturbed | 42,732 | 3,845.9 | 9,503.2 | 0.016 | 0.139 |
| Coastal Wetland | 0 | 0 | 0 | 0.000 | 0.000 |
| Total | 2,741,080 | 246,697.2 | 609,588.8 | 1.000 | 0.451 |

Table 45. Results of the 5x5 homogeneous filter on land cover types within scene 1535 in area, proportion of total area, and proportion remaining from 1535 every-pixel level.

| | Pixels | Hectares | Acres | Proportion of Total Area | Proportion of Every-Pixel |
|-------------------|-----------|-----------|-----------|-----------------------------|------------------------------|
| Deciduous Forest | 606,492 | 54,584.3 | 134,877.8 | 0.458 | 0.261 |
| Coniferous Forest | 233,887 | 21,049.8 | 52,014.1 | 0.177 | 0.192 |
| Mixed Forest | 510 | 45.9 | 113.4 | 0.000 | 0.003 |
| Shrub/Scrub | 30,957 | 2,786.1 | 6,884.5 | 0.023 | 0.053 |
| Herbaceous | 306,374 | 27,573.7 | 68,134.5 | 0.232 | 0.247 |
| Open Water | 136,583 | 12,292.5 | 30,374.7 | 0.103 | 0.609 |
| Disturbed | 8,492 | 764.3 | 1,888.5 | 0.006 | 0.028 |
| Coastal Wetland | 0 | 0 | 0 | 0.000 | 0.000 |
| Total | 1,323,295 | 119,096.6 | 294,287.6 | 1.000 | 0.218 |

Table 46. Error matrix for scene 1535 at the every-pixel level. Reference data (aerial videography points) are shown as column headings, while actual pixel values are displayed in the left column as row headings. The number of points classified correctly in each cover-type is in bold.

| | Deciduous Forest | Coniferous Forest | Mixed Forest | Shrub/ Scrub | Herbaceous | Water Open | Disturbed | Coastal Wetland | Total |
|-------------------|---------------------|----------------------|-----------------|-----------------|------------|---------------|-----------|--------------------|-------|
| Deciduous Forest | 3 | 2 | 1 | 1 | | | | | 7 |
| Coniferous Forest | 1 | 6 | | | 1 | | | | 8 |
| Mixed Forest | | | | 1 | | | | | 1 |
| Shrub/Scrub | | 2 | | 1 | 1 | | | | 4 |
| Herbaceous | 1 | 1 | | | 3 | | | | 5 |
| Open Water | | | | | | | | | 0 |
| Disturbed | | | | | 1 | | | | 1 |
| Coastal Wetland | | | | | | | | | 0 |
| Other | 2 | 1 | 3 | 0 | 4 | 0 | 0 | 0 | 10 |
| Total | 7 | 12 | 4 | 3 | 10 | 0 | 0 | 0 | 36 |

Table 47. User's and producer's accuracy for each land cover class, along with overall accuracy and the Kappa statistic, for scene 1535 at the every-pixel level.

| | User's | Producer's |
|-------------------|--------|------------|
| Deciduous Forest | 0.429 | 0.429 |
| Coniferous Forest | 0.750 | 0.500 |
| Mixed Forest | 0.000 | 0.000 |
| Shrub/Scrub | 0.250 | 0.333 |
| Herbaceous | 0.600 | 0.300 |
| Open Water | | |
| Disturbed | 0.333 | |
| Coastal Wetland | | |
| Overall Accuracy | 0.361 | |
| Kappa | 0.237 | |

Table 48. Error matrix for scene 1535 at the 3x3 homogeneous level. Reference data (aerial videography points) are shown as column headings, while actual pixel values are displayed in the left column as row headings. The number of points classified correctly in each cover-type is in bold. The number of reference points for each category that falls on non-homogeneous pixels is shown in the last row.

| | Deciduous Forest | Conifer Forest | Mixed Forest | Shrub/ Scrub | Herbaceous | Open Water | Disturbed | Coastal Wetland | Total |
|---------------------|---------------------|-------------------|-----------------|-----------------|------------|---------------|-----------|--------------------|-------|
| Deciduous Forest | 2 | 1 | | | | | | | 3 |
| Coniferous Forest | | 5 | | | 1 | | | | 6 |
| Mixed Forest | | | | | | | | | 0 |
| Shrub/Scrub | | 1 | | | | | | | 1 |
| Herbaceous | | | | | 3 | | | | 3 |
| Open Water | | | | | | | | | 0 |
| Disturbed | | | | | | | | | 0 |
| Coastal Wetland | | | | | | | | | 0 |
| Other | | | | | | | | | 0 |
| Total | 2 | 7 | 0 | 0 | 4 | 0 | 0 | 0 | 13 |
| Non- Homogeneous | 5 | 5 | 4 | 3 | 6 | 0 | 0 | 0 | 23 |

Table 49. User's and producer's accuracy for each category, along with overall accuracy and Kappa statistic, for scene 1535 at the 3x3 homogeneous level.

| | User's | Producer's |
|-------------------|--------|------------|
| Deciduous Forest | 0.667 | 1.000 |
| Coniferous Forest | 0.833 | 0.714 |
| Mixed Forest | | |
| Shrub/Scrub | 0.000 | |
| Herbaceous | 1.000 | 0.750 |
| Open Water | | |
| Disturbed | | |
| Coastal Wetland | | |
| Overall Accuracy | 0.769 | |
| Kappa | 0.642 | |

Table 50. Error matrix for scene 1535 at the 5x5 homogeneous level. Reference data (aerial videography points) are shown as column headings, while actual pixel values are displayed in the left column as row headings. The number of points correctly classified in each cover-type is in bold. The number of reference points for each category that falls on non-homogeneous pixels is shown in the last row.

| | Deciduous Forest | Coniferous Forest | Mixed Forest | Shrub/ Shrub | Herbaceous | Open Water | Disturbed | Coastal Wetland | Total |
|-------------------|------------------|-------------------|--------------|--------------|------------|------------|-----------|-----------------|-------|
| Deciduous Forest | 2 | | | | | | | | 2 |
| Coniferous Forest | | 4 | | | | | | | 4 |
| Mixed Forest | | | | | | | | | 0 |
| Shrub/Scrub | | | | | | | | | 0 |
| Herbaceous | | 1 | | | 3 | | | | 4 |
| Open Water | | | | | | | | | 0 |
| Disturbed | | | | | | | | | 0 |
| Coastal Wetland | | | | | | | | | 0 |
| Other | | | | | | | | | 0 |
| Total | 2 | 5 | 0 | 0 | 3 | 0 | 0 | 0 | 10 |
| Non-Homogeneous | 5 | 7 | 4 | 3 | 7 | 0 | 0 | 0 | 26 |

Table 51. User's and producer's accuracy for each land cover class, along with overall accuracy and Kappa statistic, for scene 1535 at the 5x5 homogeneous level.

| | User's | Producer's |
|------------------|--------|------------|
| Deciduous Forest | 1.000 | 1.000 |
| Conifer Forest | 1.000 | 0.800 |
| Mixed Forest | | |
| Shrub/Scrub | | |
| Herbaceous | 0.750 | 1.000 |
| Open Water | | |
| Disturbed | | |
| Coastal Wetland | | |
| Overall Accuracy | 0.900 | |
| Kappa | 0.844 | |