# Permits

| Permit Type | Activity | Quantity | Watershed | Note |
|---|---|---|---|---|
| Domestic Sewage General Permit | Active | 1 | Horsepen | Single Family Residence |
| Virginia Water Protection Permit | History | 3 | Horsepen & Little Roanoke | All permits received for culvert replacements |
| Construction Stormwater General Permit | History | 2 | Little Roanoke | Stream and restoration projects |
| | Under Review | 1 | Little Roanoke | Stream bank restoration project |

Are there other large-scale operations or construction projects we've missed?

# Land Use

| Watersheds | | Horsepen Creek | | Little Roanoke Creek | | Spencer Creek, UT | |
|---|---|---|---|---|---|---|---|
| **Land use type** | **Land use description** | **Area (acres)** | **% land use** | **Area (acres)** | **% land use** | **Area (acres)** | **% land use** |
| **Water** | Drainage networks and basins | 75.93 | 0.56% | 207.41 | 0.92% | 7.85 | 0.82% |
| **Impervious** | Extracted and External-high percentage of constructed materials | 185.62 | 1.38% | 373.7 | 1.67% | 24.8 | 2.57% |
| **Barren** | Areas with little or no vegetation | 2.71 | 0.02% | 20.49 | 0.09% | 0 | 0 |
| **Forest** | Areas with tree cover of natural or semi-natural woody vegetation | 9,178.54 | 67.98% | 13,163.93 | 58.53% | 528.71 | 54.95% |
| **Tree** | Areas with tree cover of natural or semi-natural woody vegetation that does not encompass an acre | 680.24 | 5.04% | 1,323.13 | 5.88% | 94.29 | 9.8% |
| **Turf Grass** | Primarily grasses | 442.05 | 3.27% | 1,017.19 | 4.52% | 61.95 | 6.44% |
| **Harvested/ Disturbed** | Areas of forest clear-cut, temporary clearing of vegetation, and other dynamically changing land cover due to land use activities as defined by the EPA | 407.2 | 3.02% | 1,308.38 | 5.82% | 0 | 0 |
| **Shrub** | Areas of natural or semi-natural woody vegetation with aerial stems generally less than 6 meters | 318.92 | 2.36% | 42.58 | 0.19% | 0 | 0 |
| **Pasture** | Areas of grasses, legumes, or grass-legumes planted for livestock grazing | 1574.5 | 11.66% | 3,083.03 | 13.71% | 226.5 | 23.54% |
| **Cropland** | Areas of herbaceous vegetation that has been planted for production of food | 132.24 | 0.9% | 828.15 | 3.68% | 6.93 | 0.72% |
| **NWI/Other** | Soil or substrate periodically covered with water | 504.31 | 3.73% | 1,121.36 | 4.99% | 11.18 | 1.16% |

From the Draft Benthic Stressor Analysis, numbers derived from VGIN 2015 GIS analysis.

| 120 meter buffer to streams | | Horsepen Creek | | Little Roanoke Creek | | Spencer Creek, UT | |
|---|---|---|---|---|---|---|---|
| **Land use type** | **Land use description** | **Area (acres)** | **% land use** | **Area (acres)** | **% land use** | **Area (acres)** | **% land use** |
| **Water** | Drainage networks and basins | 68.46 | 1.31 % | 171.25 | 1.9% | 7.85 | 1.84% |
| **Impervious** | Extracted and External- high percentage of constructed materials | 21.5 | 0.41% | 61.53 | 0.68% | 3.99 | 0.94% |
| **Barren** | Areas with little or no vegetation | 0.47 | 0.01% | 6.49 | 0.07% | 0 | 0% |
| **Forest** | Areas with tree cover of natural or semi-natural woody vegetation | 3,573.76 | 68.29% | 5,483.47 | 60.81% | 295.89 | 69.42% |
| **Tree** | Areas with tree cover of natural or semi-natural woody vegetation that does not encompass an acre | 178.89 | 3.42% | 339.67 | 3.77% | 24.67 | 5.79% |
| **Turf Grass** | Primarily grasses | 75.15 | 1.44% | 239.22 | 2.65% | 18.97 | 4.45% |
| **Harvested/ Disturbed** | Areas of forest clear-cut, temporary clearing of vegetation, and other dynamically changing land cover due to land use activities as defined by the EPA | 163.03 | 3.12% | 467.77 | 5.19% | 0 | 0% |
| **Shrub** | Areas of natural or semi-natural woody vegetation with aerial stems generally less than 6 meters | 145.24 | 2.78% | 30.08 | 0.33% | 0 | 0% |
| **Pasture** | Areas of grasses, legumes, or grass-legumes planted for livestock grazing | 557.48 | 10.65% | 857.73 | 9.51% | 61.85 | 14.51% |
| **Cropland** | Areas of herbaceous vegetation that has been planted for production of food | 12.77 | 0.24% | 365.34 | 4.05% | 1.83 | 0.43% |
| **NWI/Other** | Soil or substrate periodically covered with water | 436.81 | 8.35% | 994.56 | 11.03% | 11.18 | 2.62% |

