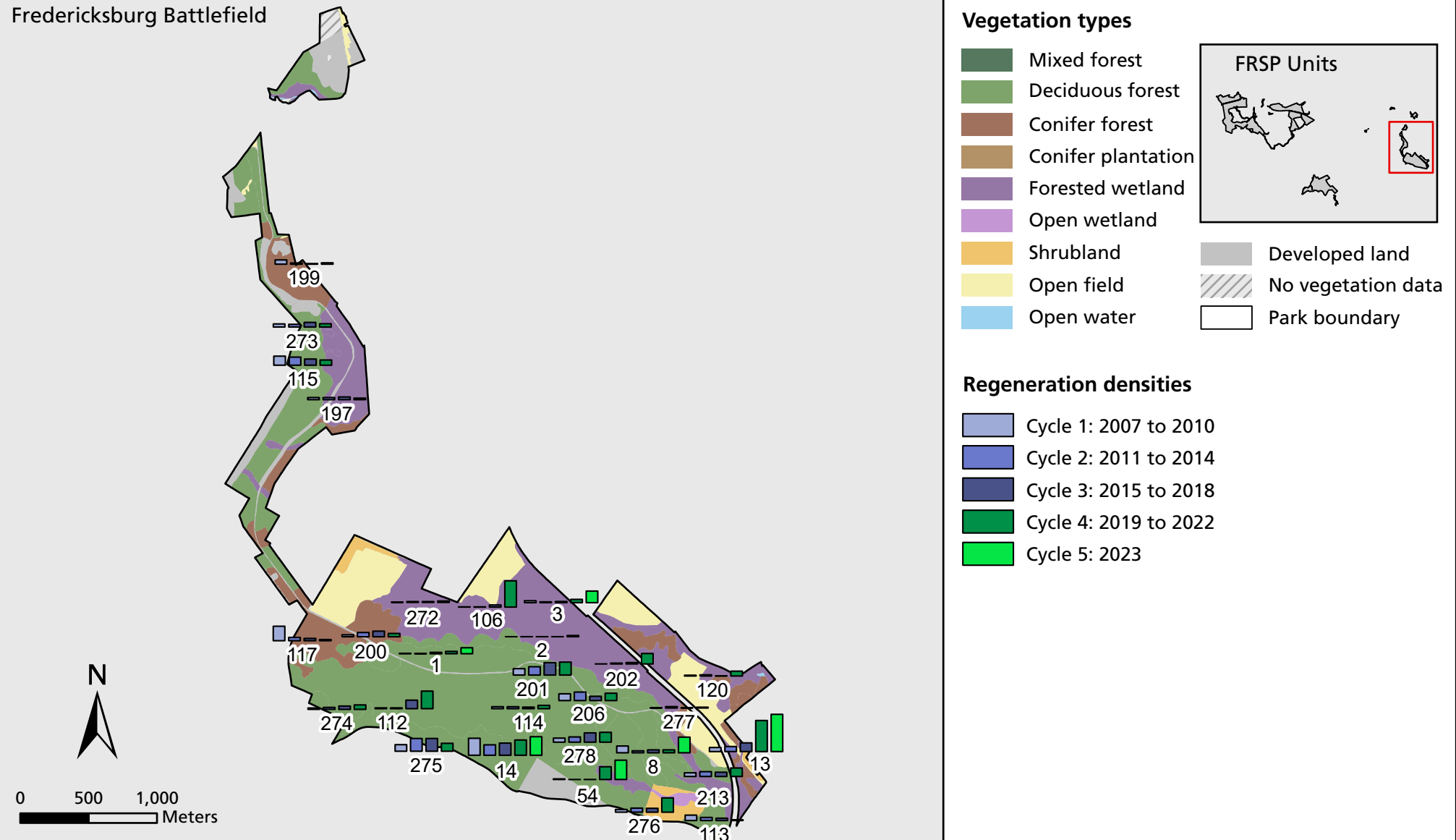




Map 1a. Tree Regeneration by Cycle

Trends in tree regeneration, including seedlings and saplings, observed in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Charts may be shifted to prevent overlap. See Table 1 for more details. Reporting Date: 01/11/2024.

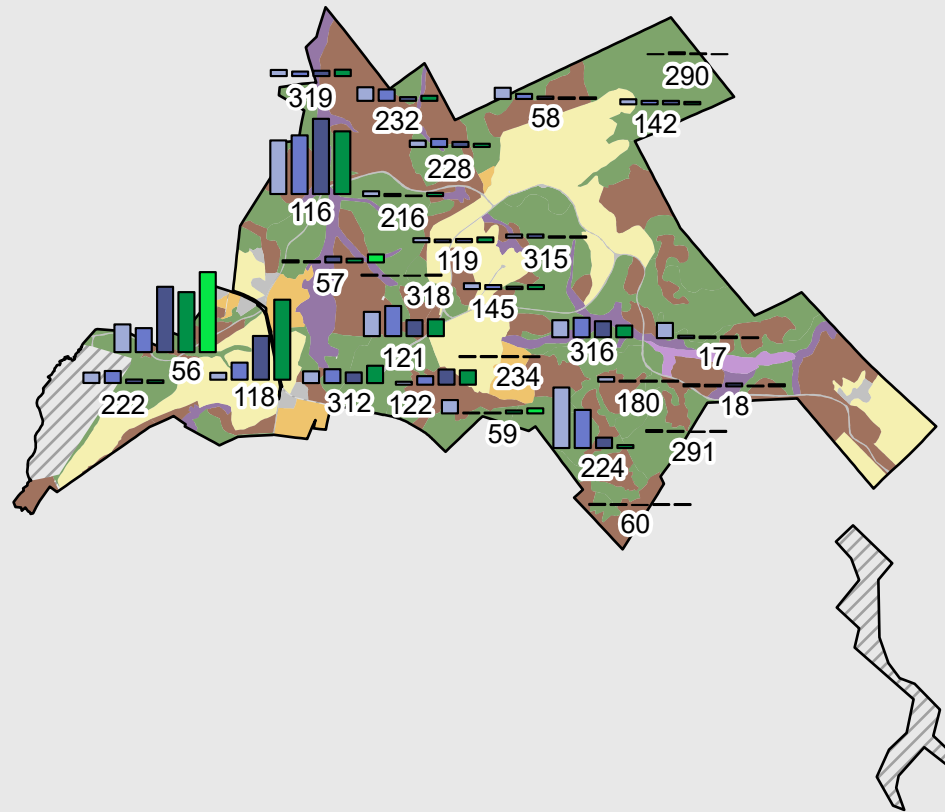




Map 1b. Tree Regeneration by Cycle

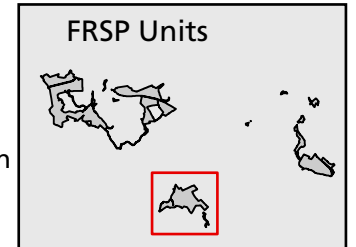
Trends in tree regeneration, including seedlings and saplings, observed in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Charts may be shifted to prevent overlap. See Table 1 for more details. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Regeneration densities

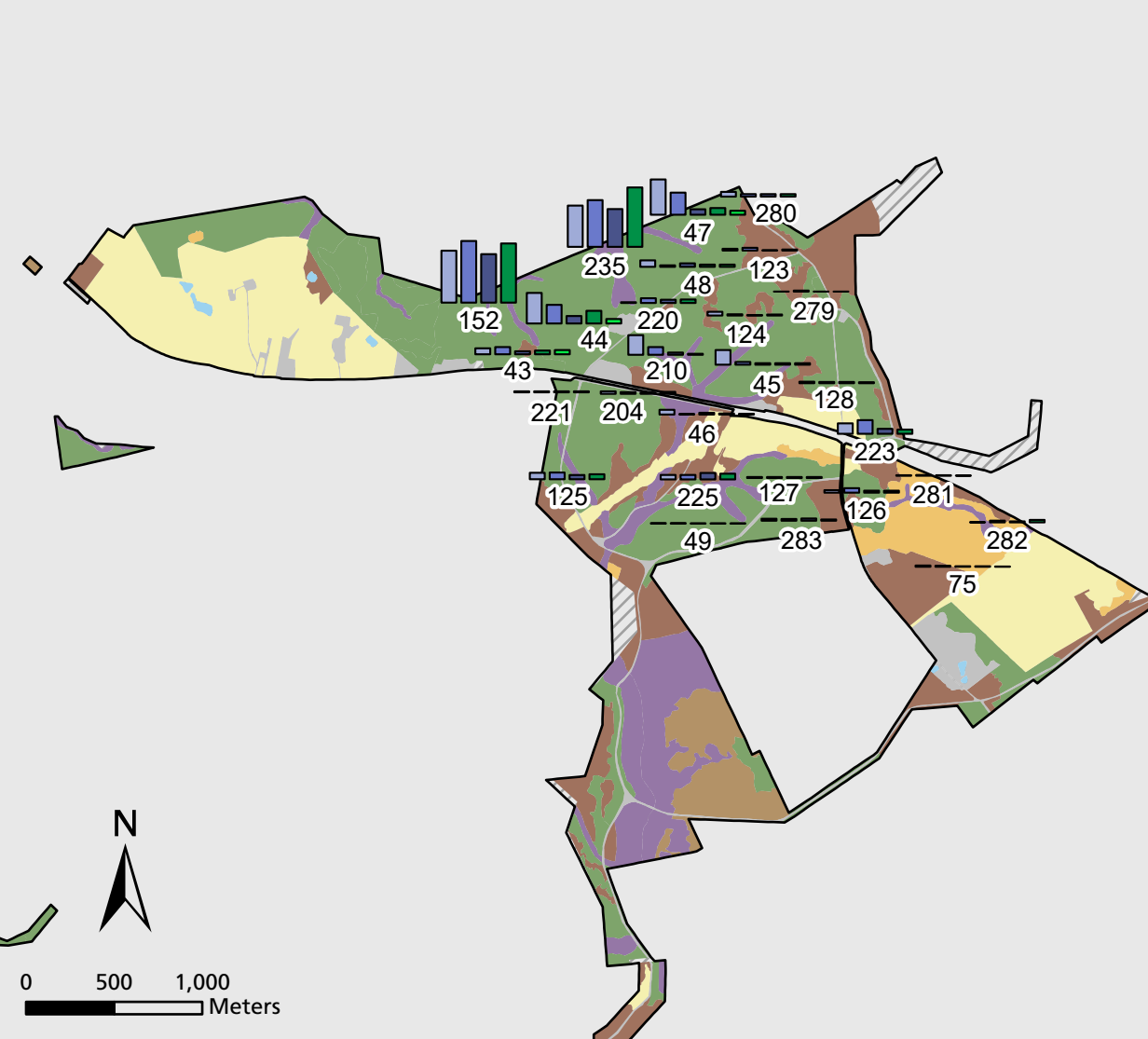
- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023



Map 1c. Tree Regeneration by Cycle

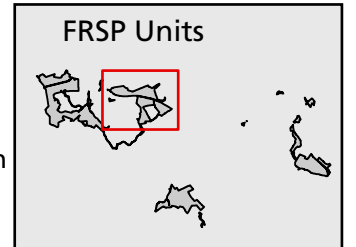
Trends in tree regeneration, including seedlings and saplings, observed in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Charts may be shifted to prevent overlap. See Table 1 for more details. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Regeneration densities

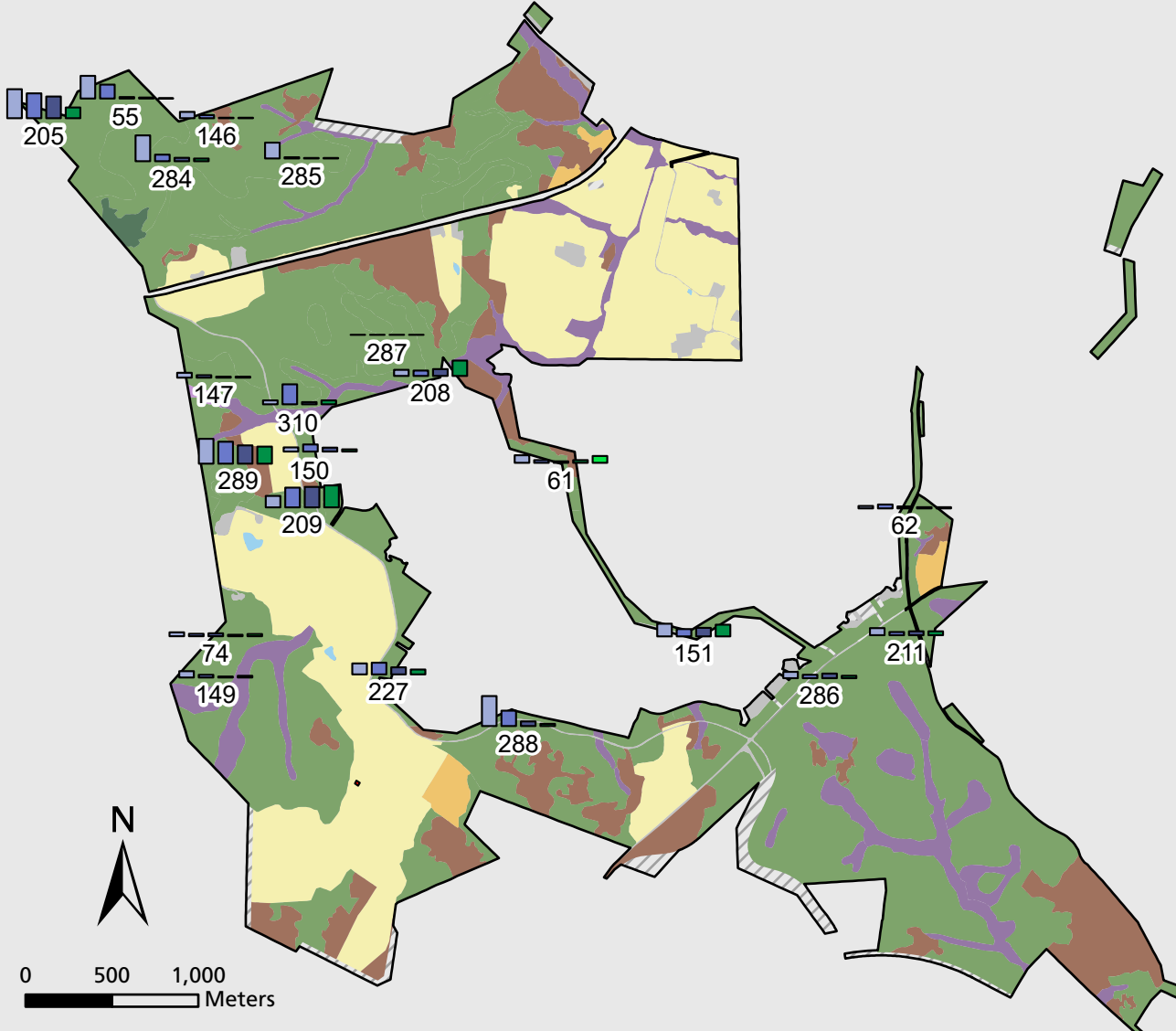
- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023



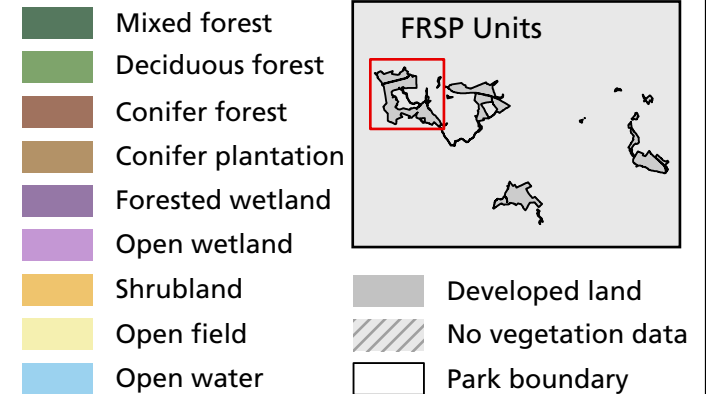
Map 1d. Tree Regeneration by Cycle

Trends in tree regeneration, including seedlings and saplings, observed in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Charts may be shifted to prevent overlap. See Table 1 for more details. Reporting Date: 01/11/2024.

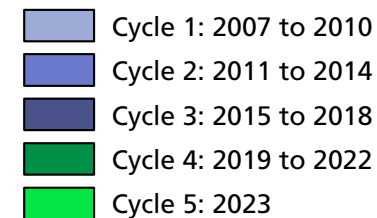
Wilderness Battlefield



Vegetation types



Regeneration densities

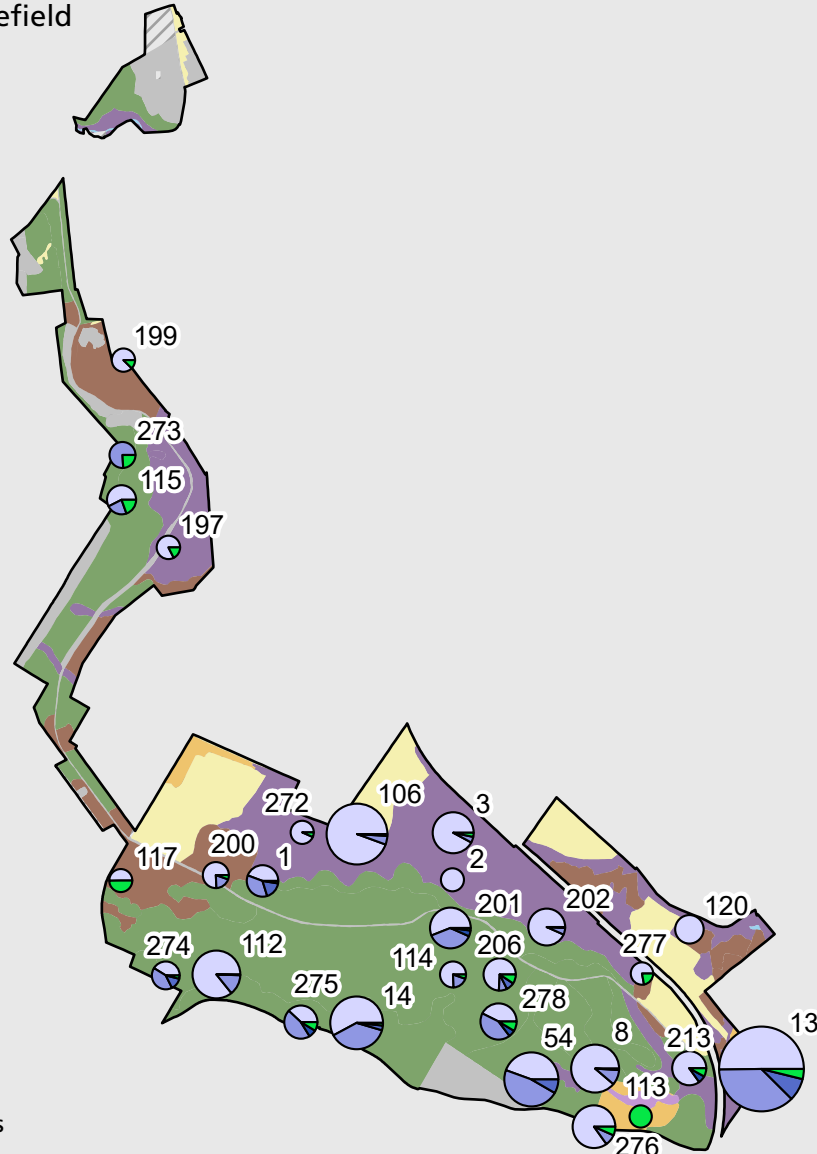




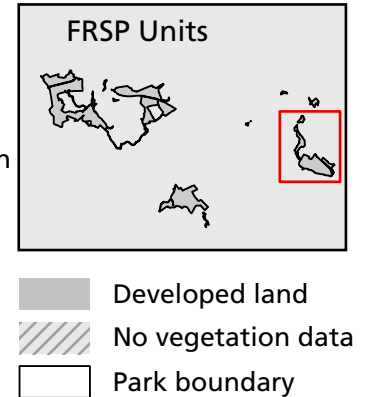
Map 2a. Tree Regeneration by Size Class

Tree regeneration stem densities by size class in forest plots from the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Reporting Date: 01/11/2024.