From the Draft Benthic Stressor Analysis, numbers derived from VGIN 2015 GIS analysis.

Does the shift in percentages within the riparian zones look appropriate for this area?

# AGRICULTURE

Acres benefited from BMPs could represent duplicated acres with multiple BMPs.

HORSEPEN

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) |
|---|---|---|
| Pasture % | 11.66% | 15.52% |
| Cropland % | 00.90% | 00.20% |

| BMPs 2005-2025 | Total Practices | # out of Lifespan | Present after Lifespan | Acres benefitted from BMPs |
|---|---|---|---|---|
| Stream Exclusion | 13 | 6/13 | 4/5*<br><br>*land use change for 1/6 | 419.5 |
| Grazing Land Management | | | | |
| Afforestation of Crop, Hay, or Pastureland | | | | |
| Streambank Stabilization | | | | |

| Land Use Details | Virginia's 2022 NPS Assessment Land Use/Land Cover Query Results Area Per Units in Acres (HUC6) |
|---|---|
| Hay % | 9% |
| Pasture: Cattle Grazed % | 3% |
| Pasture: Poultry Litter Applied | 1% |
| Pasture: Unimproved | 1% |
| Conventional Tillage | 1% |
| Conservation Tillage | 3% |
| Confined Beef Cattle | < 40 |
| Unconfined Beef Cattle | < 900 |
| Unconfined Dairy Cows | < 50 |
| Horses | < 120 |

Do these numbers seem correct?

Is it true that low/no till practices are 3 times more common than conventional tillage in this area?

Does this ratio of higher hay to pastureland seem correct in this watershed?

LITTLE ROANOKE

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) |
|---|---|---|
| Pasture % | 13.71% | 19.67% |
| Cropland % | 3.68% | 3.00% |

| BMPs 2005-2025 | Total Practices | # out of Lifespan | Present after Lifespan | Acres benefitted from BMPs |
|---|---|---|---|---|
| Stream Exclusion | 33 | 13/33 | 11/11*<br><br>*cover crops 2/13 | 3434.3 |
| Grazing Land Management | | | | |
| Afforestation of Crop, Hay, or Pastureland | | | | |
| Long Term/ Permanent Vegetative Cover | | | | |
| Cover Crops | | | | |

| Land Use Details | Virginia's 2022 NPS Assessment Land Use/Land Cover Query Results Area Per Units in Acres (HUC6) |
|---|---|
| Hay % | 13% |
| Pasture: Cattle Grazed % | 1% |
| Pasture: Poultry Litter Applied | 0% |
| Pasture: Unimproved | 0% |
| Conventional Tillage | 1% |
| Conservation Tillage | 3% |
| Confined Beef Cattle | < 15 |
| Unconfined Beef Cattle | < 400 |
| Unconfined Dairy Cows | < 25 |
| Horses | < 40 |

Do these numbers seem correct?

What is the usual condition of the pastureland in this area (good, fair, poor)?

Has there been an increase in pastureland simultaneously with a decrease in cropland in these watersheds?

UT SPENCER CREEK

Subset data within Little Roanoke Creek Watershed, NPS assessment includes entire HUC6

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) |
|---|---|---|
| Pasture % | 23.54% | 32.50% |
| Cropland % | 00.72% | 00.00% |

| BMPs 2005-2025 | Total Practices | # out of Lifespan | Acres benefitted from BMPs |
|---|---|---|---|
| Stream Exclusion | 3 | 0 | 151.9 |
| Afforestation of Crop, Hay, or Pastureland | | | |

| Land Use Details | Virginia's 2022 NPS Assessment Land Use/Land Cover Query Results Area Per Units in Acres (HUC6) |
|---|---|
| Hay % | 13% |
| Pasture: Cattle Grazed % | 1% |
| Pasture: Poultry Litter Applied | 0% |
| Pasture: Unimproved | 0% |
| Conventional Tillage | 1% |
| Conservation Tillage | 3% |
| Confined Beef Cattle | < 15 |
| Unconfined Beef Cattle | < 400 |
| Unconfined Dairy Cows | < 25 |
| Horses | < 40 |

This area seems to be either heavily grazed or hayed, does that seem correct?

What are the popular pasture conservation practices in this area, if there are any (rotational grazing, grazing management, stream exclusion)?

Our numbers represent those from the local conservation district, are we missing anything that may be more popular with entities like NRCS?

# SILVICULTURE

HORSEPEN

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Forest % | 67.98% | 60.27% | 69% |
| Harvested/Disturbed % | 3.02% | - | 5% |
| Grassland/Herbaceous % | - | 7.51% | NA |
| Shrub/Scrub % | 2.36% | 7.10% | NA |

| Harvests (2015-2024) | Acres | Avg # Harvests/YR | Avg # Acres/Yr |
|---|---|---|---|
| Commercial Selection | 68 | <1 | 6-7 |
| Thinning | 571 | <1 | 57 |
| Total Harvest | 1525 | 3-4 | 161 |

LITTLE ROANOKE

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Forest % | 58.53% | 56.21% | 65% |
| Harvested/Disturbed % | 5.82% | - | 7% |
| Grassland/Herbaceous % | - | 4.49% | |
| Shrub/Scrub % | 0.19% | 4.67% | |

| Harvests (2015-2024) | Acres | Avg # Harvests/YR | Avg # Acres/Yr |
|---|---|---|---|
| Commercial Selection | 213 | 2 | 21 |
| Thinning | 511 | 2 | 51 |
| Total Harvest | 1801 | 4 | 180 |

UT SPENCER CREEK

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Forest % | 54.95% | 44.46% | 65% |
| Harvested/Disturbed % | 00.00% | - | 7% |
| Grassland/Herbaceous % | - | 10.95% | |
| Shrub/Scrub % | 00.00% | 1.90% | |

| Harvests (2015-2024) | Acres | Avg # Harvests/YR | Avg # Acres/Yr |
|---|---|---|---|
| Commercial Selection | 30 | Only 2/10 most recent years have there been any harvests within this small watershed. | |
| Total Harvest | 34 | | |

Do these land percentages seem correct?

What about the harvest percentages?

It appears that there have been recent harvest and land use changes occurring in UT to Spencer Creek (Hatchets Branch), is that the case? What is the cause?

# RESIDENTIAL/INDUSTRIAL

HORSEPEN

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Turf Grass/ Developed, Open Space % | 3.27% | 4.04% | - |
| Impervious/Developed, Low-Medium Intensity % | 1.38% | 0.67% | - |
| Urban: Impervious | - | - | 2% |
| Urban: Pervious | - | - | 7% |

LITTLE ROANOKE

| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Turf Grass/ Developed, Open Space % | 4.52% | 5.15% | - |
| Impervious/Developed, Low-High Intensity % | 1.67% | 1.15% | - |
| Urban: Impervious | - | - | 2% |
| Urban: Pervious | - | - | 7% |