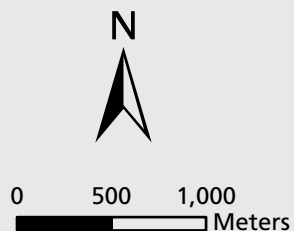
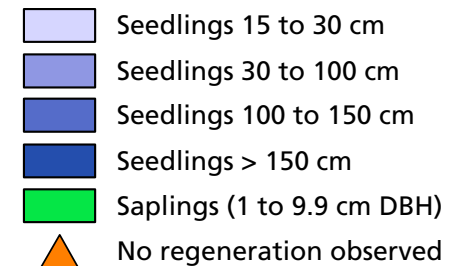
Fredericksburg Battlefield



Vegetation types



Stem densities by size class

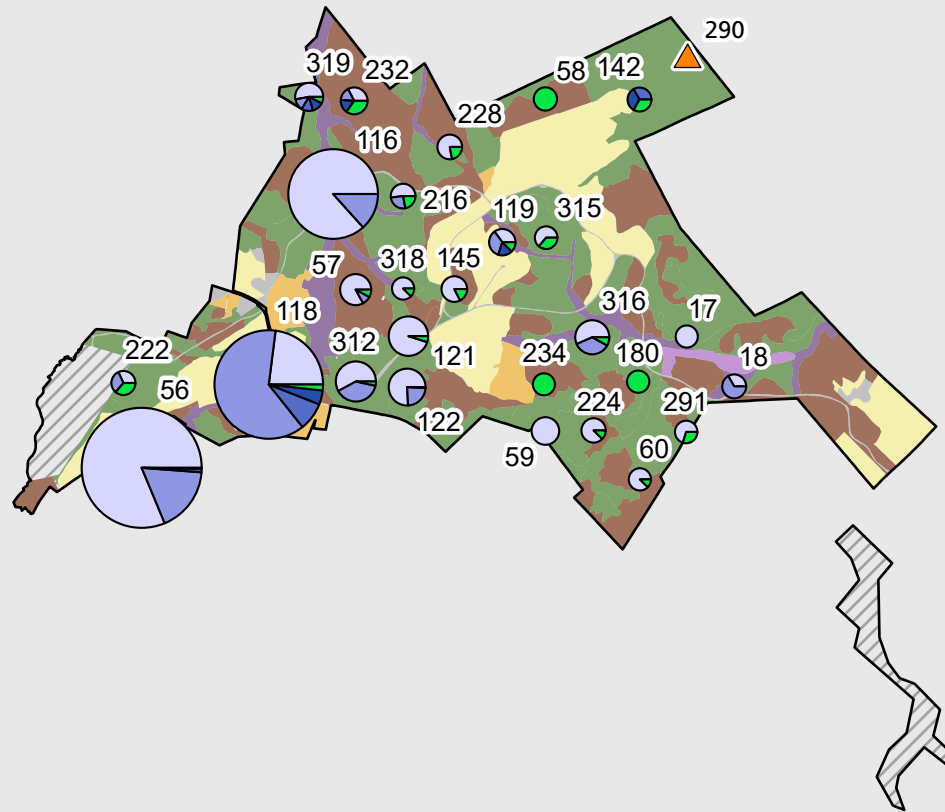




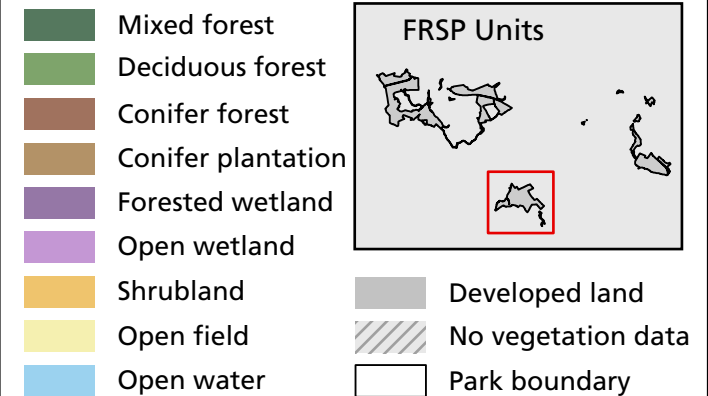
Map 2b. Tree Regeneration by Size Class

Tree regeneration stem densities by size class in forest plots from the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Reporting Date: 01/11/2024.

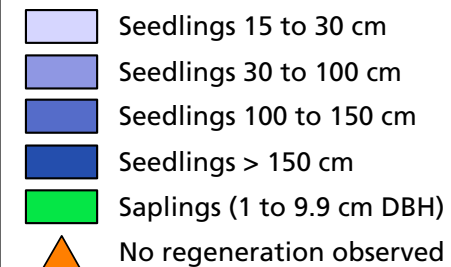
Spotsylvania Courthouse Battlefield



Vegetation types



Stem densities by size class

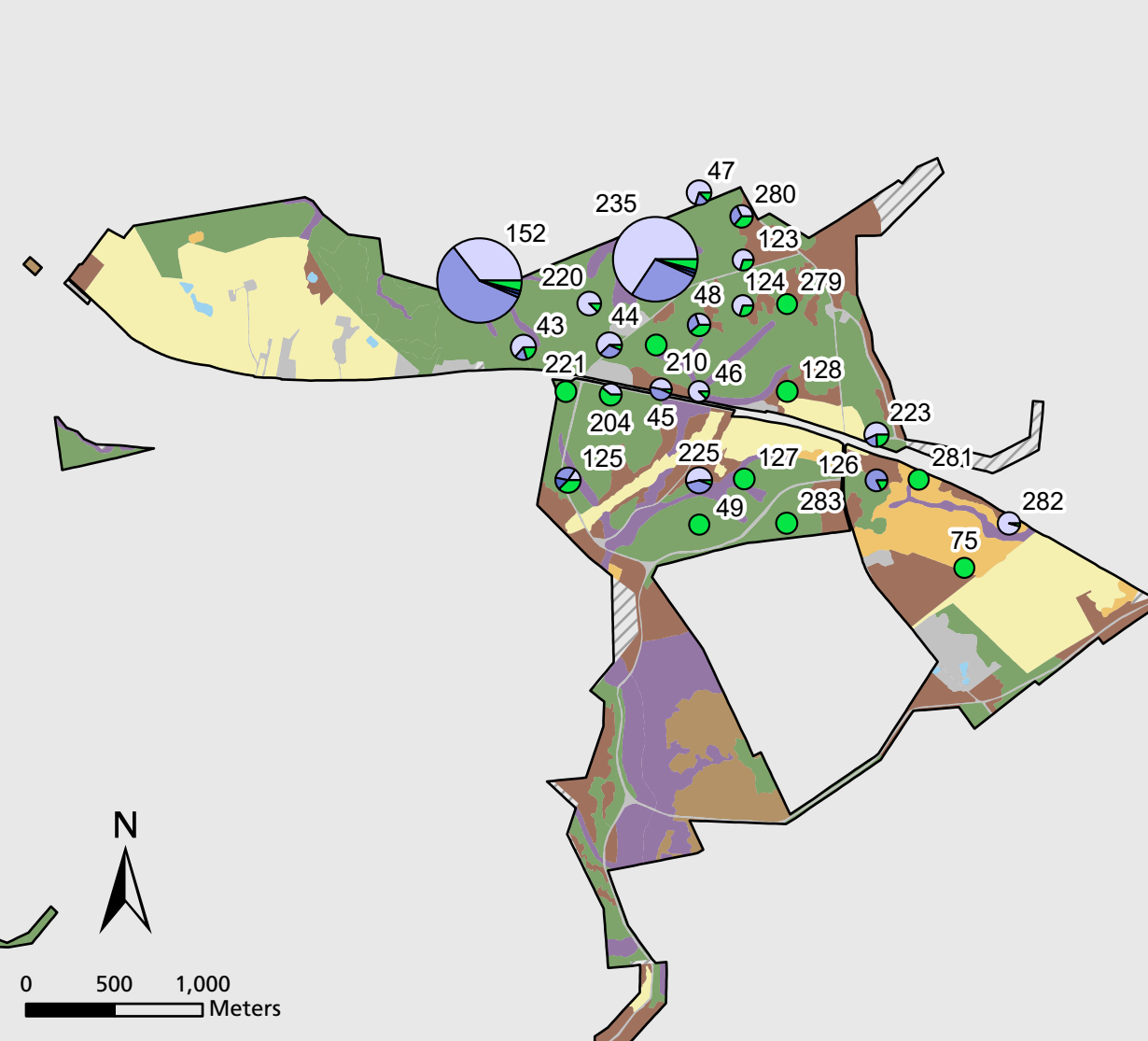




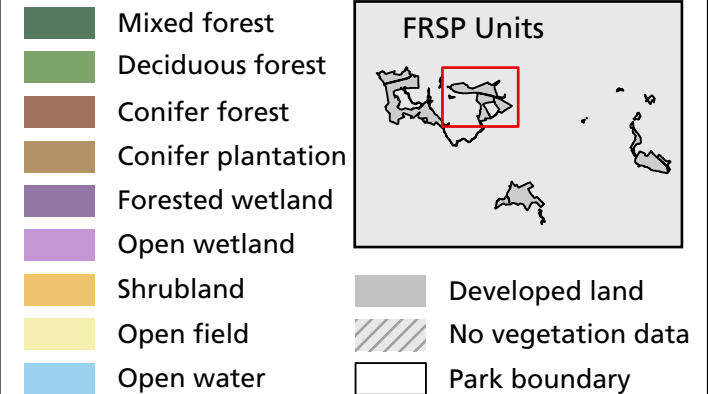
Map 2c. Tree Regeneration by Size Class

Tree regeneration stem densities by size class in forest plots from the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Reporting Date: 01/11/2024.

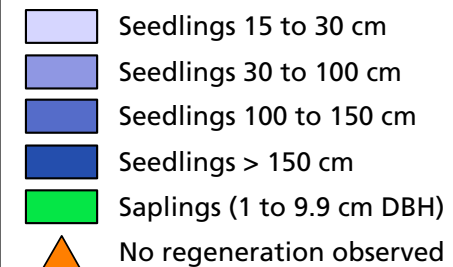
Chancellorsville Battlefield



Vegetation types



Stem densities by size class

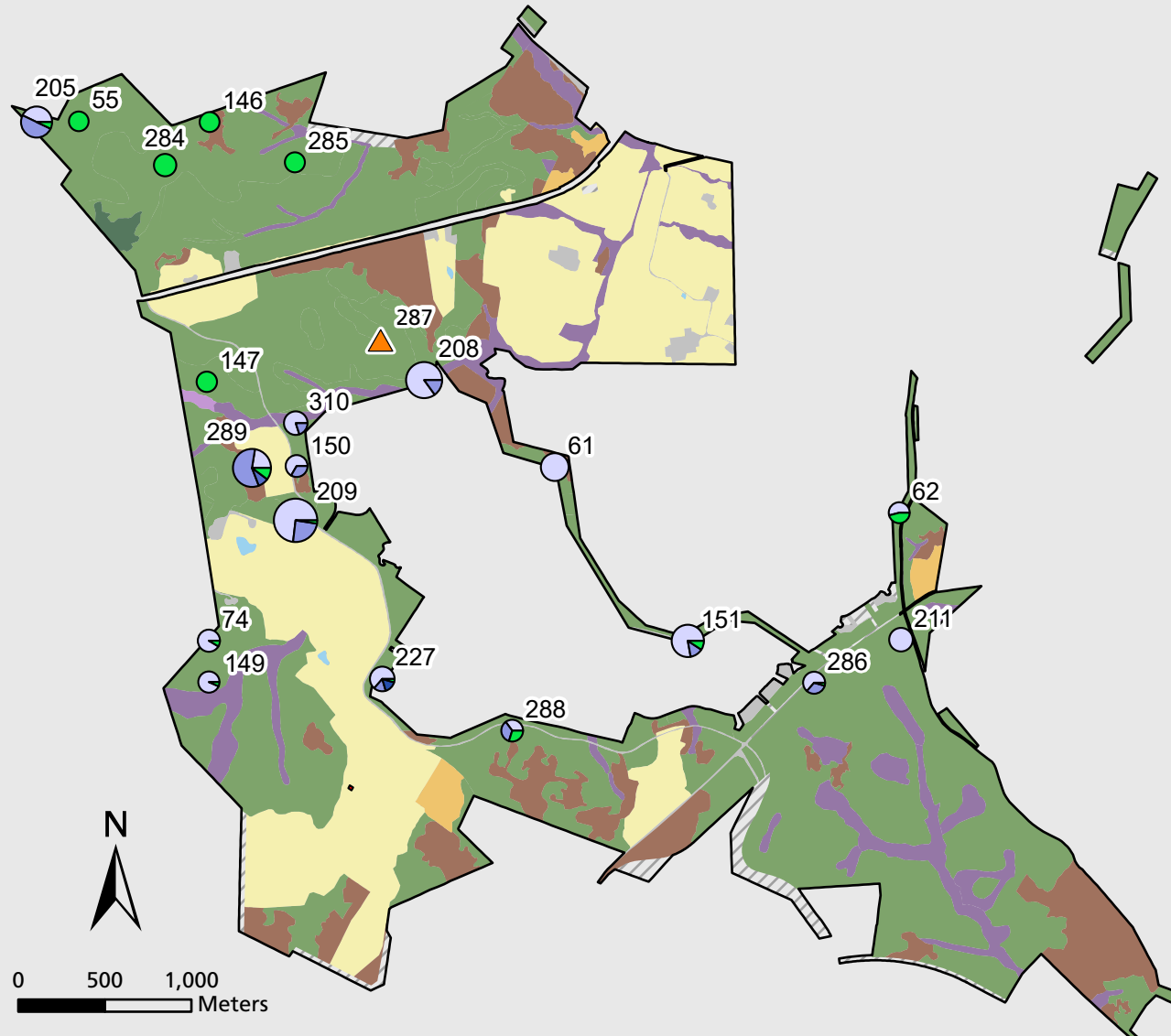




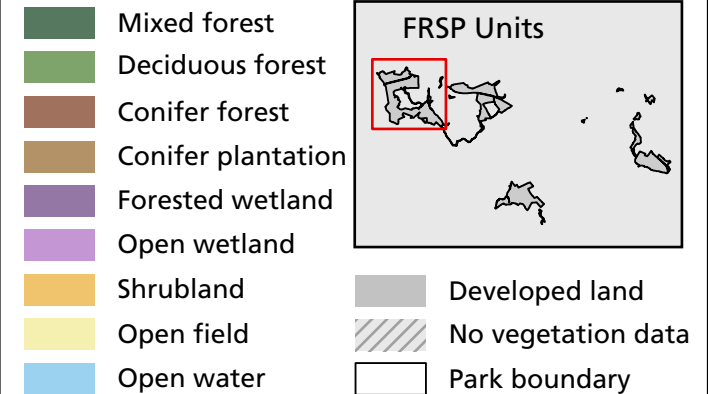
Map 2d. Tree Regeneration by Size Class

Tree regeneration stem densities by size class in forest plots from the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities range from 0 to 9.0 stems/m² across all park units, and only include native canopy-forming species. Reporting Date: 01/11/2024.

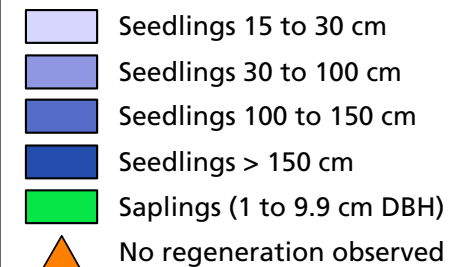
Wilderness Battlefield



Vegetation types



Stem densities by size class

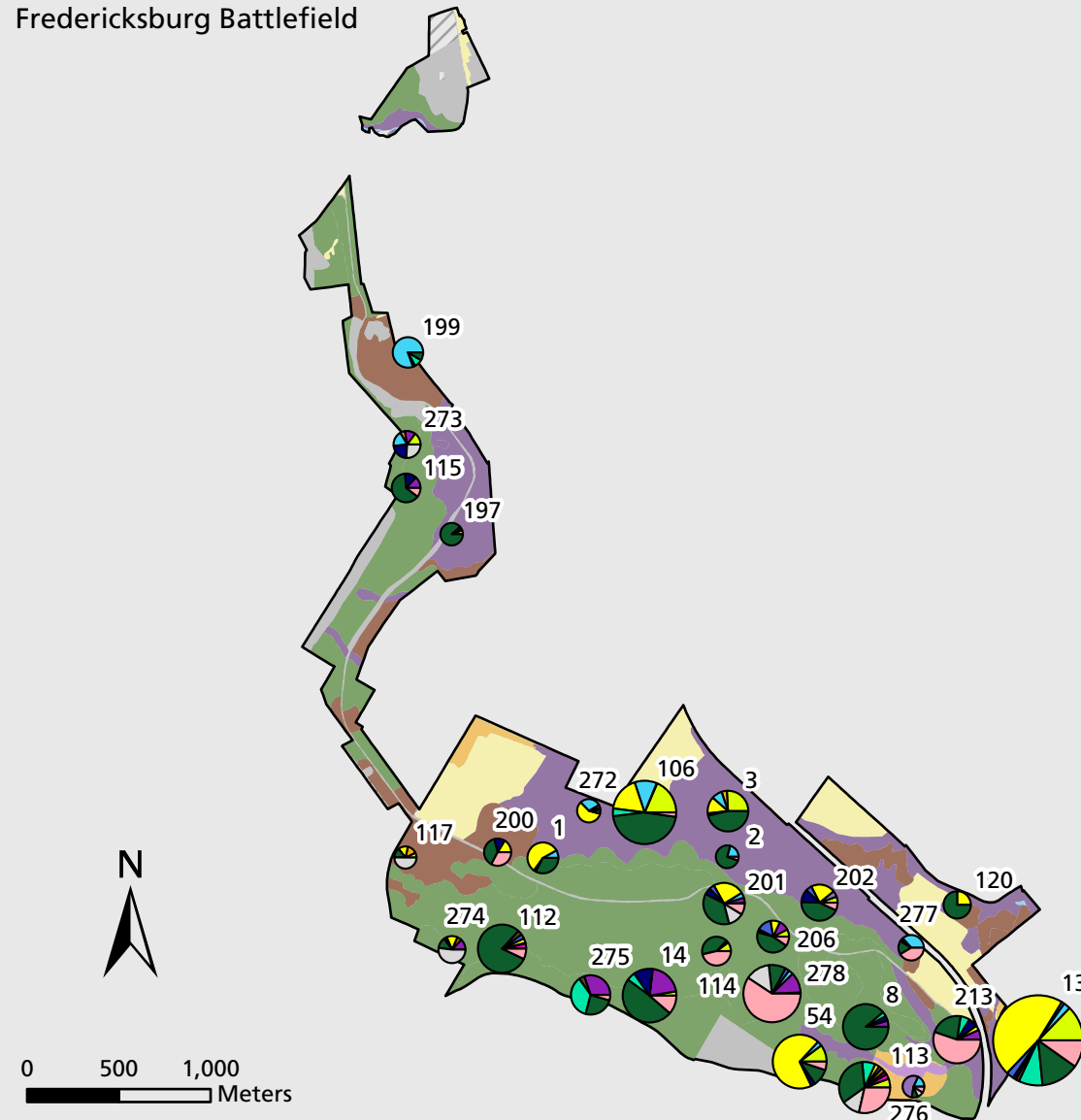




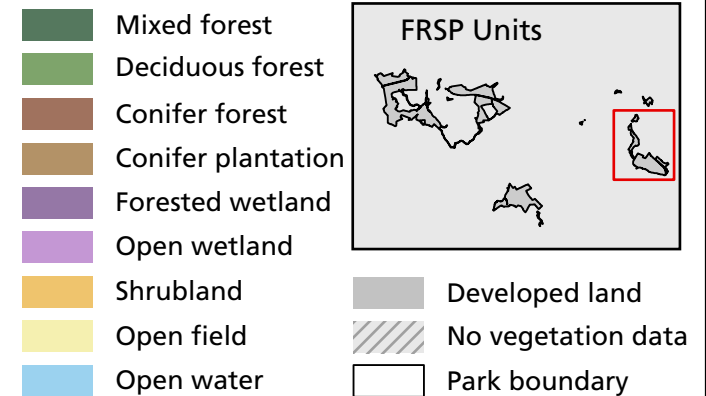
Map 3a. Tree Regeneration Composition

Tree regeneration, including seedlings and saplings, by species group observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities ranges from 0.02 to 9.4 stems/m² across all park units, and includes all species. Reporting Date: 01/11/2024.

Fredericksburg Battlefield



Vegetation types



Species in pie charts

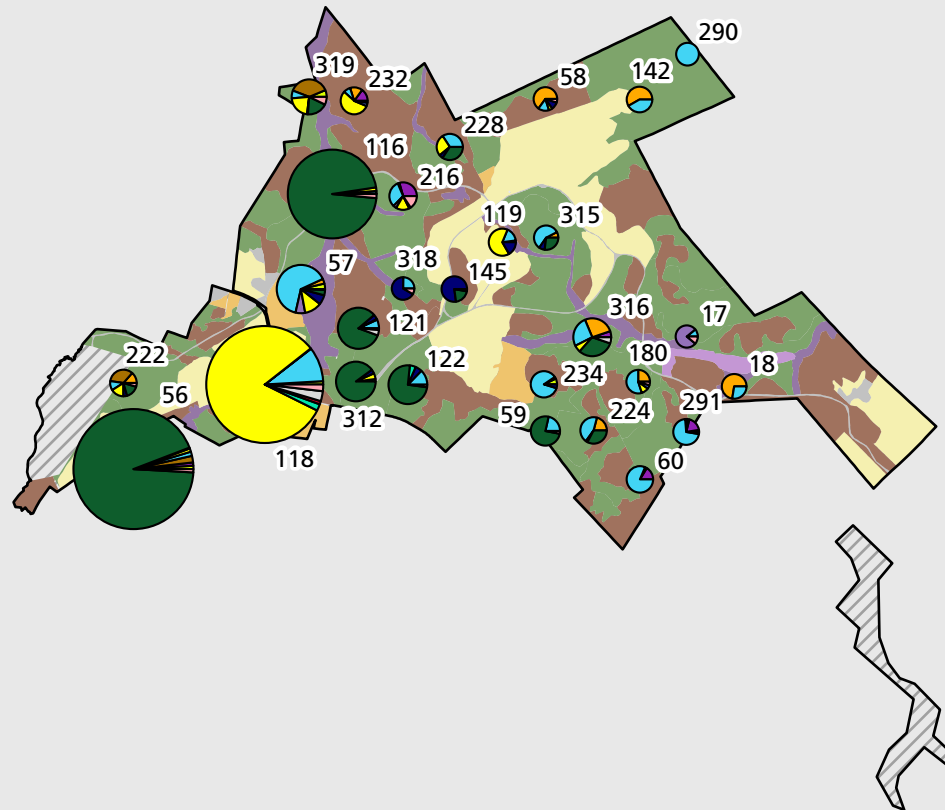




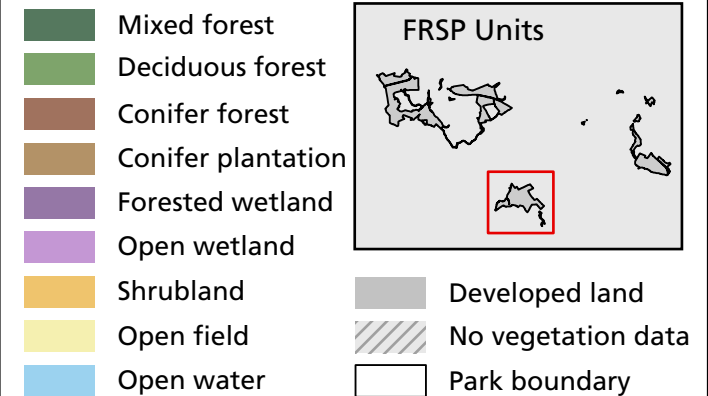
Map 3b. Tree Regeneration Composition

Tree regeneration, including seedlings and saplings, by species group observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities ranges from 0.02 to 9.4 stems/m² across all park units, and includes all species. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types



Species in pie charts

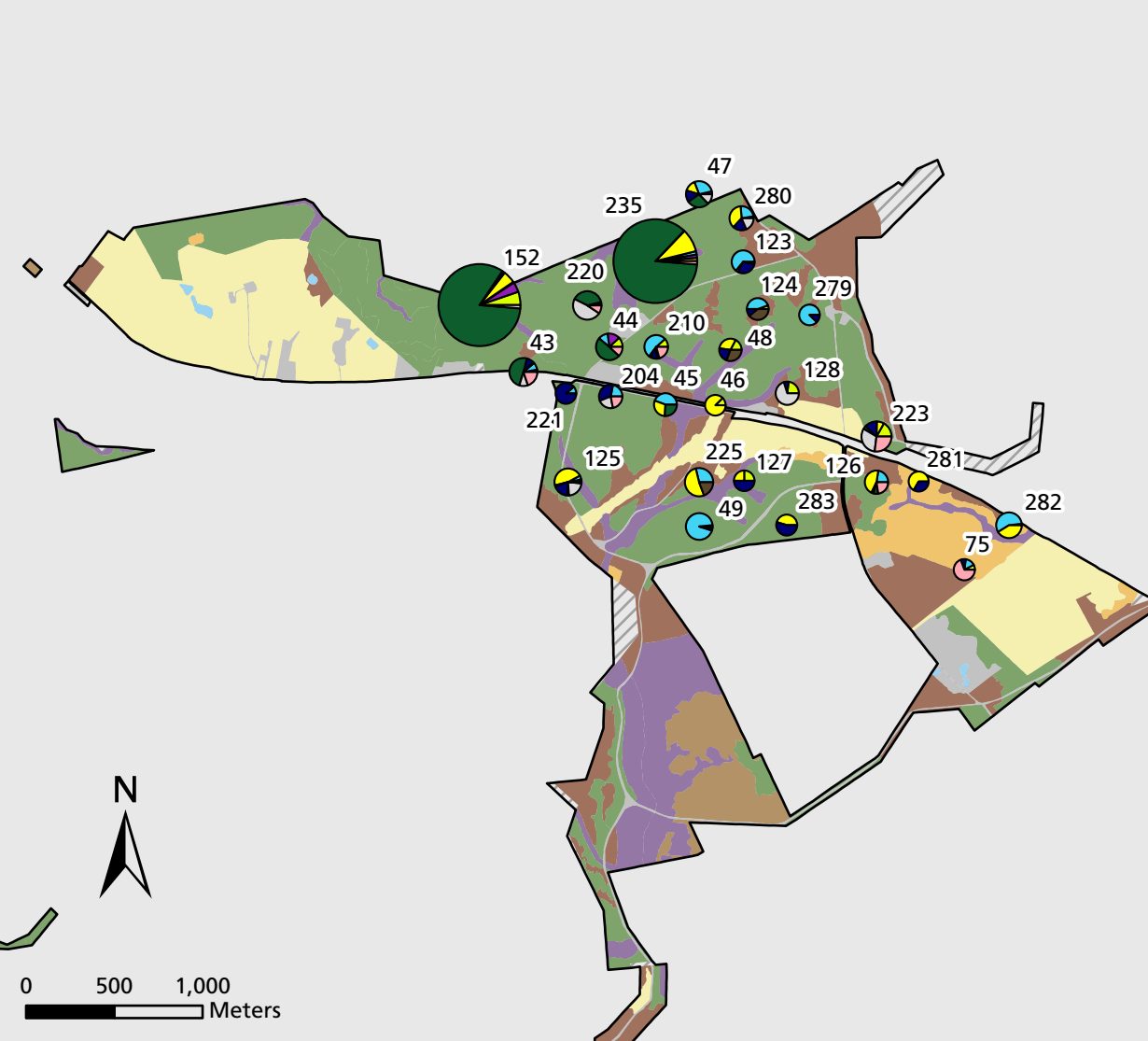




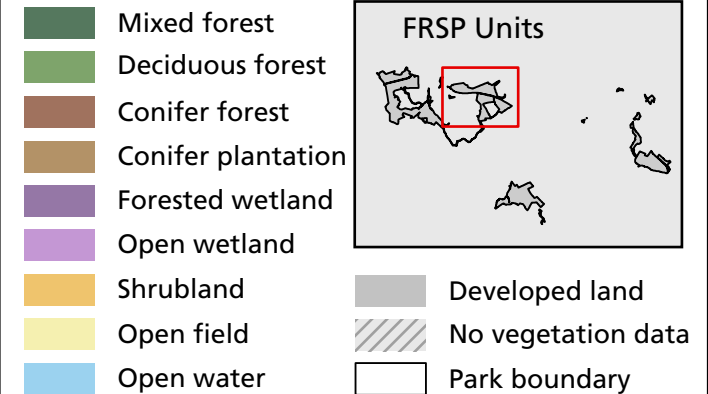
Map 3c. Tree Regeneration Composition

Tree regeneration, including seedlings and saplings, by species group observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities ranges from 0.02 to 9.4 stems/m² across all park units, and includes all species. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types



Species in pie charts

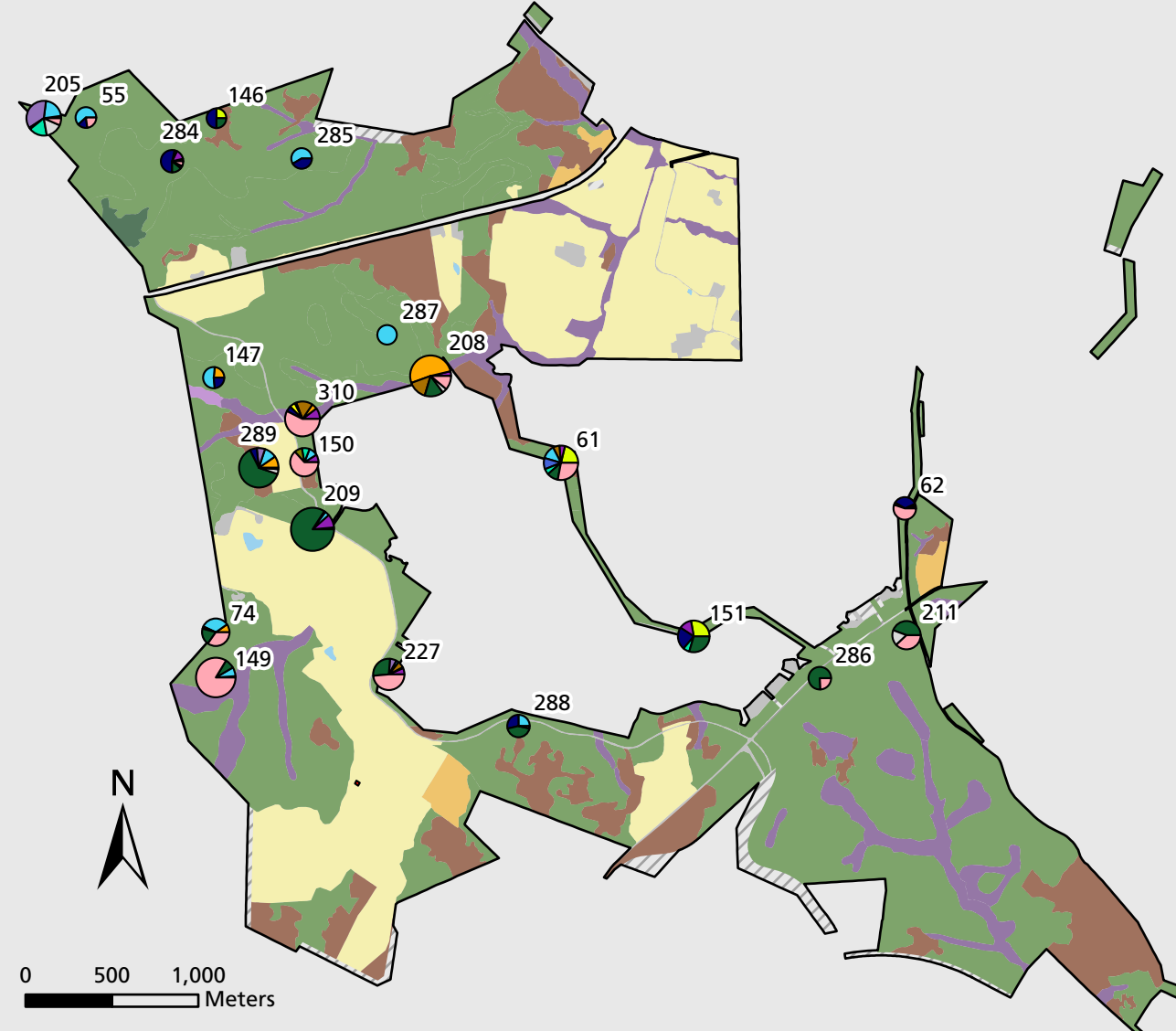




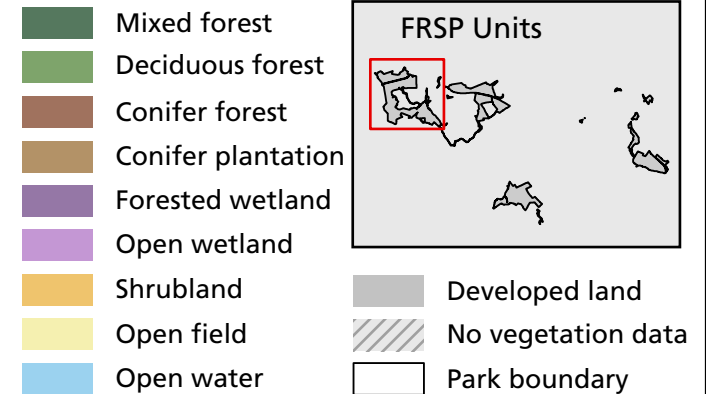
Map 3d. Tree Regeneration Composition

Tree regeneration, including seedlings and saplings, by species group observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level regeneration density. Pies may be shifted to prevent overlap. Total densities ranges from 0.02 to 9.4 stems/m² across all park units, and includes all species. Reporting Date: 01/11/2024.

Wilderness Battlefield



Vegetation types



Species in pie charts

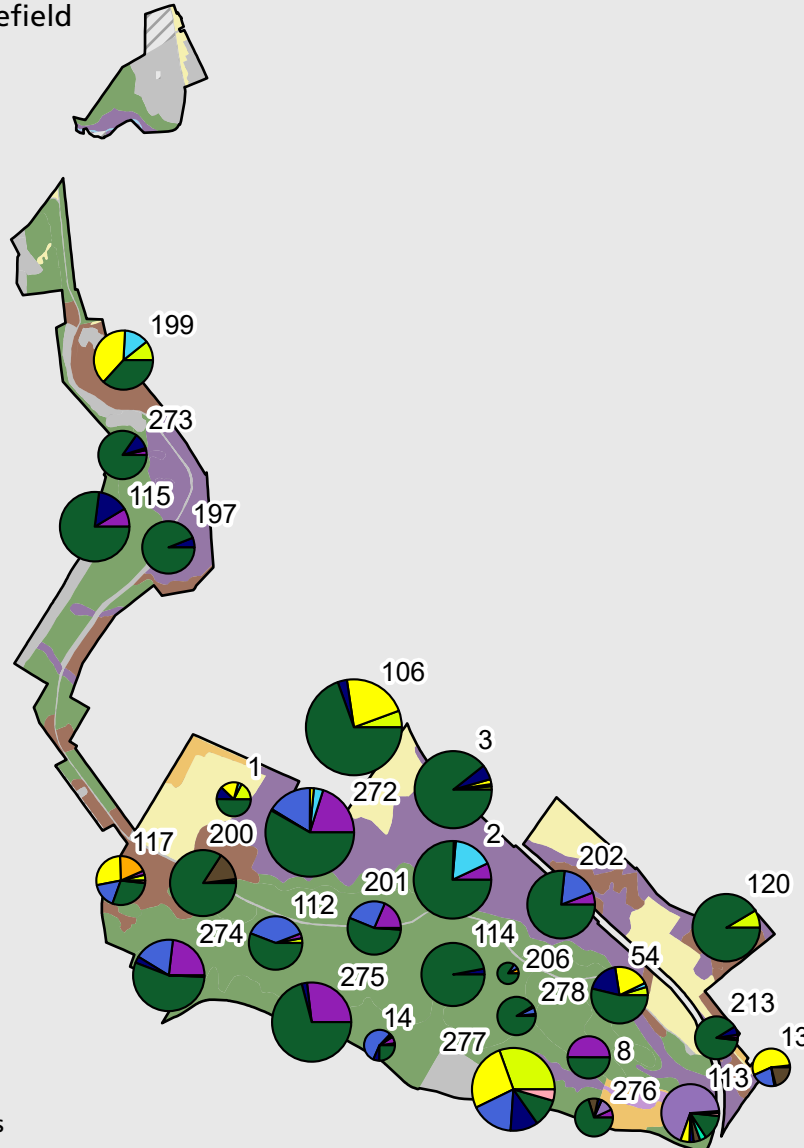




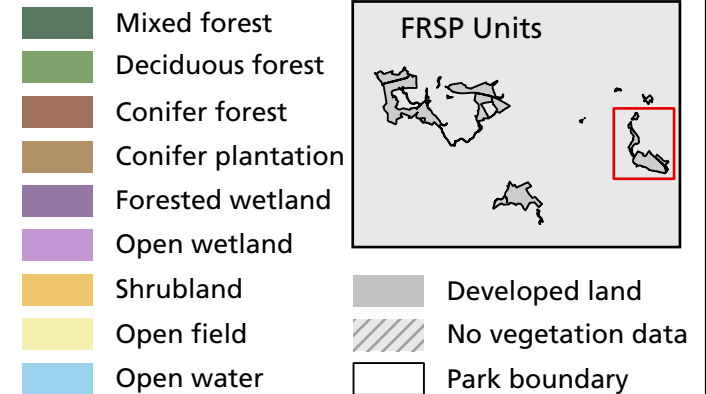
Map 4a. Tree Canopy Composition

Tree composition, by species group, observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level basal areas. Pies may be shifted to prevent overlap. Total basal area ranges from 7.0 to 57.6 m²/ha across all park units. Reporting Date: 01/11/2024.

Fredericksburg Battlefield



Vegetation types



Species in pie charts

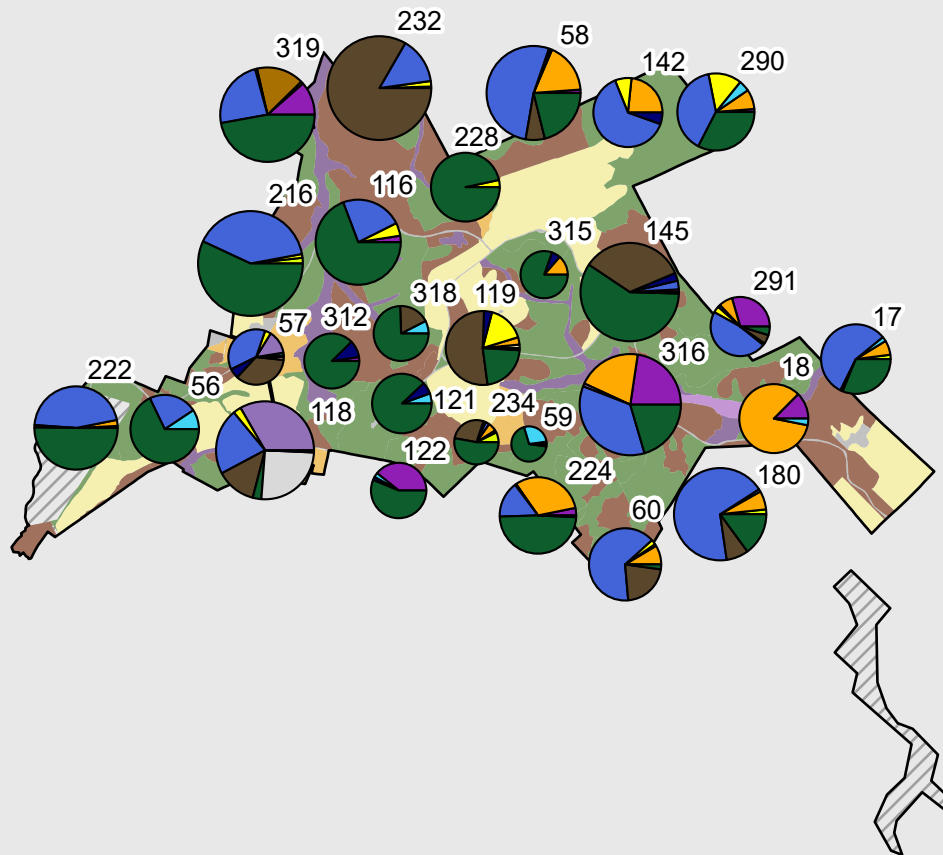




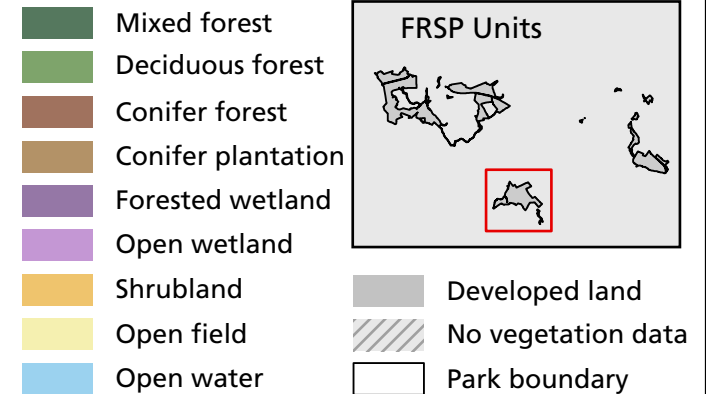
Map 4b. Tree Canopy Composition

Tree composition, by species group, observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level basal areas. Pies may be shifted to prevent overlap. Total basal area ranges from 7.0 to 57.6 m²/ha across all park units. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types



Species in pie charts

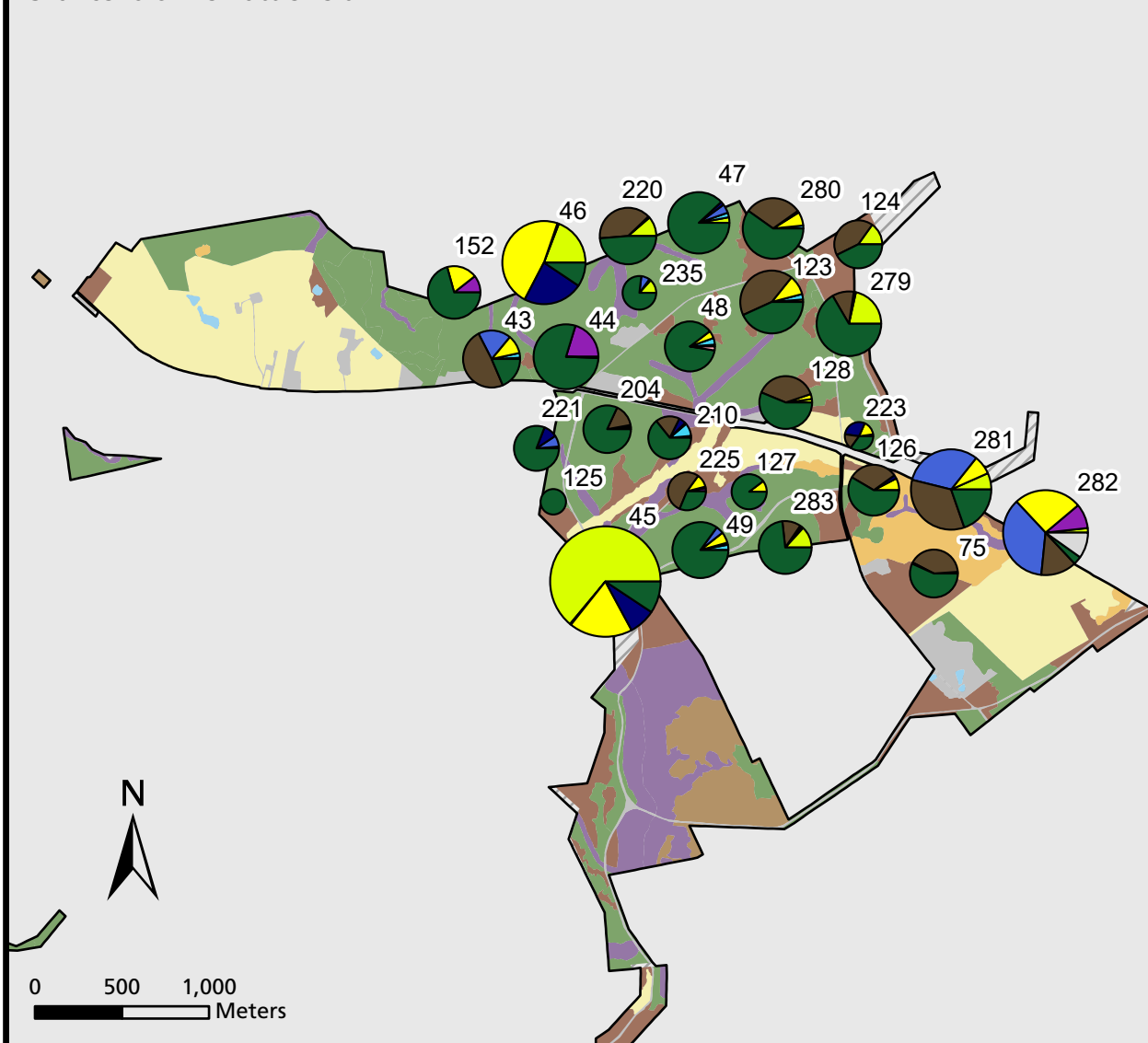




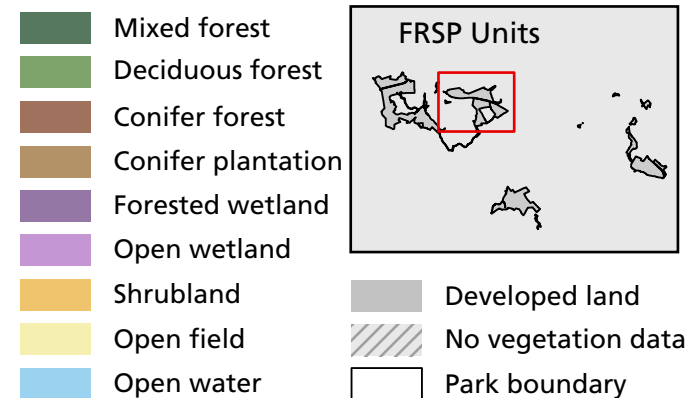
Map 4c. Tree Canopy Composition

Tree composition, by species group, observed in forest plots sampled in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to plot-level basal areas. Pies may be shifted to prevent overlap. Total basal area ranges from 7.0 to 57.6 m²/ha across all park units. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types