UT SPENCER CREEK

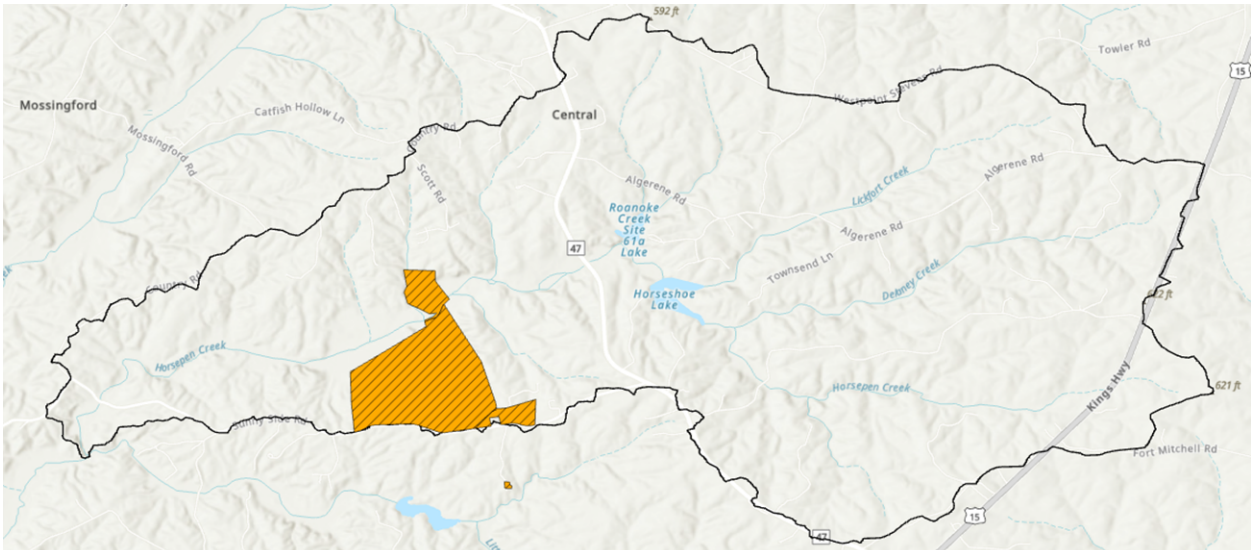
| Land Use | Watershed (VGIN 2015) | Watershed (NLCD 2023) | Virginia's 2022 NPS Assessment (HUC6) |
|---|---|---|---|
| Turf Grass/ Developed, Open Space % | 6.44% | 7.77% | - |
| Impervious/Developed, Low-Medium Intensity % | 2.57% | 0.87% | - |
| Urban: Impervious | - | - | 2% |
| Urban: Pervious | - | - | 7% |

Do these numbers seem correct?

# FUTURE DEVELOPMENT

## SOLAR

- >27,000 acres within Charlotte County are optioned for solar development
- Only one proposed solar project currently has optioned parcels within the three impaired watersheds.
    - Horsepen Creek's watershed holds optioned parcels for the Randolf Solar Project
    - Optioned acres total ~ **505.08 acres** or ~ **3.7%** of the watershed




## RELEVANT STATE AND LOCAL SOLAR REGULATIONS

- Both the Virginia Department of Environmental Quality (DEQ) and the State Corporation Commission (SCC) permit utility-scale solar facilities.
- DEQ adheres to the Virginia Administrative Code (VAC) in regulating small renewable energy projects with Permit by Rule (PBR) (https://law.lis.virginia.gov/admincode/title9/agency15/chapter60/)
    - Projects with a rated capacity > 500 kW < 5 MW or a disturbance zone > 2 acres and < 10 acres must submit a notice of intent and a certification from the locality where the project will be constructed that the project complies with all applicable land use ordinances. (9VAC15-60-130, PBR applicable)
    - Small solar energy projects with a rated capacity > 5 MWAC and a disturbance zone > 10 acres require the PBR applicant to fulfill the criteria listed in 9VAC15-60-30. These are summarized below.
        - Provides to DEQ a certification by the governing body of the locality/localities that the project complies with all applicable land use ordinances.
        - Provides to DEQ an analysis of potential environmental impacts of the project's operations on attainment of national ambient air quality standards.
        - Provides to DEQ, where relevant, an analysis of the beneficial and adverse impacts of the proposed project on natural resources, incudes:

                - Desktop surveys and maps. The applicant shall obtain a wildlife report and map generated from DWR's Virginia Fish and Wildlife Information Service web-based application or from a data and mapping system including the most recent data available from DWR's subscriber-based Wildlife Environmental Review Map Service of the known wildlife species and habitat features on the site or within two miles of the boundary of the site.
                - Analyses of historic resources. The analysis shall include each of the following:
                    - Compilation of known historic resources
                    - Architectural survey
                    - Archaeological survey
                - Analyses of other natural resources, natural heritage resources.
                - Summary report.
            - Provides to DEQ a mitigation plan that details reasonable actions to be taken by the owner or operator to avoid, minimize, or otherwise mitigate such impacts. The mitigation plan shall be enforceable by the PBR.
            - Provides to DEQ a site plan and operating plan that follows the mitigation plan, should one be required.
            - Conducts a 30-day public review and comment period and holds a public meeting within the locality of the proposed project.
- Charlotte County's solar regulations can be found within their Master Zoning Ordinance (https://www.charlottecountyva.gov/departments/planning___zoning/solar_development.php) (3 underscores before "zoning")
    - no more than three percent (3%) of the land area in any given five-mile radius shall be approved for use as the project area for Utility-Scale Solar Energy Systems
    - utility-Scale Solar Energy Systems shall conform to the following setbacks: a minimum setback of 125 feet from the center line of any state maintained road abutting the property; a minimum setback of 75 feet from all other property lines with the exception of those property lines that are inside the project's boundaries and which do not abut property located outside the project area; and a minimum of 400' from all off-site residential structures.
    - Existing mature tree growth and natural land forms on the site shall be preserved to the maximum extent possible and may be used in whole or in part to provide the required screening
    - Adequate drainage for the disposition of storm water both on site and off site must be provided in accordance with county ordinances, and where applicable, the standards of VDOT and other state law.
    - Provisions must be made for all necessary temporary and permanent erosion and sedimentation control measures, both on site and off site, in accordance with the county's erosion and sediment control regulations and state law.

Considering 3.7% of one of our watersheds may be converted to solar, is this a reasonable percentage we expect to be similar in the other impaired watersheds over time?

Writing a watershed plan in this context, is there anything the local community would like considered (industry significance, trends, water quality, etc.)?

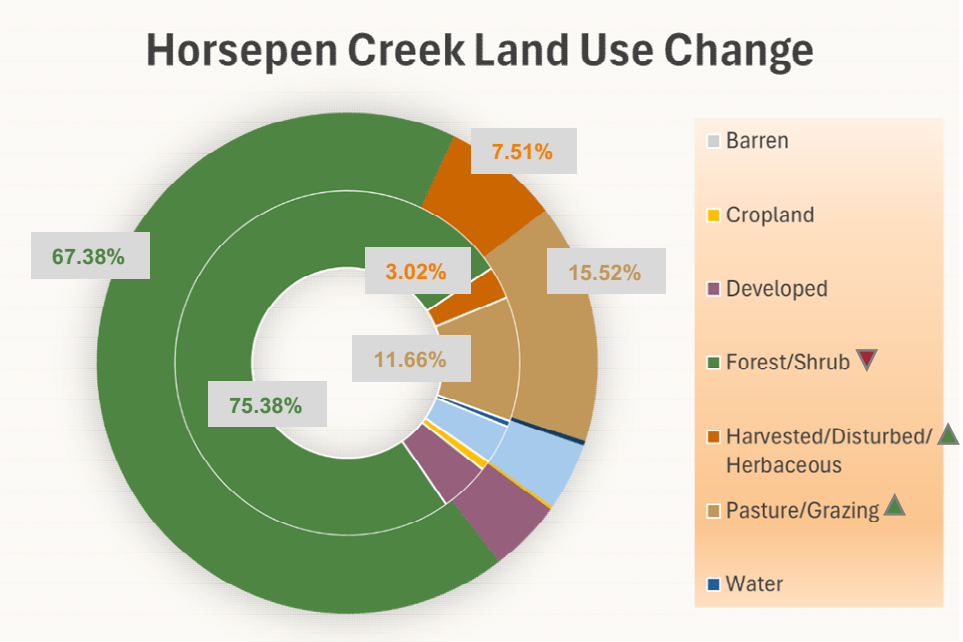
# GRAPHICS

LAND USE CHANGE

Because the VGIN 2015 and NLCD 2023 Land Cover types don't exactly line up due to advancements in the land cover differentiation, I've lumped the land uses from each dataset into eight groups to make this data more visually digestible. Please see the groups and the land cover types they synthesize in the table below.