Species in pie charts

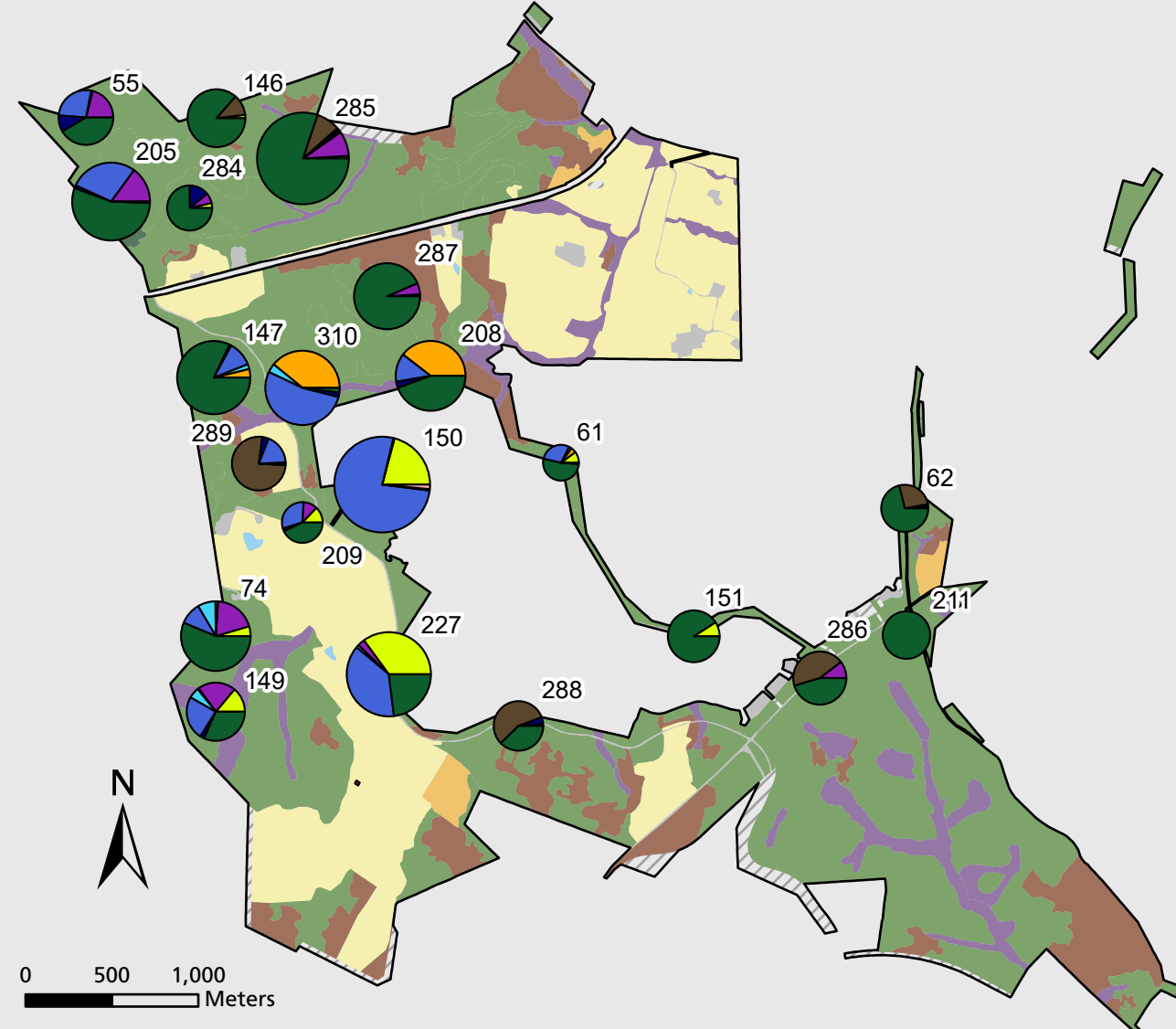




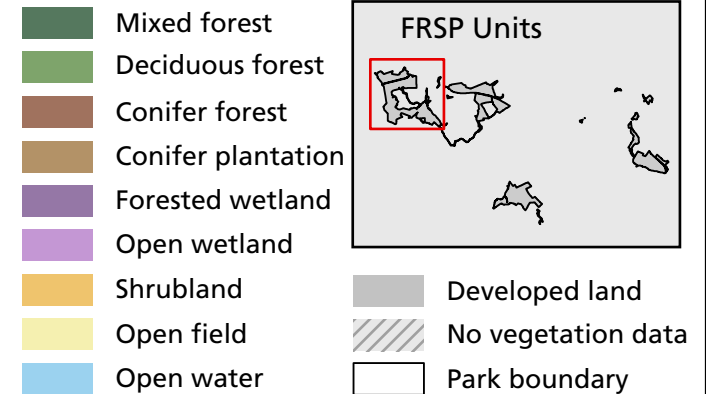
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Wilderness Battlefield



Vegetation types



Species in pie charts

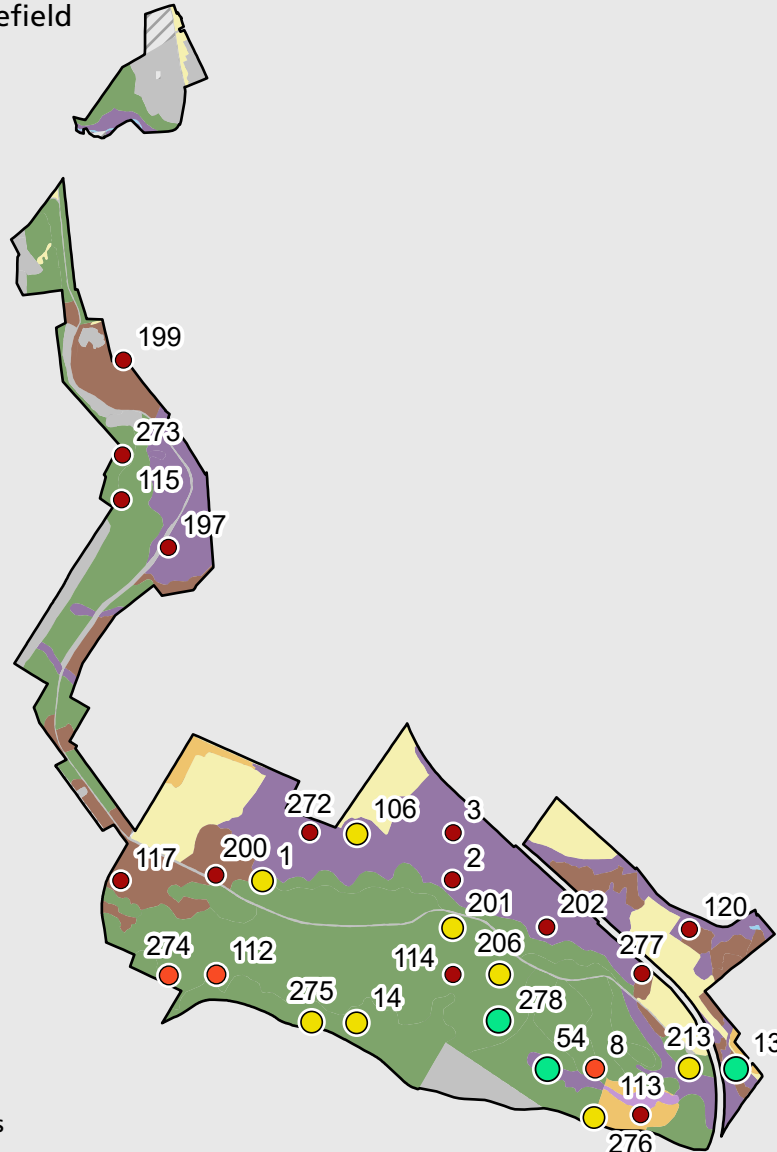




Map 5a. Tree Regeneration Stocking Index

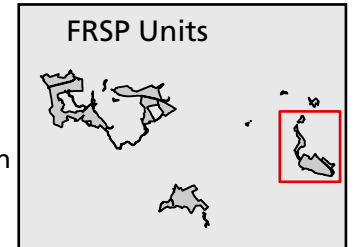
Regeneration stocking index for the most recent census (2021-2023). This index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights and quantifies whether current regeneration densities are sufficient to restock a forest canopy. Stocking index is reported at a 2-m scale to maintain consistency with other regional publications (range 0-592.4 across all park units). Only native canopy-forming species included. See Table 1 for stocking index values. Reporting Date: 01/11/2024.

Fredericksburg Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Stocking index ranges

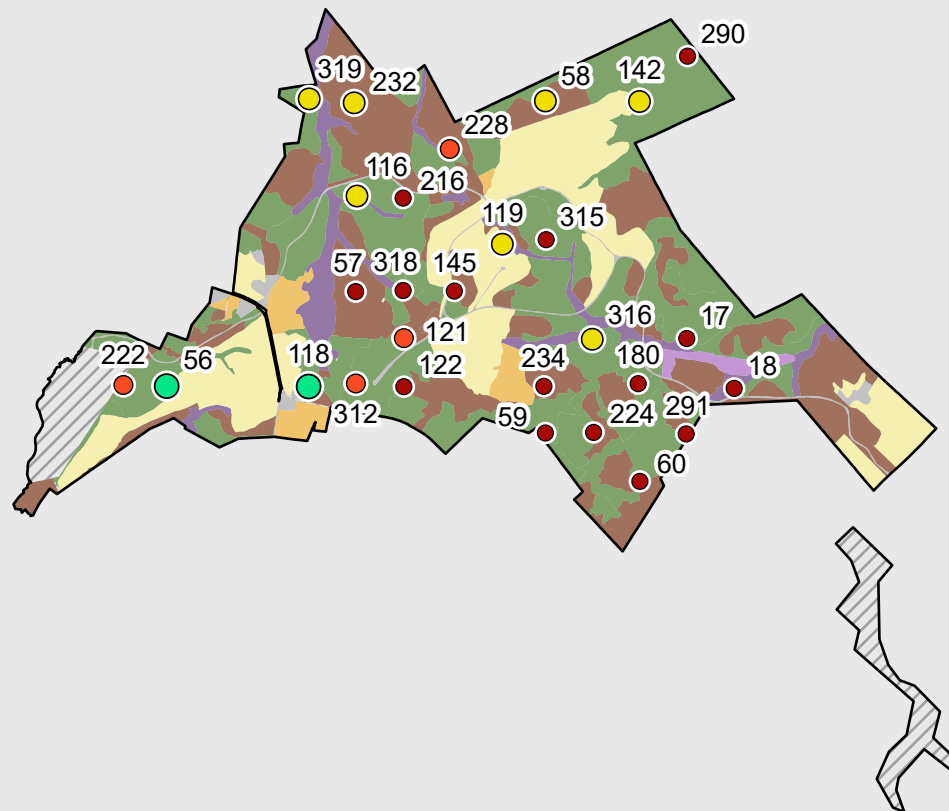
- <25: Severely understocked. Regeneration is insufficient to replace the forest canopy.
- 25 to 50: Moderately stocked regeneration for areas with low deer impacts.
- 50 to 100: Sufficient regeneration to replace forest canopy in areas with low deer impacts.
- > 100: Sufficiently stocked with regeneration for areas with high deer impacts.



Map 5b. Tree Regeneration Stocking Index

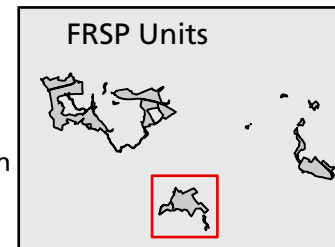
Regeneration stocking index for the most recent census (2021-2023). This index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights and quantifies whether current regeneration densities are sufficient to restock a forest canopy. Stocking index is reported at a 2-m scale to maintain consistency with other regional publications (range 0-592.4 across all park units). Only native canopy-forming species included. See Table 1 for stocking index values. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Stocking index ranges

- <25: Severely understocked. Regeneration is insufficient to replace the forest canopy.
- 25 to 50: Moderately stocked regeneration for areas with low deer impacts.
- 50 to 100: Sufficient regeneration to replace forest canopy in areas with low deer impacts.
- > 100: Sufficiently stocked with regeneration for areas with high deer impacts.

0 500 1,000
Meters



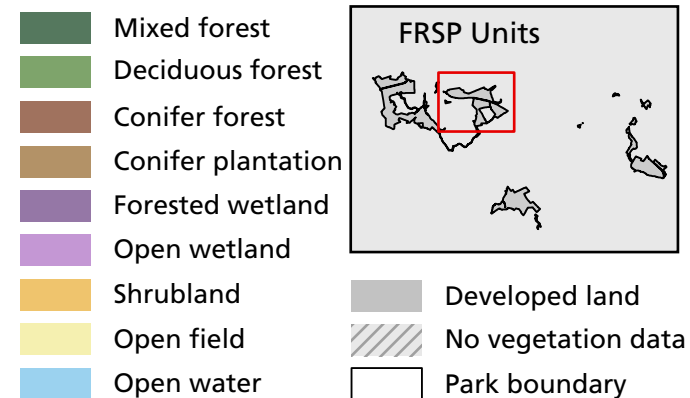
Map 5c. Tree Regeneration Stocking Index

Regeneration stocking index for the most recent census (2021-2023). This index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights and quantifies whether current regeneration densities are sufficient to restock a forest canopy. Stocking index is reported at a 2-m scale to maintain consistency with other regional publications (range 0-592.4 across all park units). Only native canopy-forming species included. See Table 1 for stocking index values. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types



Stocking index ranges

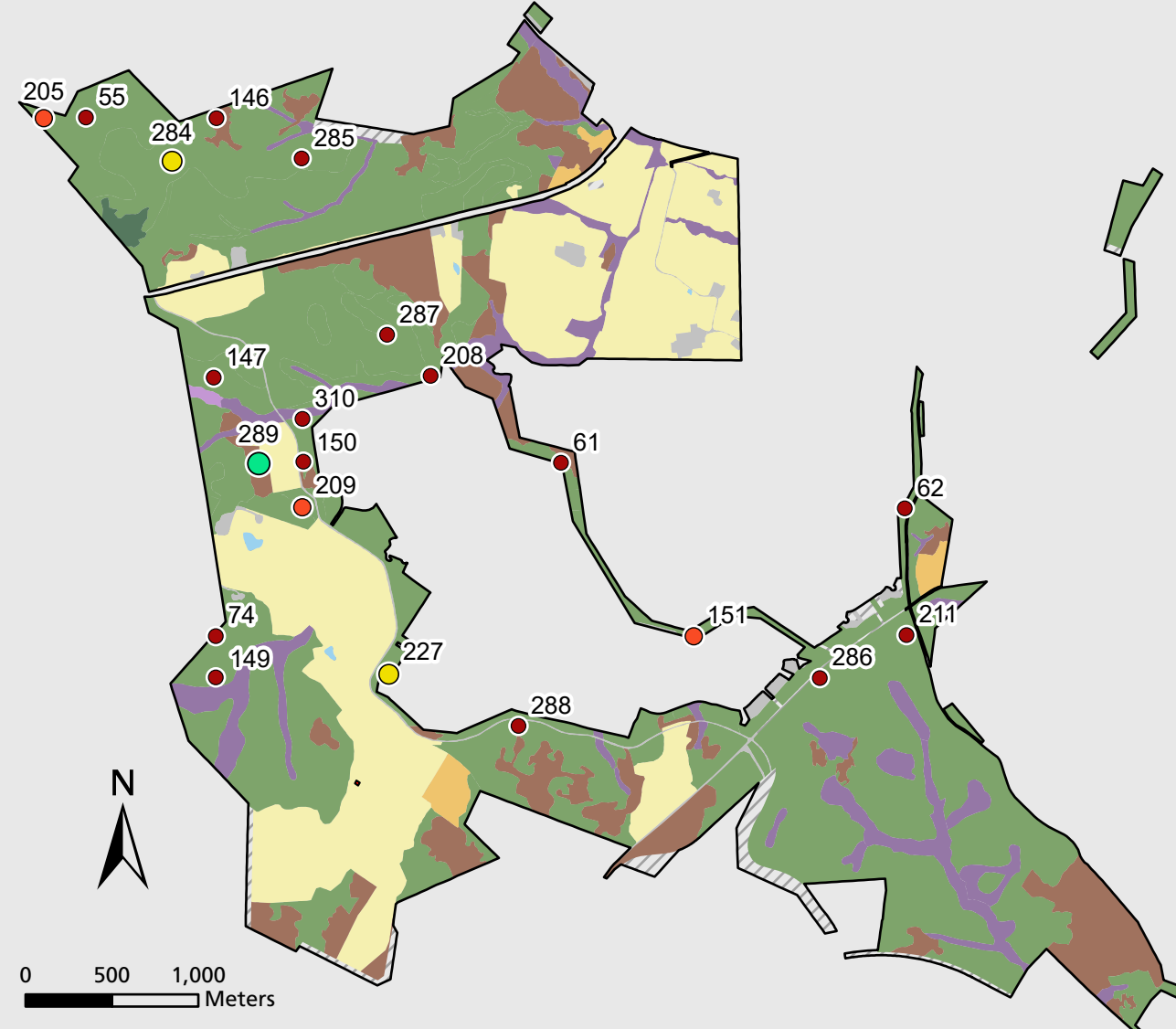
- <25: Severely understocked. Regeneration is insufficient to replace the forest canopy.
- 25 to 50: Moderately stocked regeneration for areas with low deer impacts.
- 50 to 100: Sufficient regeneration to replace forest canopy in areas with low deer impacts.
- > 100: Sufficiently stocked with regeneration for areas with high deer impacts.



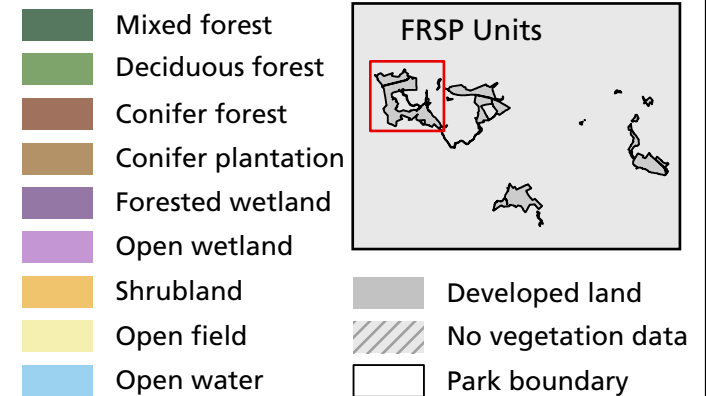
Map 5d. Tree Regeneration Stocking Index

Regeneration stocking index for the most recent census (2021-2023). This index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights and quantifies whether current regeneration densities are sufficient to restock a forest canopy. Stocking index is reported at a 2-m scale to maintain consistency with other regional publications (range 0-592.4 across all park units). Only native canopy-forming species included. See Table 1 for stocking index values. Reporting Date: 01/11/2024.

Wilderness Battlefield



Vegetation types



Stocking index ranges

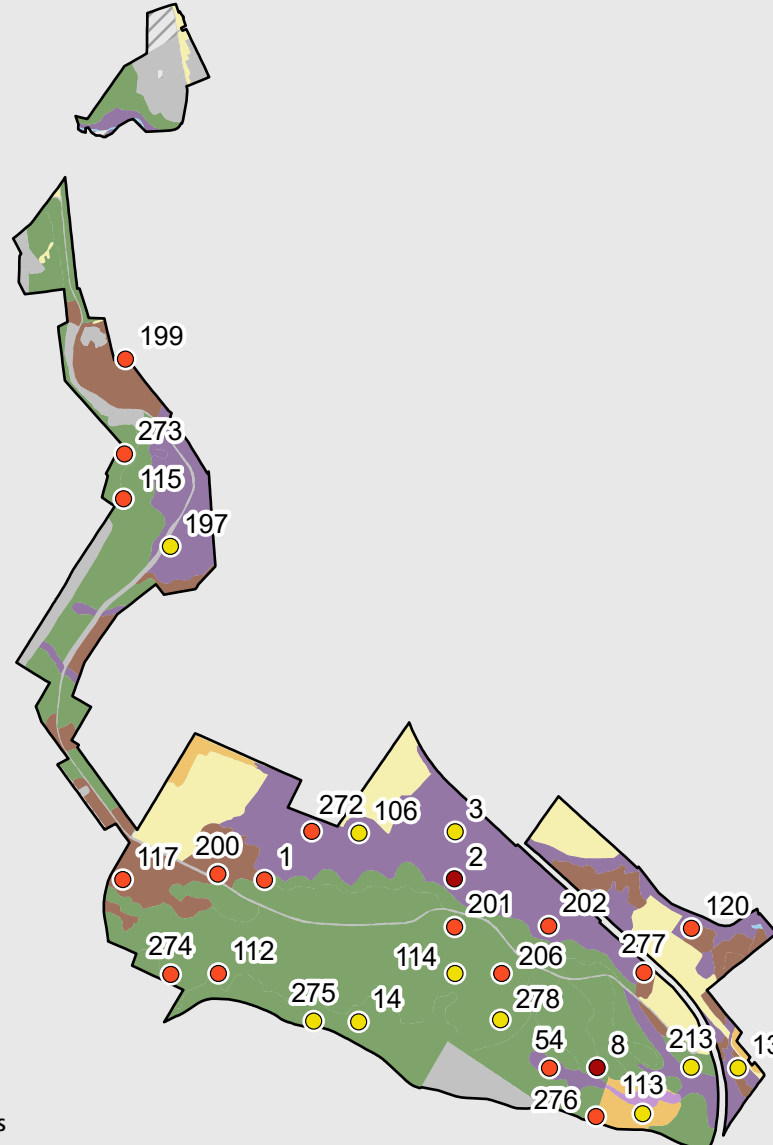
- <25: Severely understocked. Regeneration is insufficient to replace the forest canopy.
- 25 to 50: Moderately stocked regeneration for areas with low deer impacts.
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- >100: Sufficiently stocked with regeneration for areas with high deer impacts.