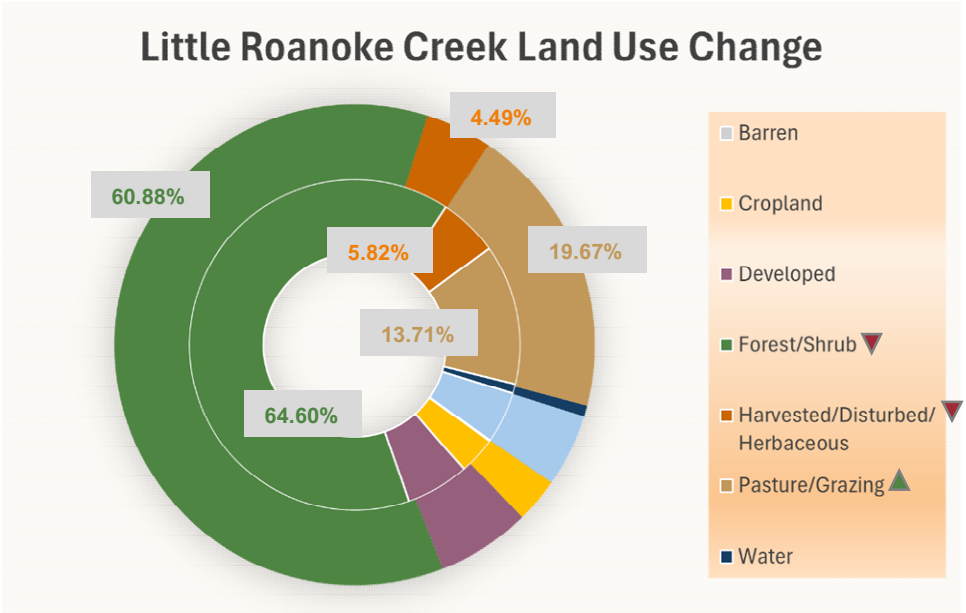
Once in these eight groups, the data appears very similar. For all three streams, only Forest/Shrub, Pasture/Grazing/Herbaceous, and Harvested/Disturbed were different by more than one percentage point. The Grassland/Herbaceous land cover types in the NLCD data can be assumed to be Harvested/Disturbed like from recent land clearing and timber harvests.

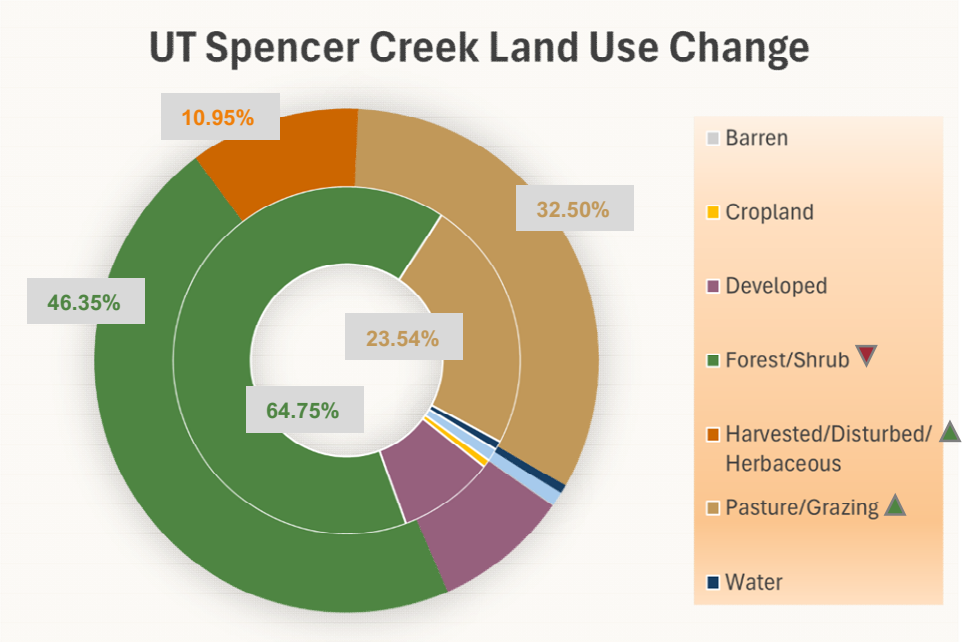
| Group | VGIN 2015 Land Cover Type(s) | NLCD 2023 Land Cover Types |
|---|---|---|
| Barren | Barren | Barren |
| Cropland | Cropland | Cultivated Crops |
| Developed | Impervious, Turf Grass | Developed: Open Space, Low Intensity, Medium Intensity, High Intensity |
| Forest/Shrub | Forest, Tree, Shrub | Deciduous Forest, Evergreen Forest, Mixed Forest, Shrub/Scrub |
| Harvested/Disturbed/Herbaceous | Harvested/Disturbed | Grassland/Herbaceous |
| Pasture/Grazing | Pasture | Pasture/Hay |
| Water | Water | Open Water |
| Wetlands | NWI/Other | Woody Wetlands, Emergent Herbaceous Wetlands |