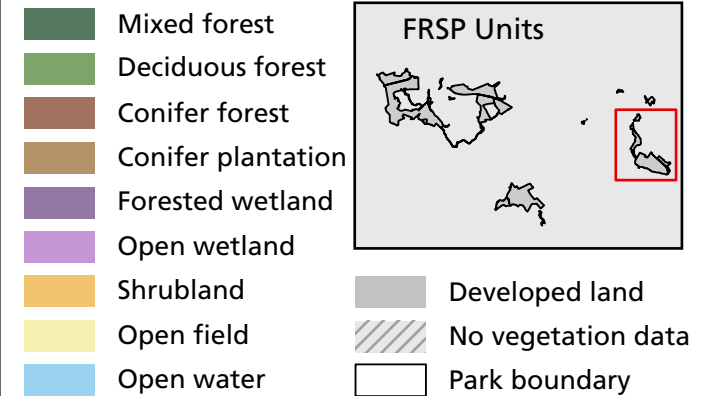
Map 6a. Index of Deer Browse Impacts

Index of deer browse impacts observed in forest plots in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Deer browse impacts are assessed on a scale of 1-5, with 1 representing no impact and 5 representing severe impacts. Reporting Date: 01/11/2024.

Fredericksburg Battlefield



Vegetation types



Deer browse index

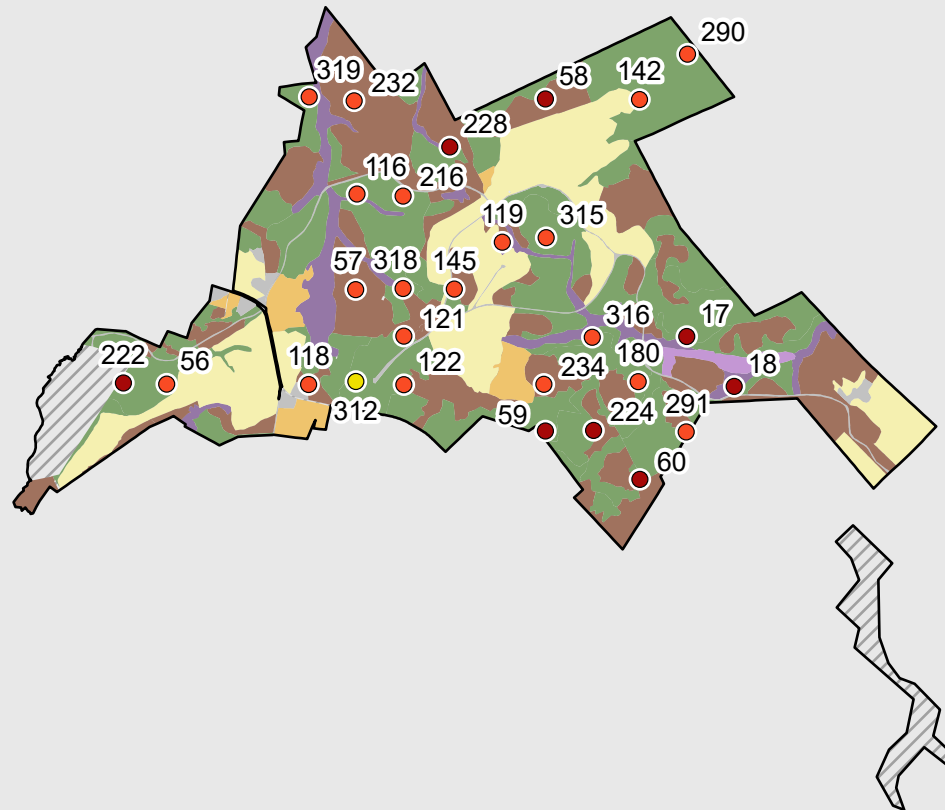
- 1) No impact: found only in well-maintained deer enclosures.
- 2) Low impact: deer-preferred (DP) species abundant and of varying heights.
- 3) Medium impact: DP species present, but mostly under 30 cm tall. DP herbs present but stunted and flowering is uncommon.
- 4) High impact: DP species are rare to absent. Non-preferred and browse-resilient vegetation (e.g. beech) limited in height by deer browse. DP herbs absent or severely stunted.
- 5) Very high impact: DP regeneration absent. Non-preferred species also reduced by heavy browsing. Distinct deer browse line.



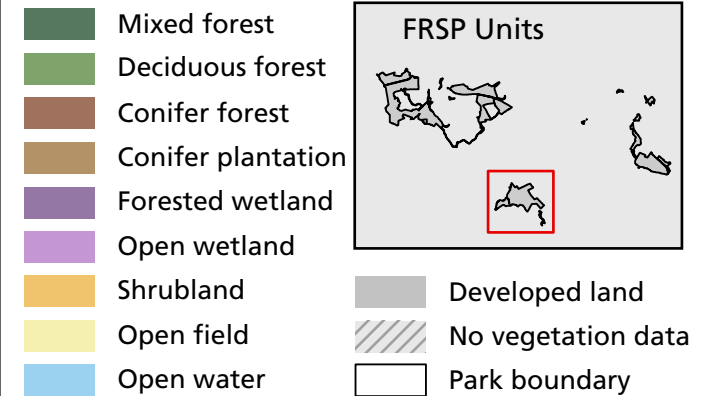
Map 6b. Index of Deer Browse Impacts

Index of deer browse impacts observed in forest plots in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Deer browse impacts are assessed on a scale of 1-5, with 1 representing no impact and 5 representing severe impacts. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types



Deer browse index

- 1) No impact: found only in well-maintained deer enclosures.
- 2) Low impact: deer-preferred (DP) species abundant and of varying heights.
- 3) Medium impact: DP species present, but mostly under 30 cm tall. DP herbs present but stunted and flowering is uncommon.
- 4) High impact: DP species are rare to absent. Non-preferred and browse-resilient vegetation (e.g. beech) limited in height by deer browse. DP herbs absent or severely stunted.
- 5) Very high impact: DP regeneration absent. Non-preferred species also reduced by heavy browsing. Distinct deer browse line.



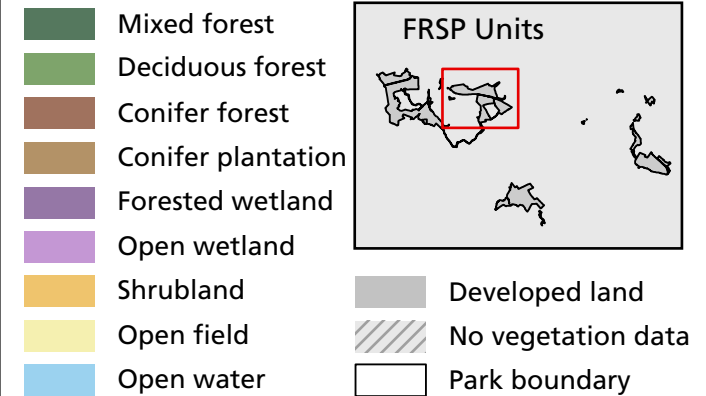
Map 6c. Index of Deer Browse Impacts

Index of deer browse impacts observed in forest plots in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Deer browse impacts are assessed on a scale of 1-5, with 1 representing no impact and 5 representing severe impacts. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types



Deer browse index

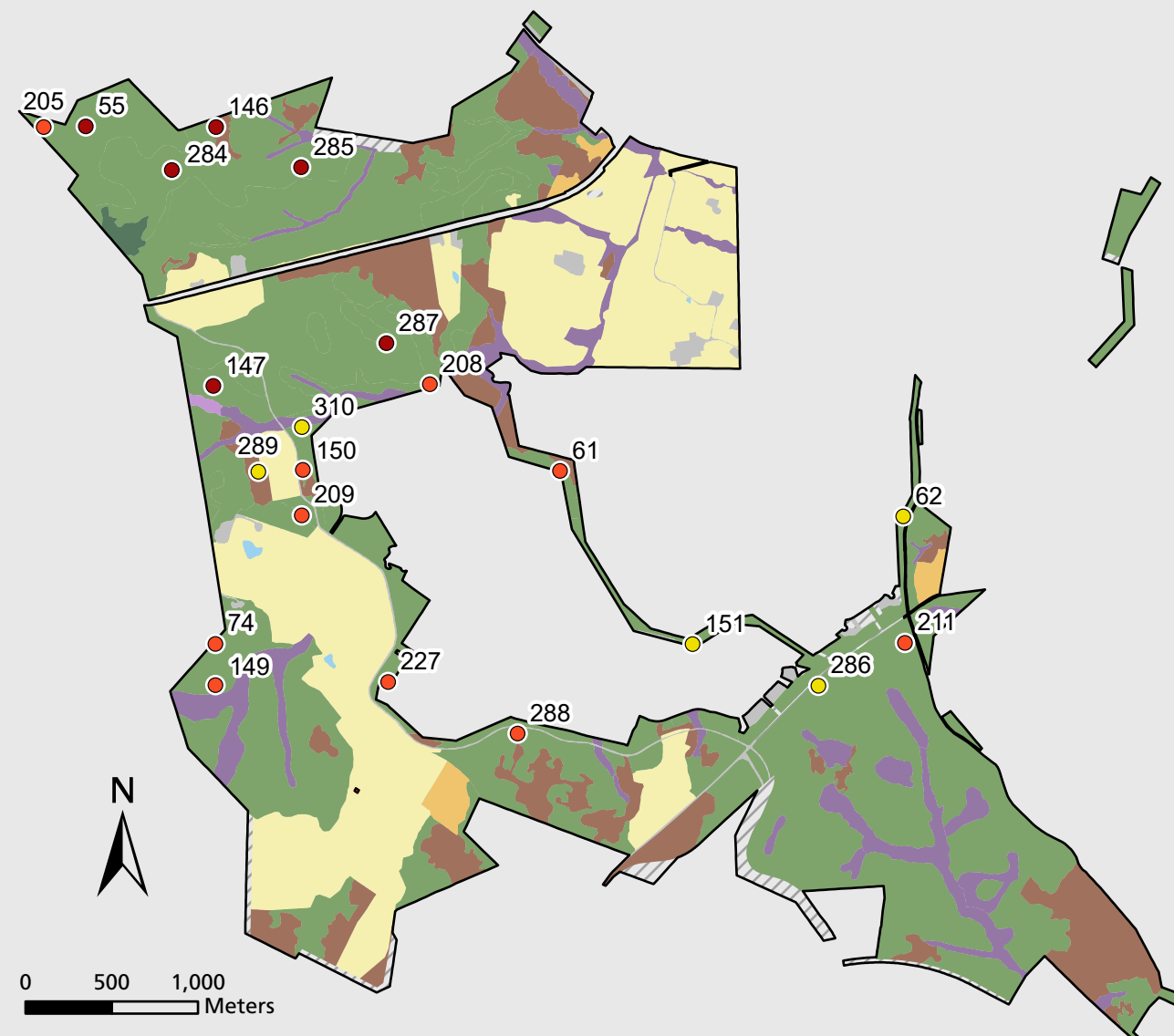
- 1) No impact: found only in well-maintained deer enclosures.
- 2) Low impact: deer-preferred (DP) species abundant and of varying heights.
- 3) Medium impact: DP species present, but mostly under 30 cm tall. DP herbs present but stunted and flowering is uncommon.
- 4) High impact: DP species are rare to absent. Non-preferred and browse-resilient vegetation (e.g. beech) limited in height by deer browse. DP herbs absent or severely stunted.
- 5) Very high impact: DP regeneration absent. Non-preferred species also reduced by heavy browsing. Distinct deer browse line.



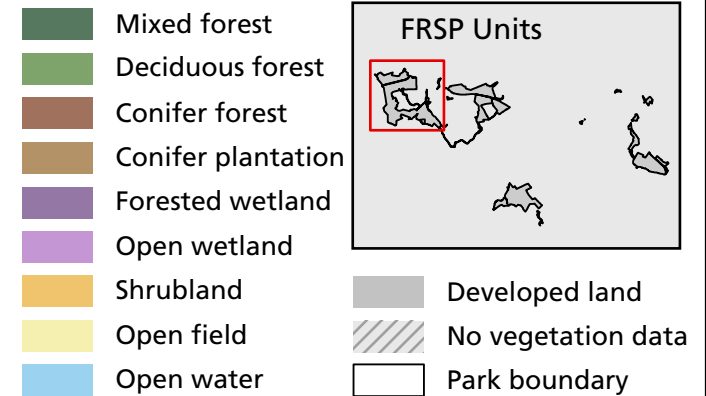
Map 6d. Index of Deer Browse Impacts

Index of deer browse impacts observed in forest plots in the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Deer browse impacts are assessed on a scale of 1-5, with 1 representing no impact and 5 representing severe impacts. Reporting Date: 01/11/2024.

Wilderness Battlefield



Vegetation types



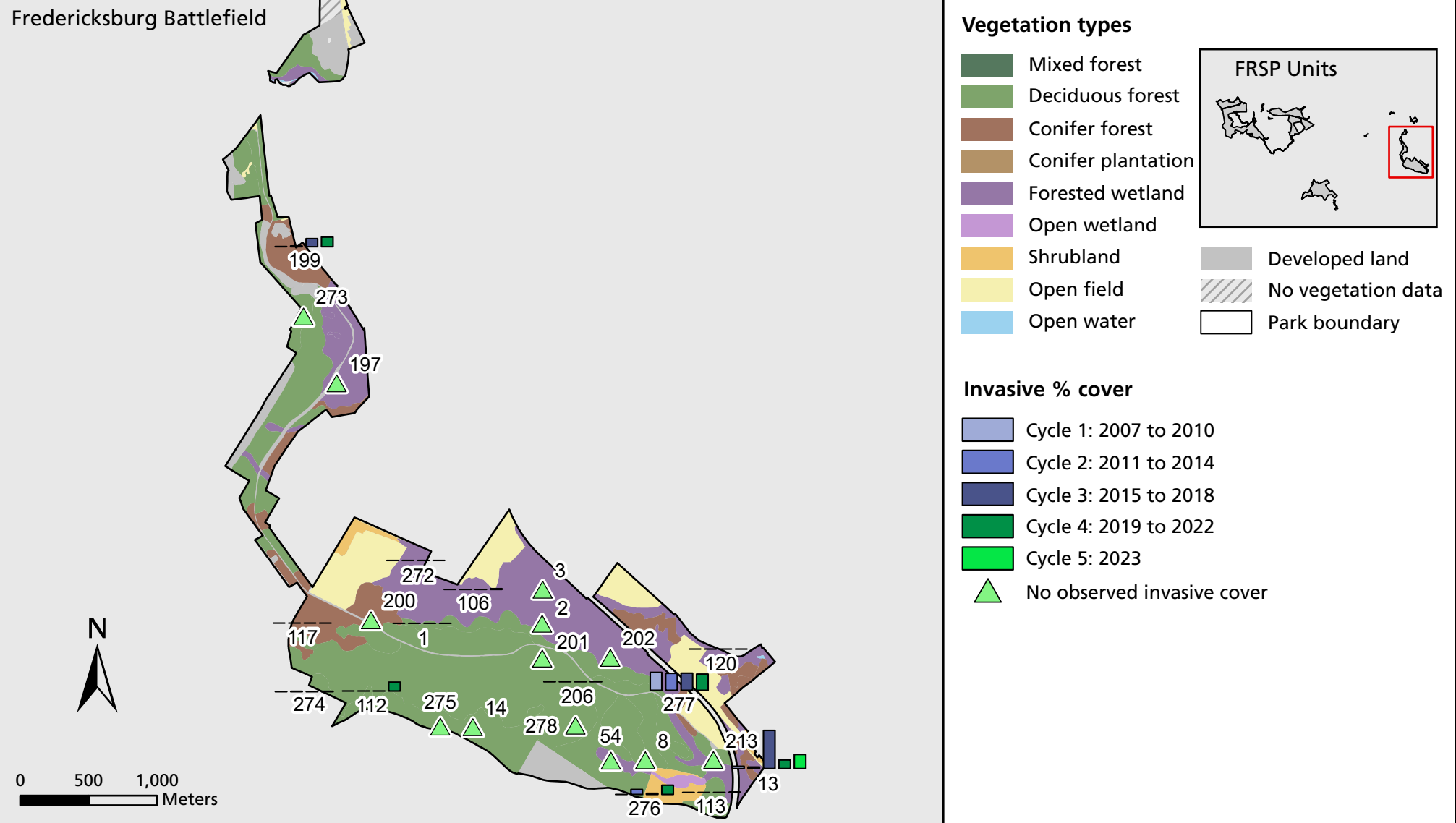
Deer browse index

- 1) No impact: found only in well-maintained deer exclosures.
- 2) Low impact: deer-preferred (DP) species abundant and of varying heights.
- 3) Medium impact: DP species present, but mostly under 30 cm tall. DP herbs present but stunted and flowering is uncommon.
- 4) High impact: DP species are rare to absent. Non-preferred and browse-resilient vegetation (e.g. beech) limited in height by deer browse. DP herbs absent or severely stunted.
- 5) Very high impact: DP regeneration absent. Non-preferred species also reduced by heavy browsing. Distinct deer browse line.



Map 7a. Invasive % Cover by Cycle

Trends in percent cover of invasive species observed in quadrats in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Average invasive cover per plot ranges from 0 to 27.7% across all park units. See Table 2 for % cover values. Average cover may be increasing over time in part due to protocol change. See the Table 2 caption and the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>) for details. Reporting Date: 01/11/20234

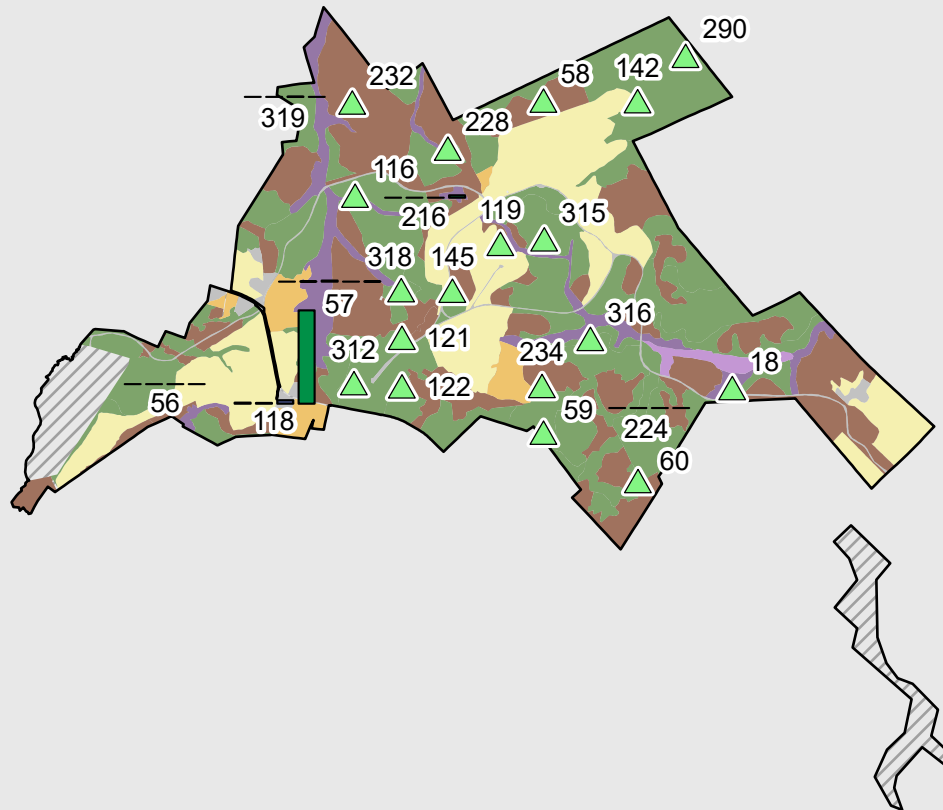




Map 7b. Invasive % Cover by Cycle

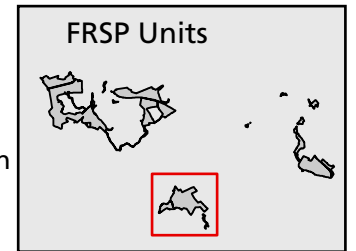
Trends in percent cover of invasive species observed in quadrats in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Average invasive cover per plot ranges from 0 to 27.7% across all park units. See Table 2 for % cover values. Average cover may be increasing over time in part due to protocol change. See the Table 2 caption and the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>) for details. Reporting Date: 01/11/20234

Spotsylvania Courthouse Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Invasive % cover

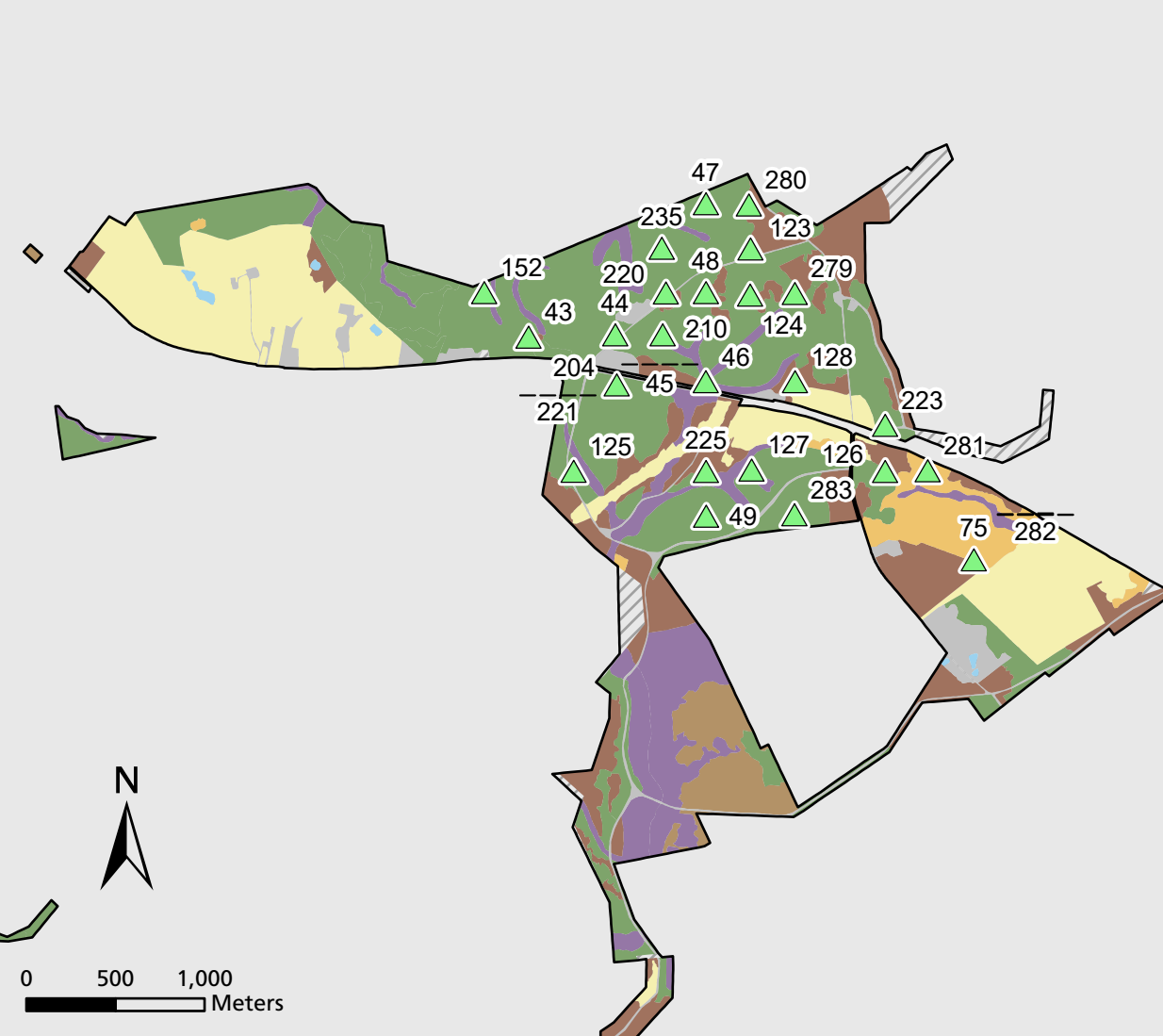
- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023
- No observed invasive cover



Map 7c. Invasive % Cover by Cycle

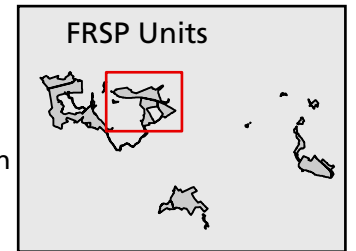
Trends in percent cover of invasive species observed in quadrats in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Average invasive cover per plot ranges from 0 to 27.7% across all park units. See Table 2 for % cover values. Average cover may be increasing over time in part due to protocol change. See the Table 2 caption and the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>) for details. Reporting Date: 01/11/20234

Chancellorsville Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Invasive % cover

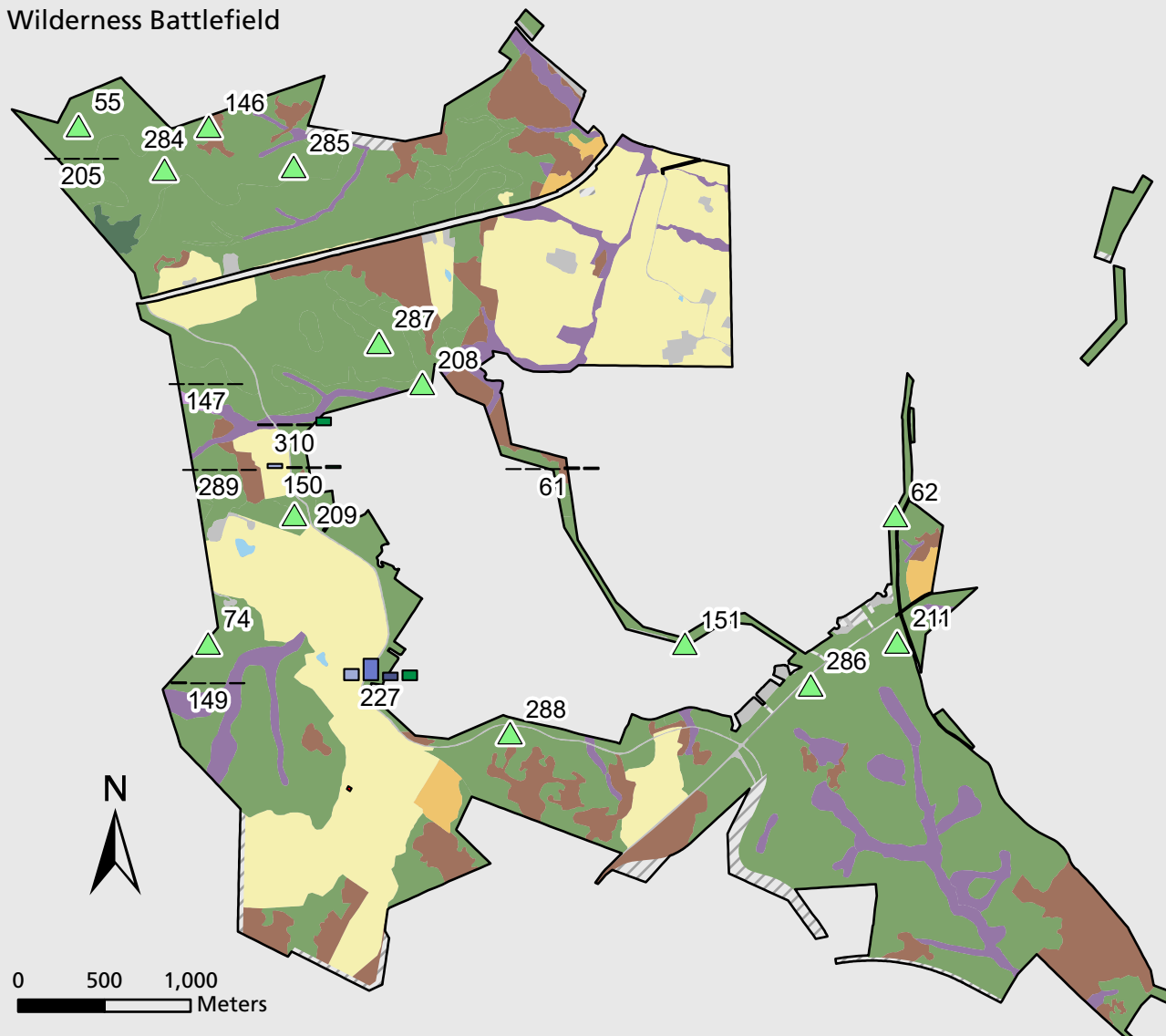
- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023
- No observed invasive cover



Map 7d. Invasive % Cover by Cycle

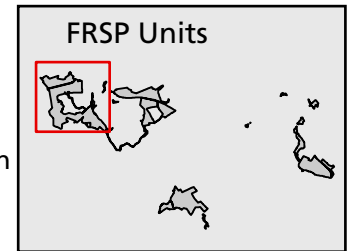
Trends in percent cover of invasive species observed in quadrats in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Average invasive cover per plot ranges from 0 to 27.7% across all park units. See Table 2 for % cover values. Average cover may be increasing over time in part due to protocol change. See the Table 2 caption and the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>) for details. Reporting Date: 01/11/20234

Wilderness Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

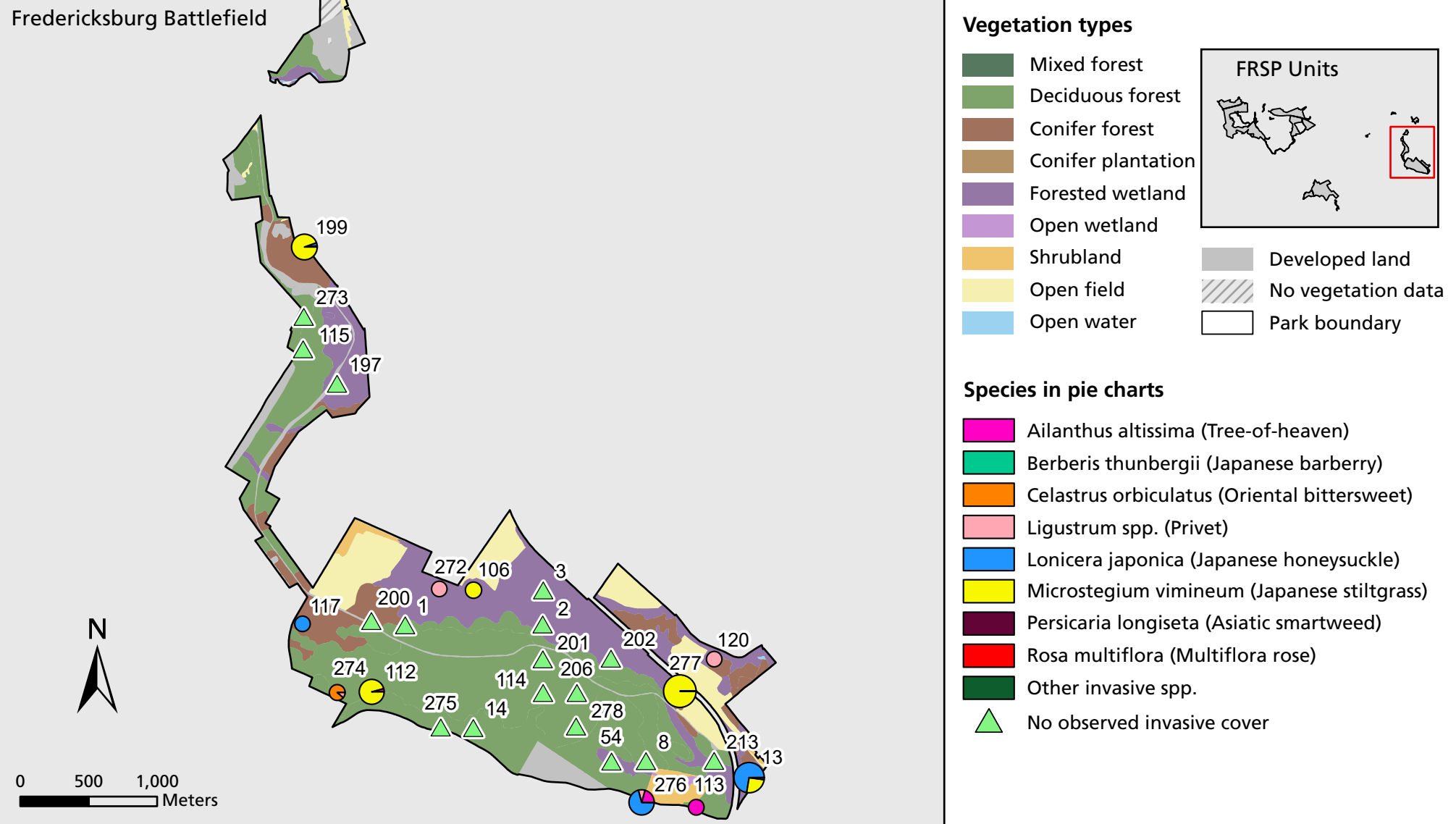
Invasive % cover

- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023
- No observed invasive cover



Map 8a. Invasive % Cover by Species

Percent invasive cover by species observed in quadrats in forest plots sampled in the most recent survey cycle (2021-2023). The top 10 species or genera are displayed individually; less common species are grouped as 'Other invasive spp.'. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to total invasive cover (range: 0 to 27.7% across all park units), and location may be shifted to prevent overlap. See Table 3 for more information. Reporting Date: 01/11/2024.

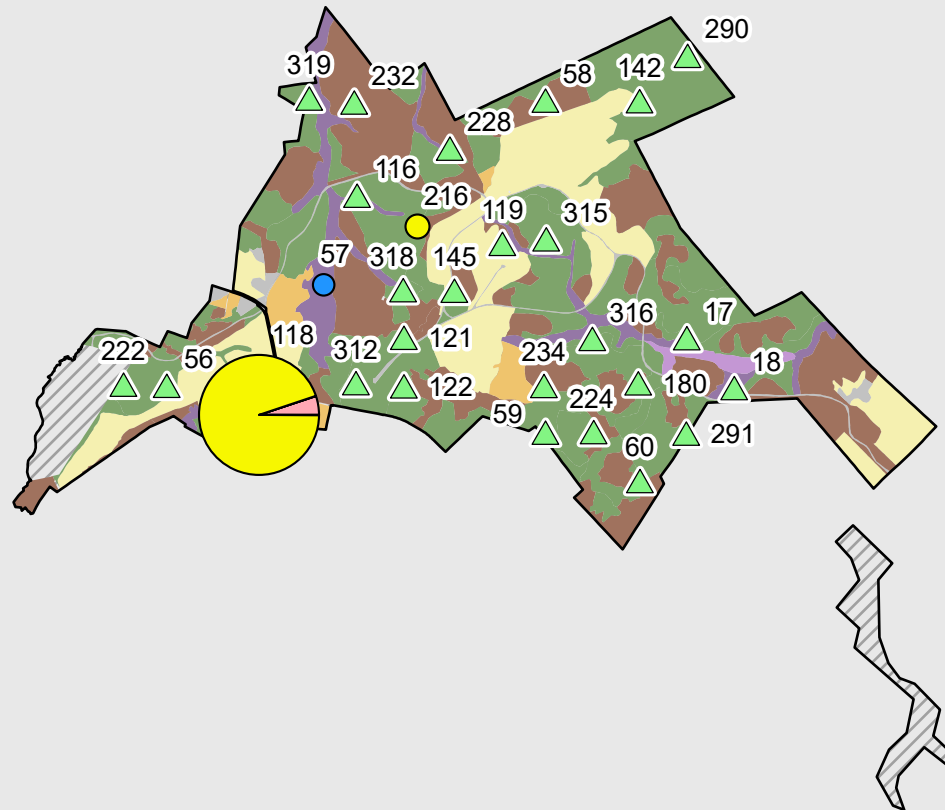




Map 8b. Invasive % Cover by Species

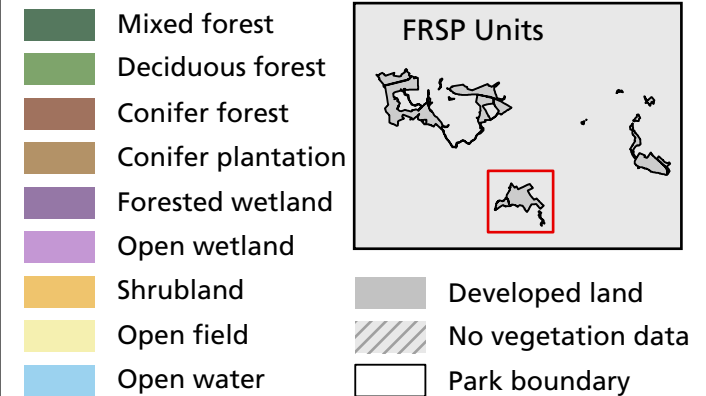
Percent invasive cover by species observed in quadrats in forest plots sampled in the most recent survey cycle (2021-2023). The top 10 species or genera are displayed individually; less common species are grouped as 'Other invasive spp.'. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to total invasive cover (range: 0 to 27.7% across all park units), and location may be shifted to prevent overlap. See Table 3 for more information. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield

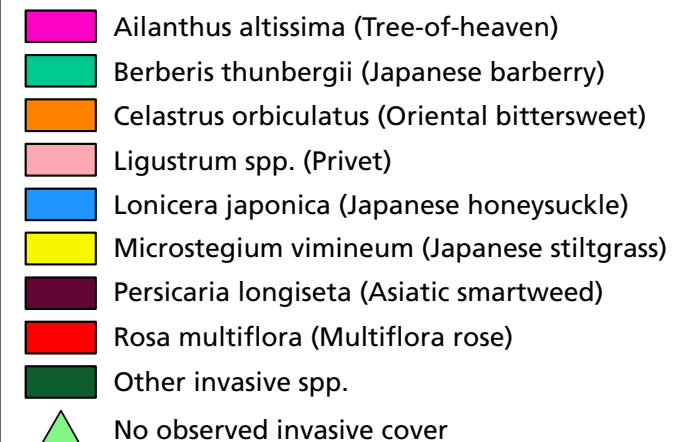


0 500 1,000
Meters

Vegetation types



Species in pie charts

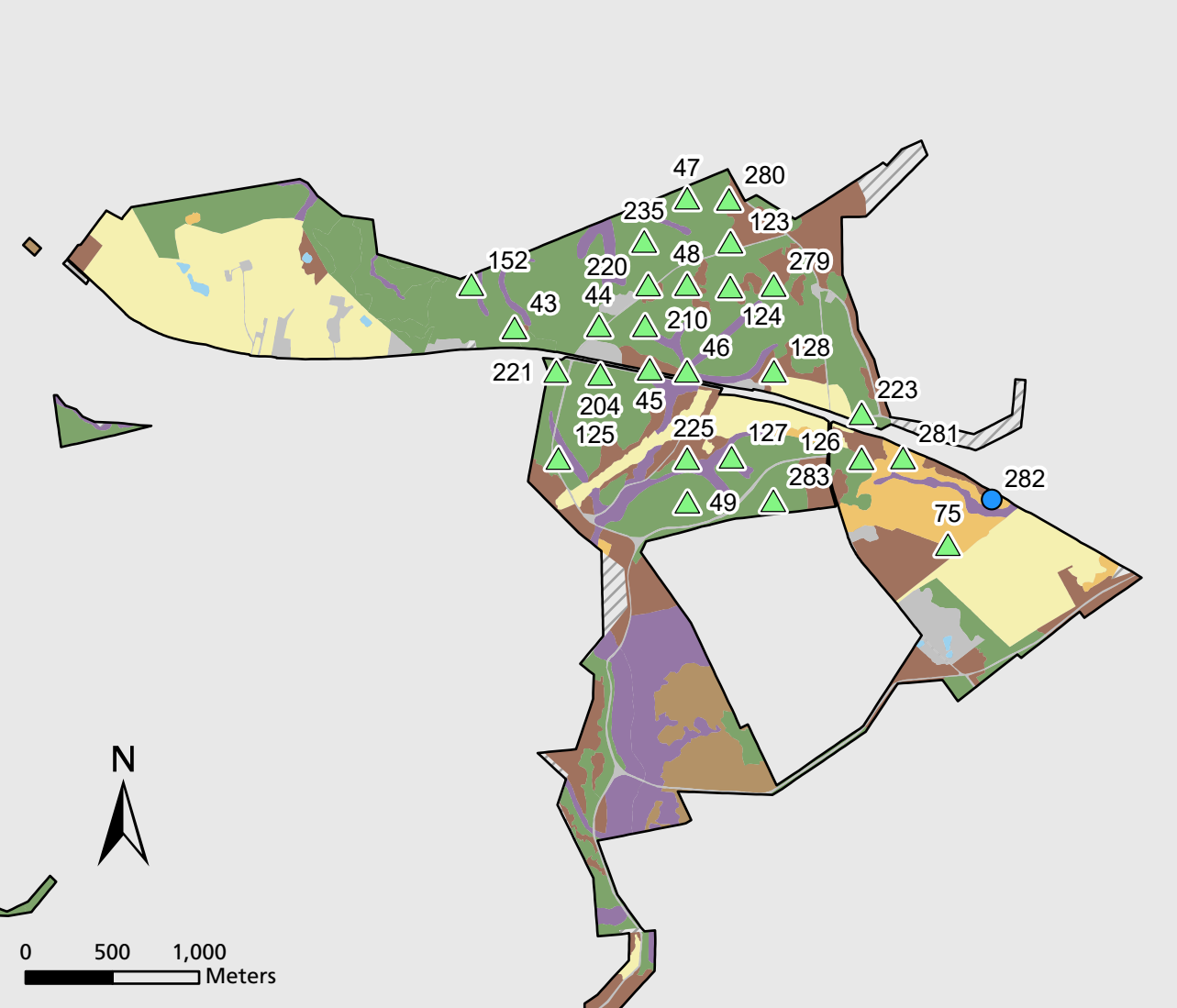




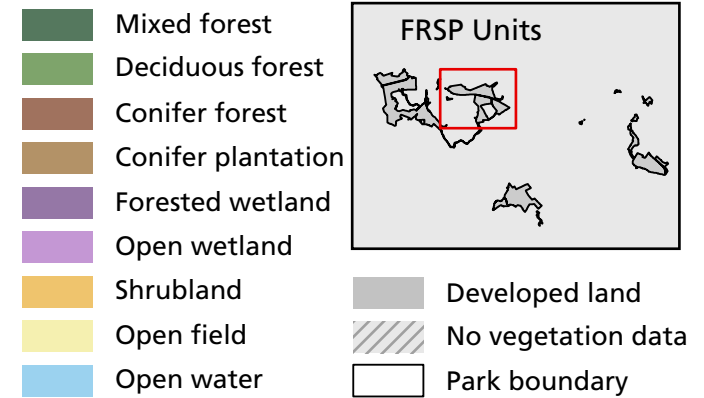
Map 8c. Invasive % Cover by Species

Percent invasive cover by species observed in quadrats in forest plots sampled in the most recent survey cycle (2021-2023). The top 10 species or genera are displayed individually; less common species are grouped as 'Other invasive spp.'. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to total invasive cover (range: 0 to 27.7% across all park units), and location may be shifted to prevent overlap. See Table 3 for more information. Reporting Date: 01/11/2024.