All three watersheds have lost forest cover and gained pasture. Both Horsepen and the UT to Spencer Creek reflect greater land disturbance and Little Roanoke Creek has seen less disturbance as reflected by the herbaceous coverage which was largely assigned to recently disturbed land. The question now is-

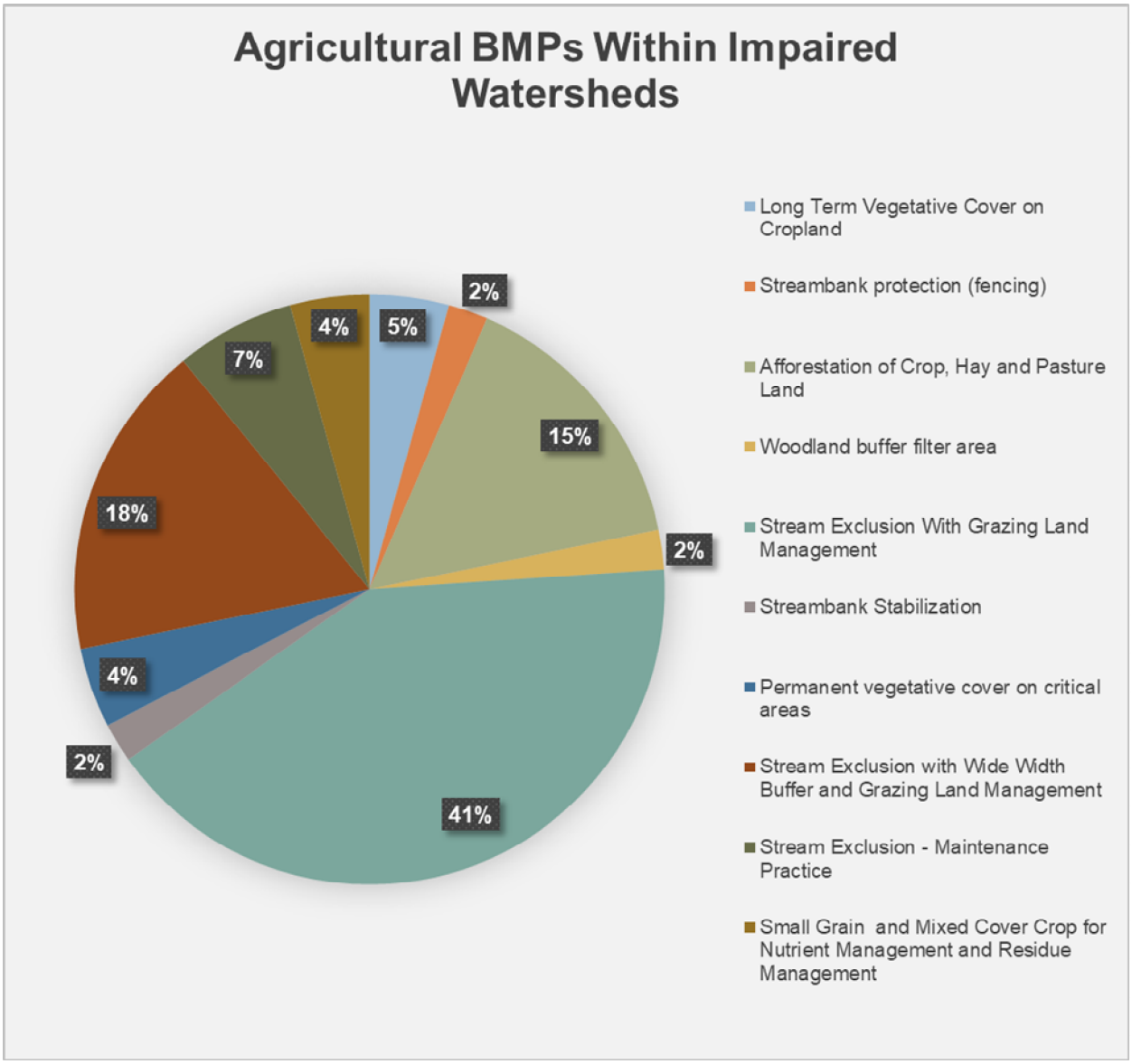
what was that land cleared for? Will it become pasture, residential space, industry, or will it be reforested?