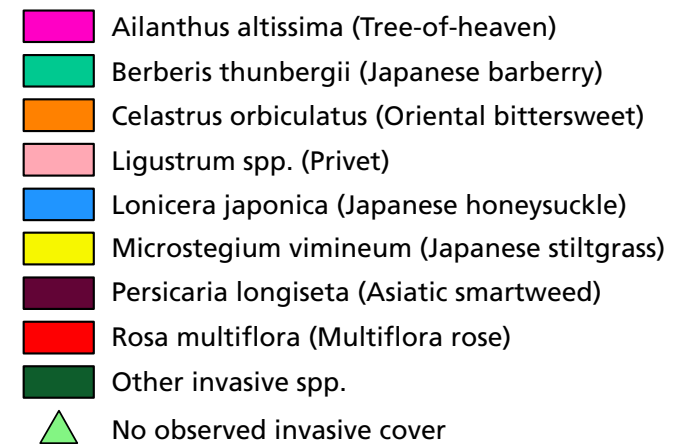
Chancellorsville Battlefield



Vegetation types



Species in pie charts

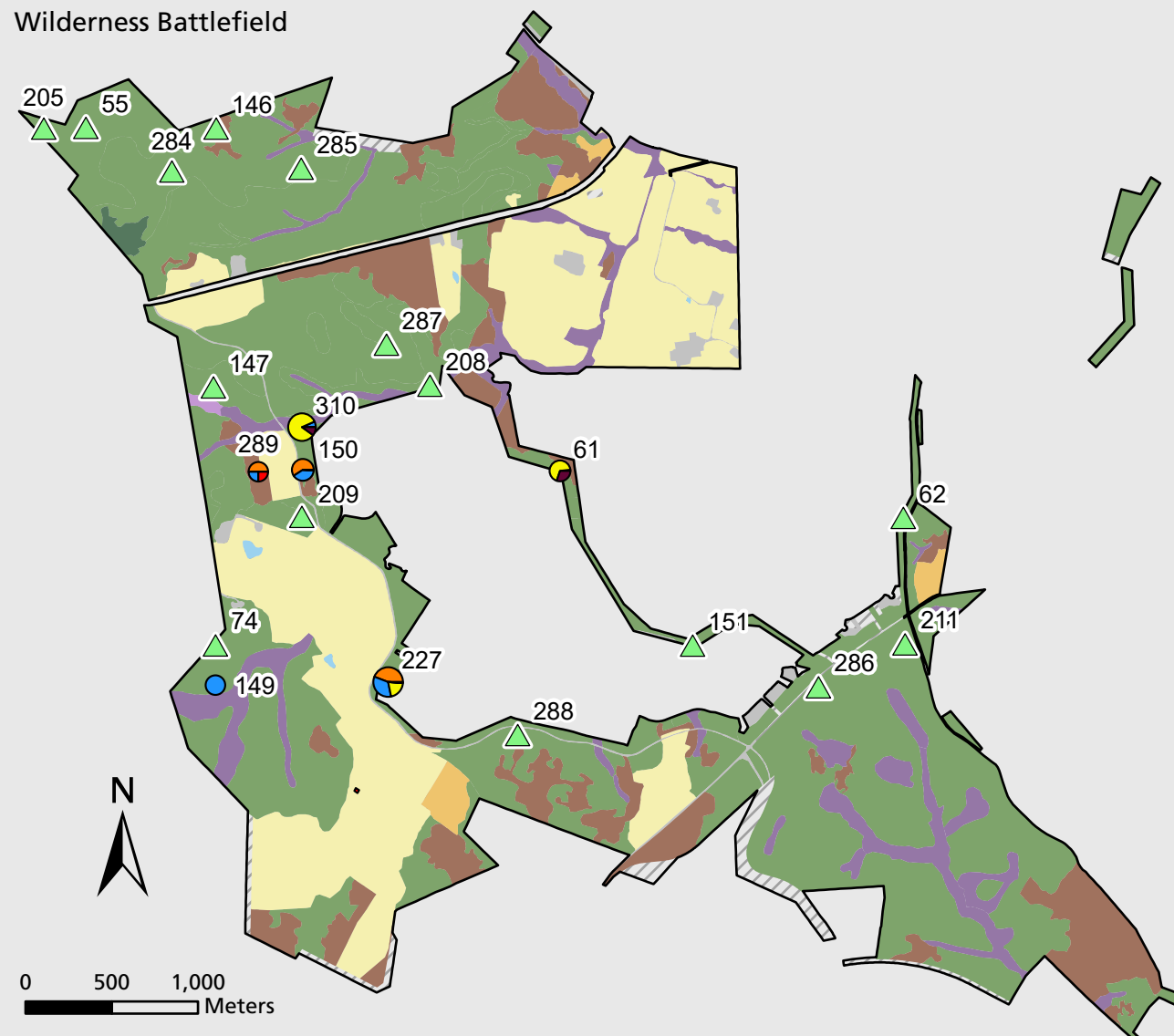




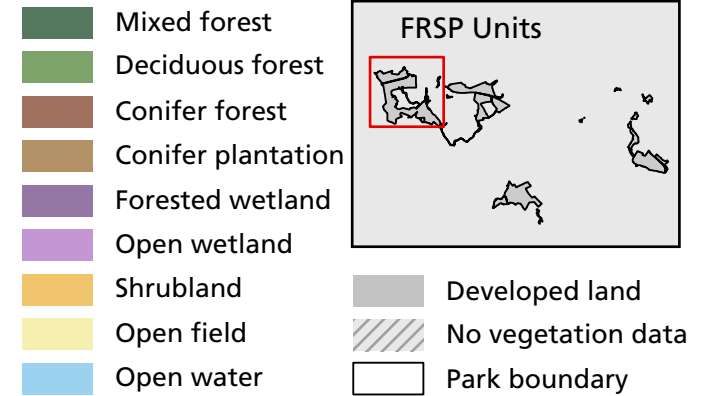
Map 8d. Invasive % Cover by Species

Percent invasive cover by species observed in quadrats in forest plots sampled in the most recent survey cycle (2021-2023). The top 10 species or genera are displayed individually; less common species are grouped as 'Other invasive spp.'. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Pie size is proportional to total invasive cover (range: 0 to 27.7% across all park units), and location may be shifted to prevent overlap. See Table 3 for more information. Reporting Date: 01/11/2024.

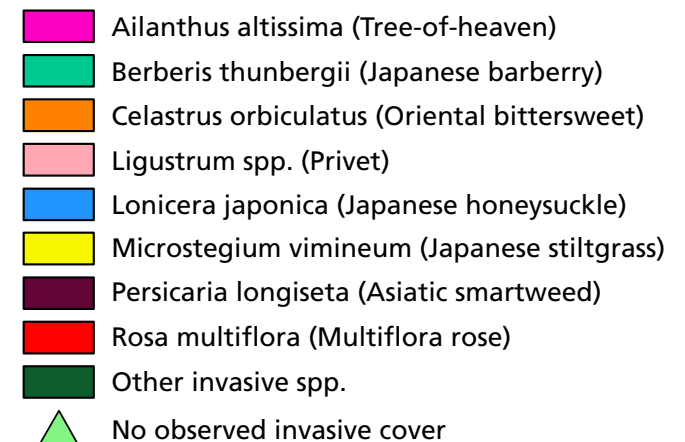
Wilderness Battlefield



Vegetation types



Species in pie charts

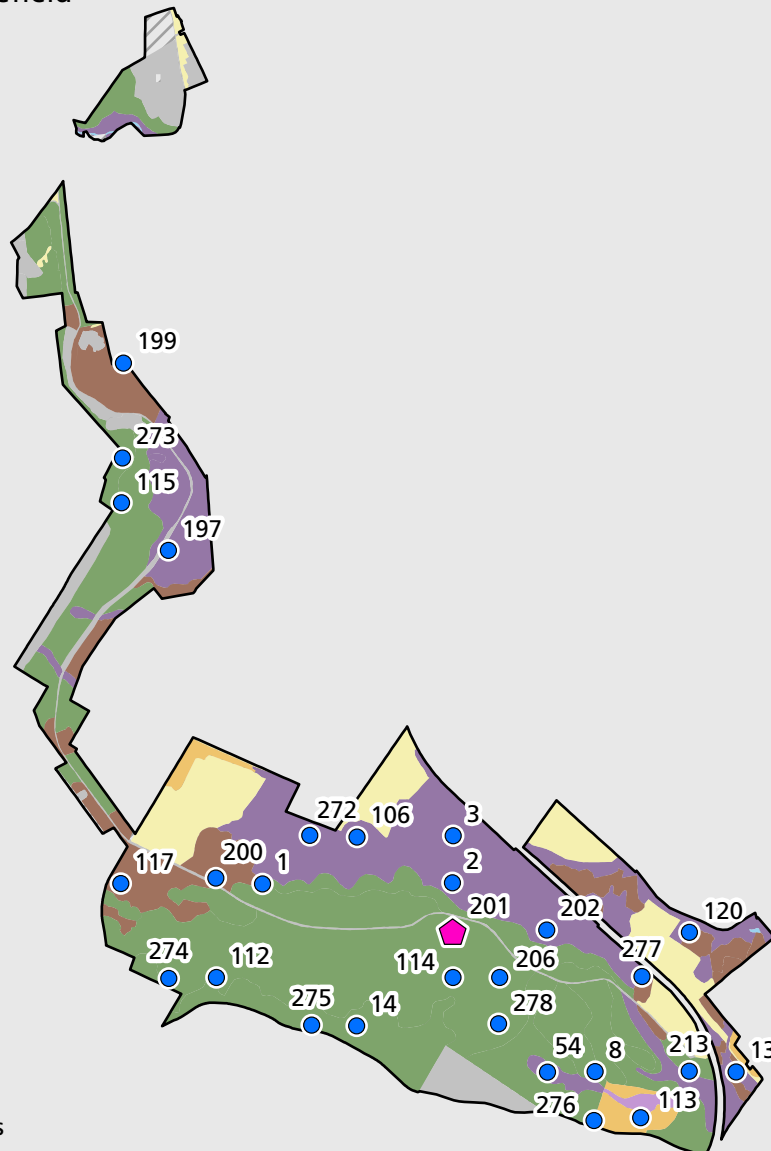




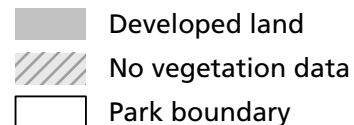
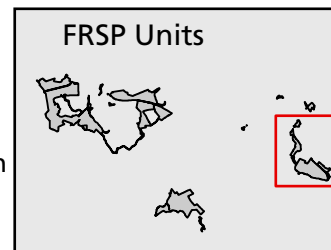
Map 9a. Forest Pest/Pathogen Detections

Detection of priority forest pests in forest plots sampled during the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Reporting Date: 01/11/2024.

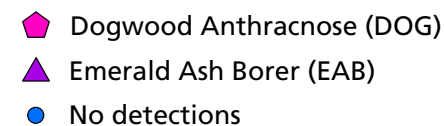
Fredericksburg Battlefield



Vegetation types



Pests/Pathogens

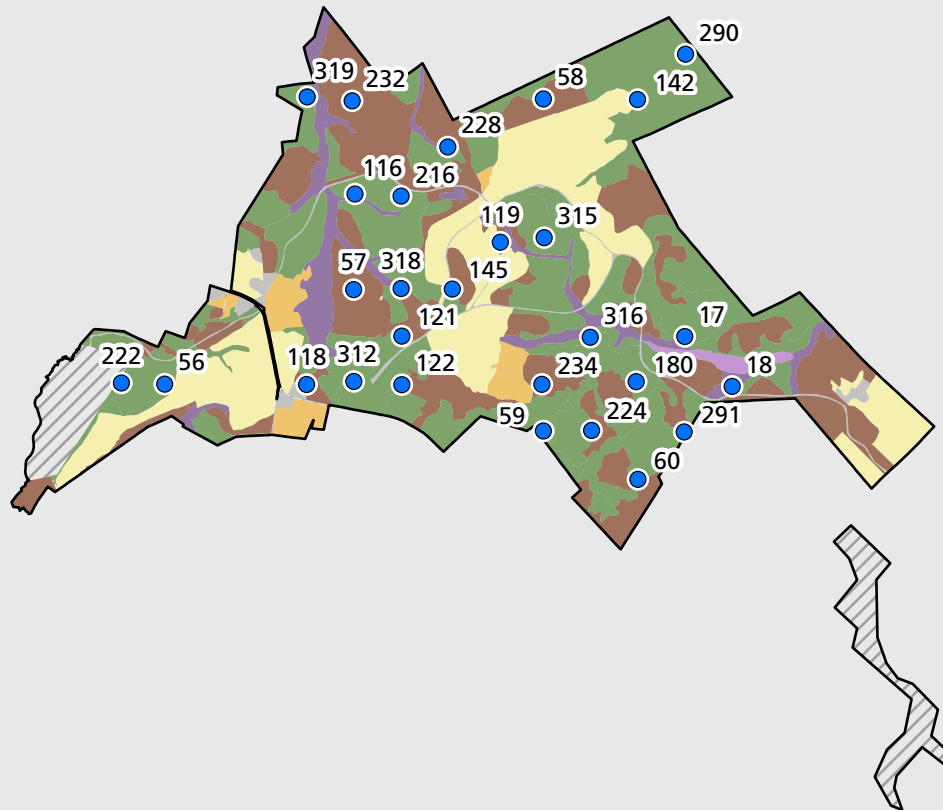




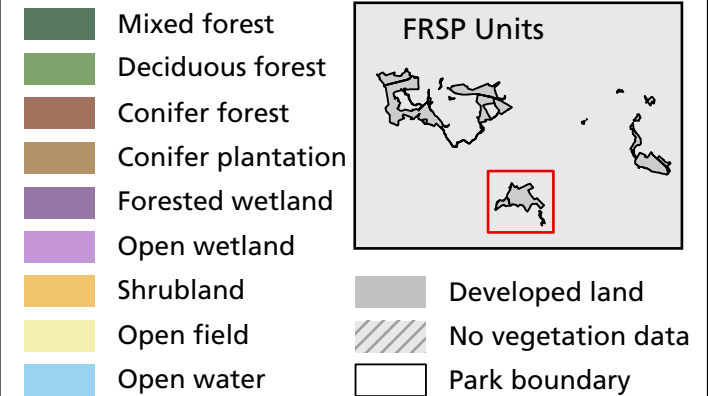
Map 9b. Forest Pest/Pathogen Detections

Detection of priority forest pests in forest plots sampled during the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Reporting Date: 01/11/2024.

Spotsylvania Courthouse Battlefield



Vegetation types



Pests/Pathogens

- ◆ Dogwood Anthracnose (DOG)
- ▲ Emerald Ash Borer (EAB)
- No detections



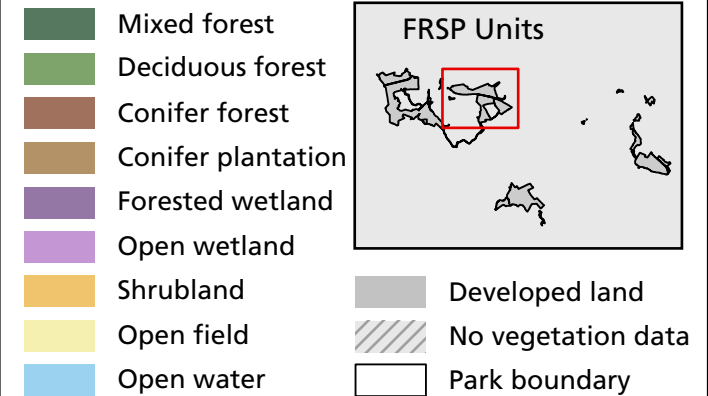
Map 9c. Forest Pest/Pathogen Detections

Detection of priority forest pests in forest plots sampled during the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types



Pests/Pathogens

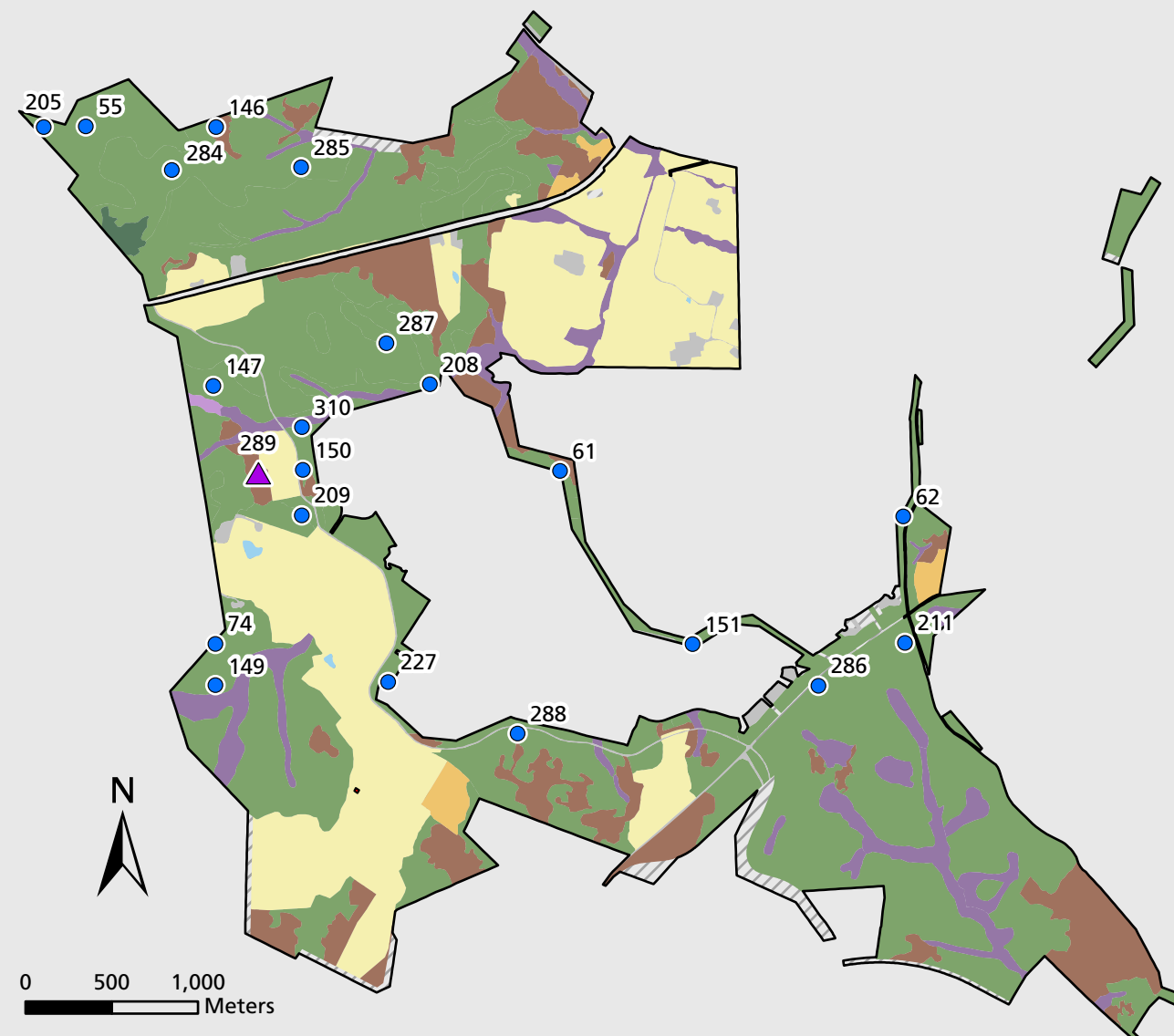
- Dogwood Anthracnose (DOG)
- Emerald Ash Borer (EAB)
- No detections



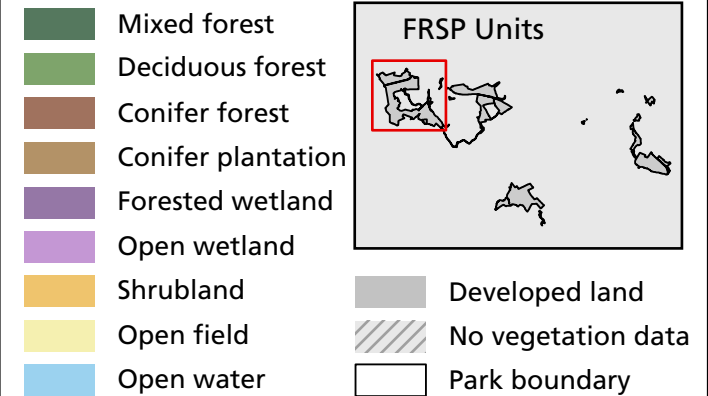
Map 9d. Forest Pest/Pathogen Detections

Detection of priority forest pests in forest plots sampled during the most recent census (2021-2023). Each plot is sampled on a 4-year cycle, with one quarter of the plots sampled every year. Reporting Date: 01/11/2024.

Wilderness Battlefield



Vegetation types



Pests/Pathogens

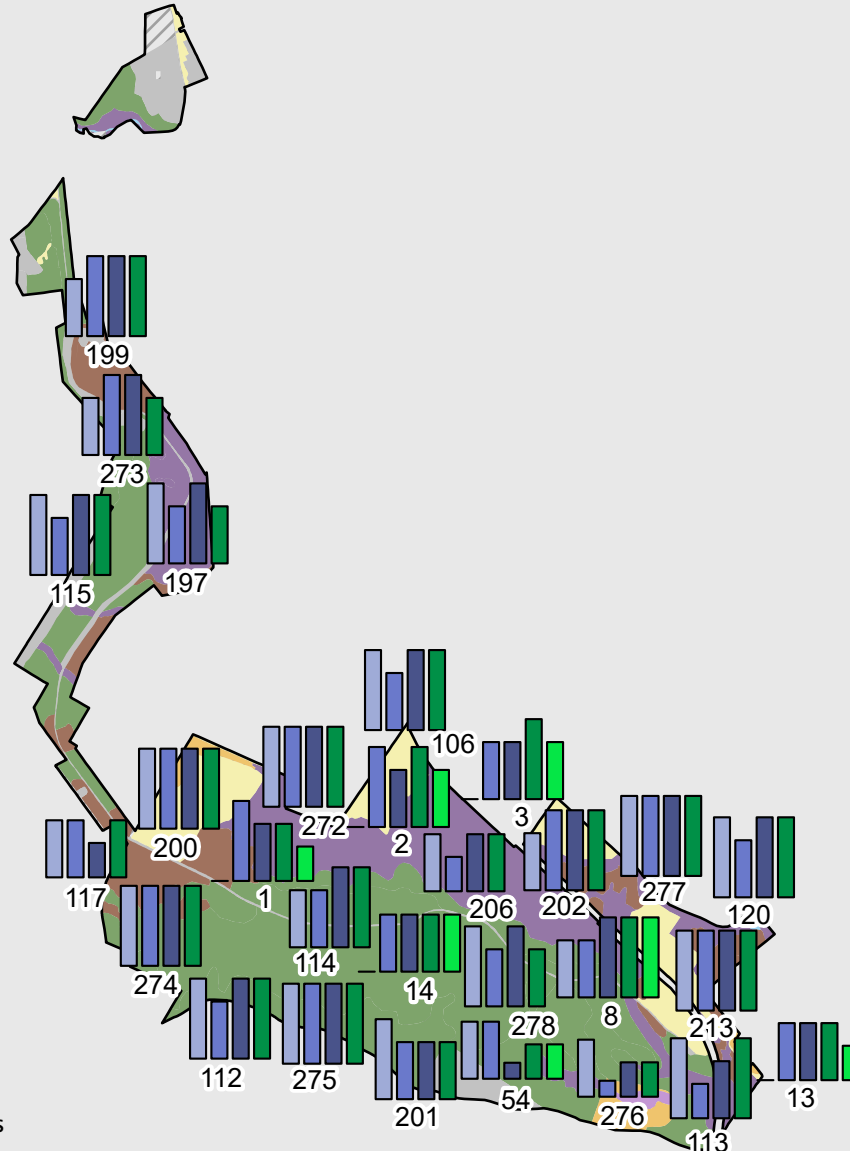
- Dogwood Anthracnose (DOG)
- Emerald Ash Borer (EAB)
- No detections



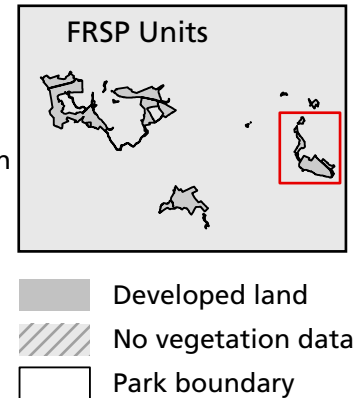
Map 10a. Canopy Cover by Cycle

Trends in tree canopy in forest plots from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Canopy cover ranges from 10 - 25% to >75% across all park units. Canopy cover was not measured in 2007. Reporting Date: 01/11/2024.