UT Spencer Creek Land Use Change
10.95%
32.50%
46.35%
23.54%
64.75%
Barren
Cropland
Developed
Forest/Shrub
Harvested/Disturbed/ Herbaceous
Pasture/Grazing
Water

BMP PRACTICES

It does seem like there is interest within these study areas in using agricultural BMPs. Stream Exclusion has been the most popular, especially if you were to combine regular stream exclusion with Wide-Buffer Stream Exclusion.

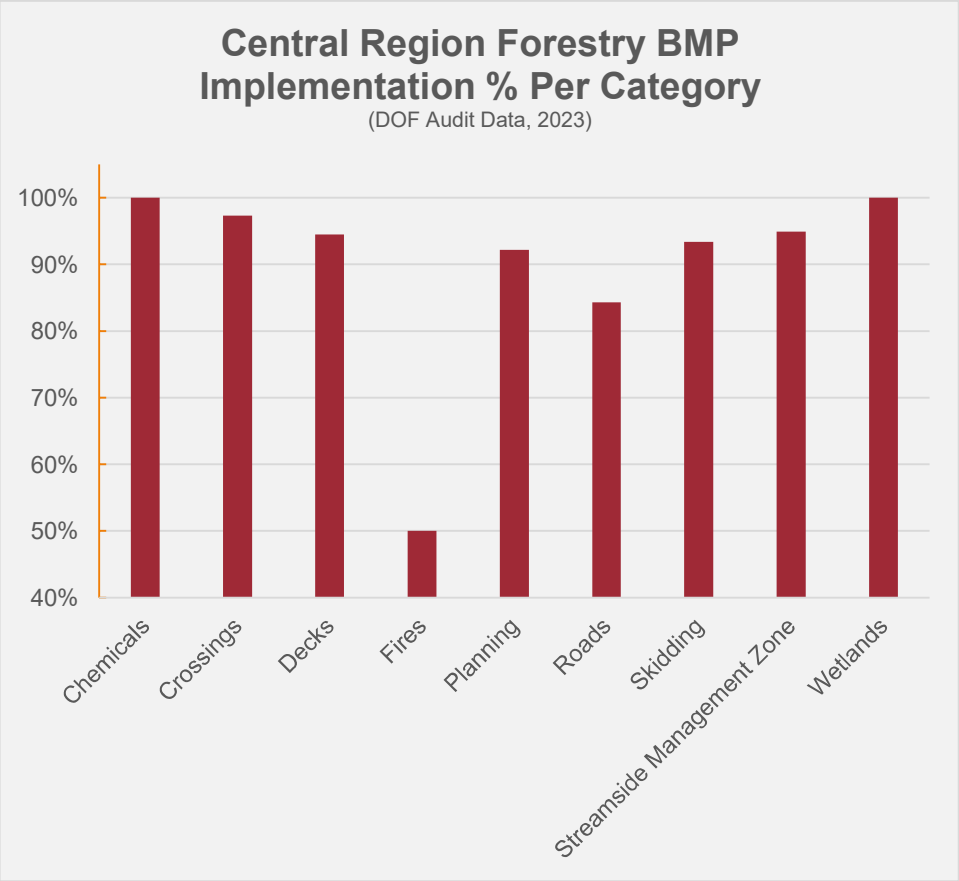



Because of 20 years of hard work by Southside Soil and Water Conservation District, nearly 4000 acres of pasture and cropland within these watersheds have seen one or more BMPs installed.

## Any suggestions for how to increase interest in agricultural conservation practices?

Agricultural lands are not the only areas where BMPs are being utilized to protect Charlotte County soil and water. Timber harvesting is a popular practice in the area and accounts for a not insignificant amount of the land disturbance within the three impaired watersheds. BMPs are used in silviculture to reduce sediment being transported off disturbed sites and into adjacent waterways. The Department of Forestry (DOF) keeps track of timber harvests and ensures protecting water quality is a priority at disturbed sites.

Charlotte County is in the central region of the State of Virginia. Within this region, there is an overall 92.1% implementation rate of prescribed BMPs to protect streams receiving runoff from harvest sites. Most BMP categories are seeing greater than 90% implementation in this region.




Even though BMP implementation is high, Increasing levels of ground disturbance within the watersheds is going to lead to increased opportunities for loose sediments to find their way into these streams.

## Are there trends/BMP advancements/or incoming land use changes that would influence the amount of forested land/harvest occurring in these areas?