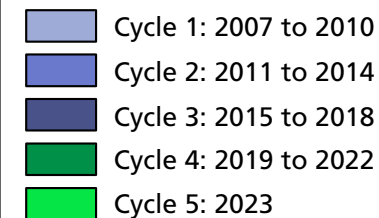
Fredericksburg Battlefield



Vegetation types



Canopy cover

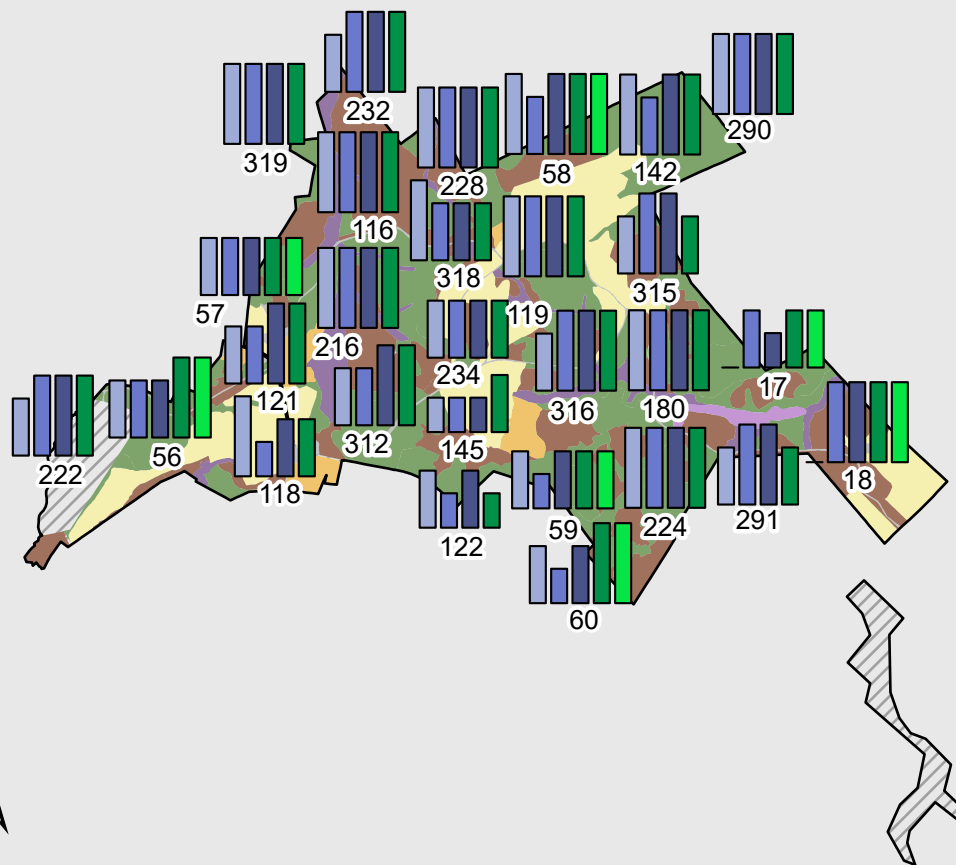




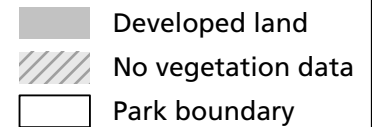
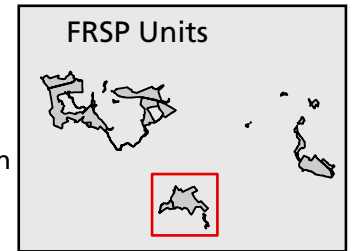
Map 10b. Canopy Cover by Cycle

Trends in tree canopy in forest plots from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Canopy cover ranges from 10 - 25% to >75% across all park units. Canopy cover was not measured in 2007. Reporting Date: 01/11/2024.

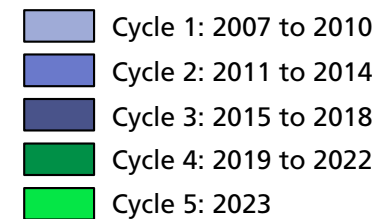
Spotsylvania Courthouse Battlefield



Vegetation types



Canopy cover



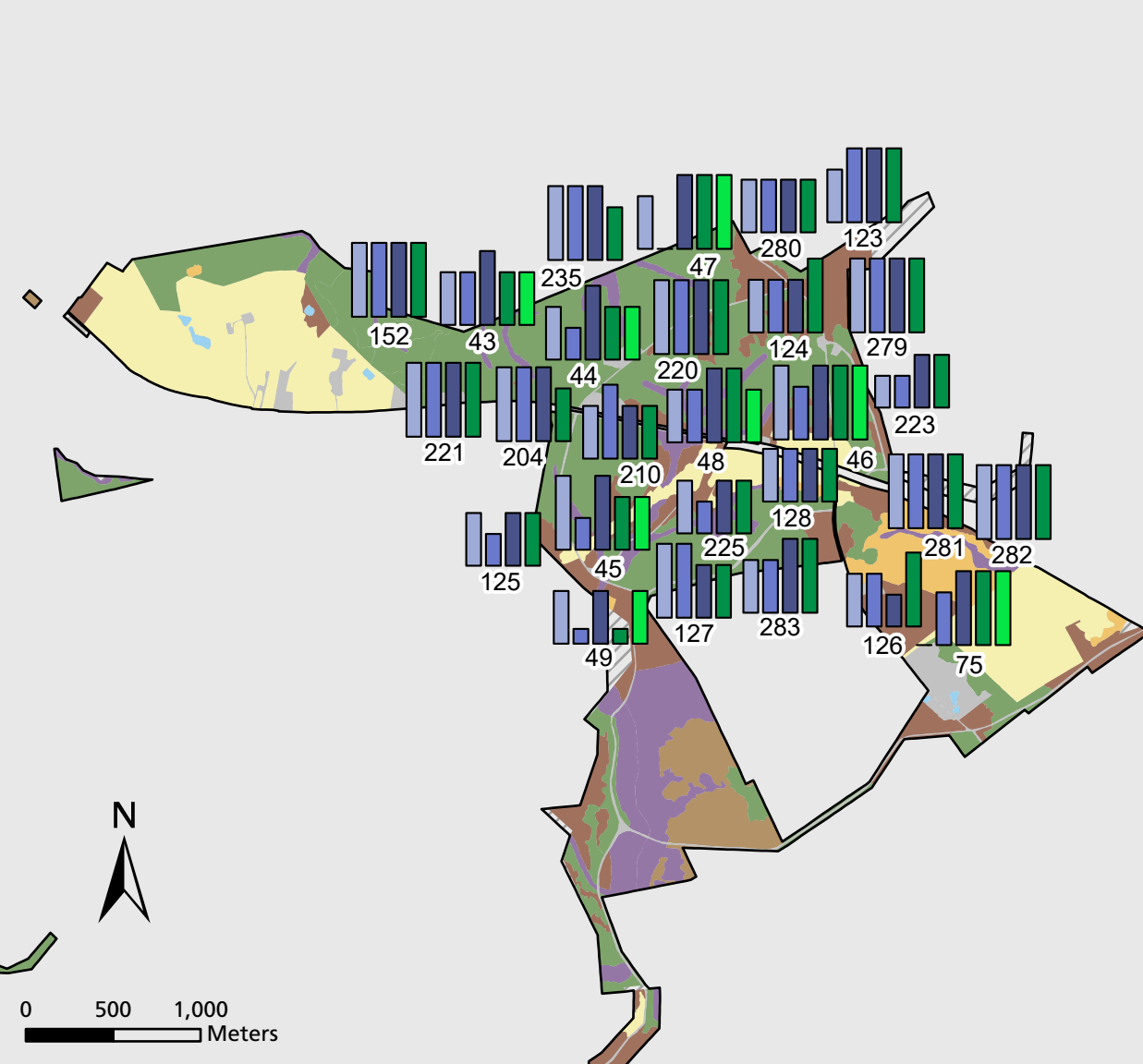
0 500 1,000
Meters



Map 10c. Canopy Cover by Cycle

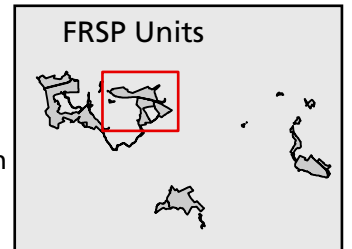
Trends in tree canopy in forest plots from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Canopy cover ranges from 10 - 25% to >75% across all park units. Canopy cover was not measured in 2007. Reporting Date: 01/11/2024.

Chancellorsville Battlefield



Vegetation types

- Mixed forest
- Deciduous forest
- Conifer forest
- Conifer plantation
- Forested wetland
- Open wetland
- Shrubland
- Open field
- Open water



- Developed land
- No vegetation data
- Park boundary

Canopy cover

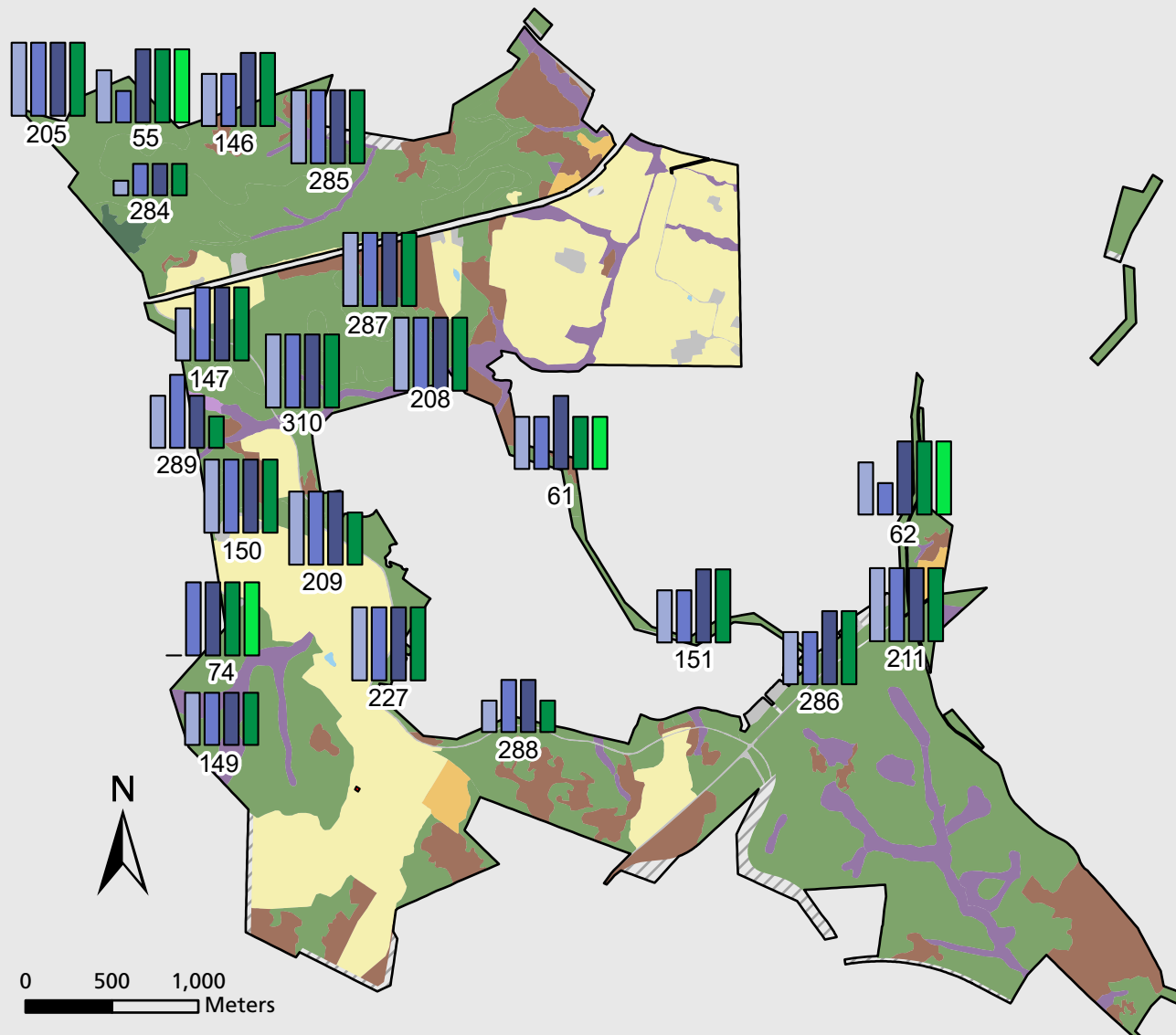
- Cycle 1: 2007 to 2010
- Cycle 2: 2011 to 2014
- Cycle 3: 2015 to 2018
- Cycle 4: 2019 to 2022
- Cycle 5: 2023



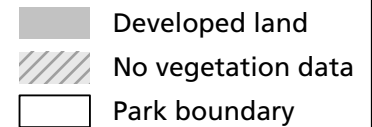
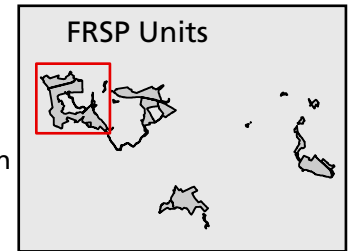
Map 10d. Canopy Cover by Cycle

Trends in tree canopy in forest plots from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Canopy cover ranges from 10 - 25% to >75% across all park units. Canopy cover was not measured in 2007. Reporting Date: 01/11/2024.

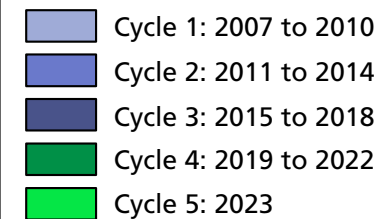
Wilderness Battlefield



Vegetation types



Canopy cover

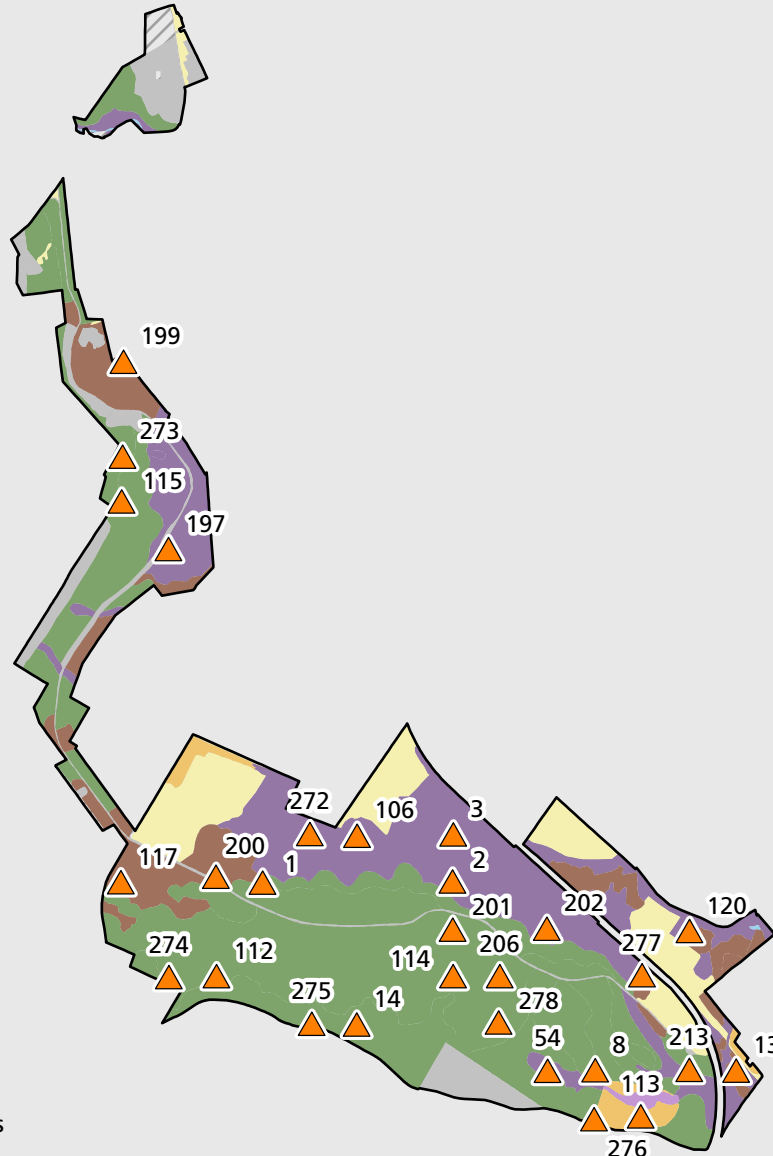




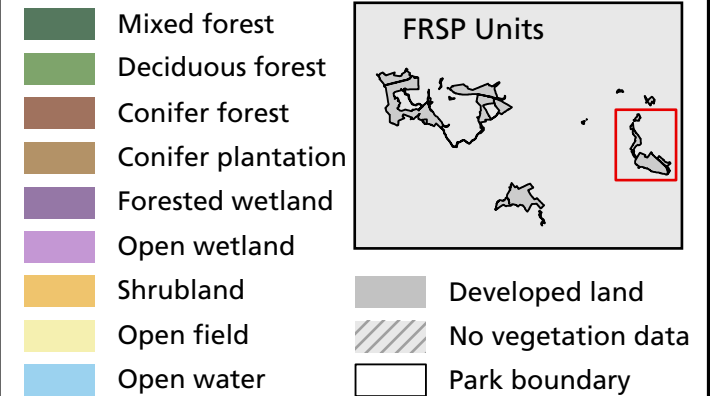
Map 11a. Ash Tree Density by Cycle

Trends in live ash tree density in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 2 stems/400m² and only include individuals >10 cm DBH. Reporting Date: 01/11/2024.

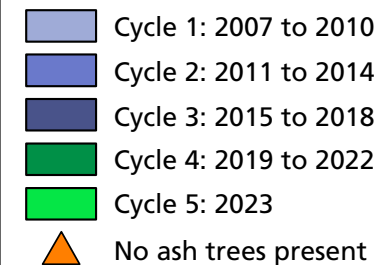
Fredericksburg Battlefield



Vegetation types



Ash tree densities

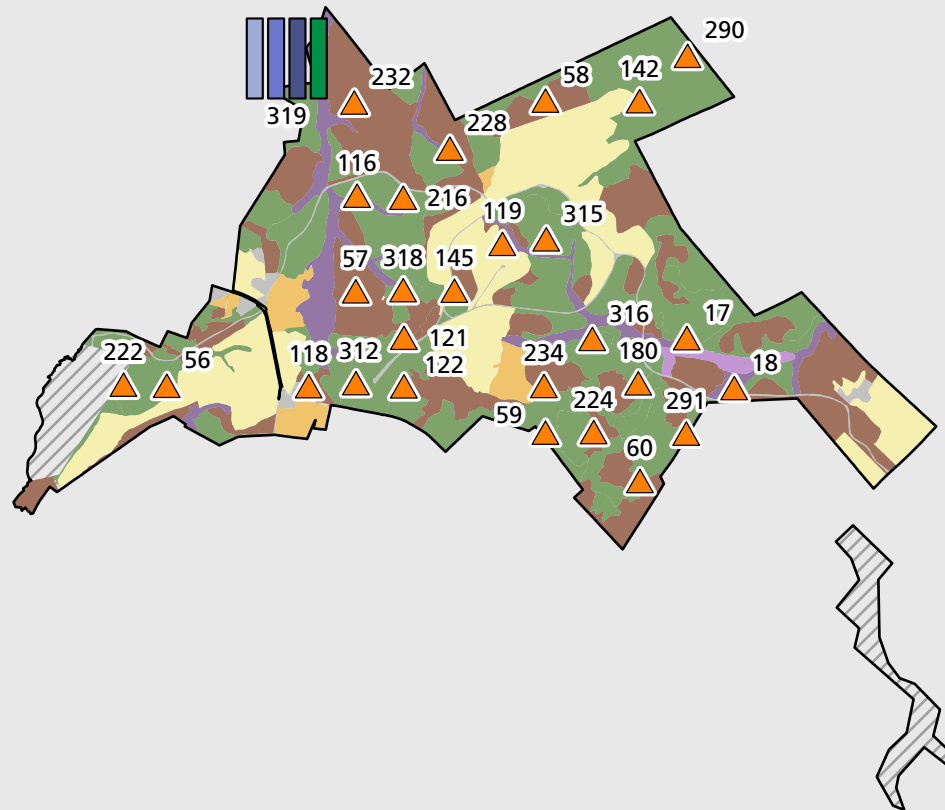




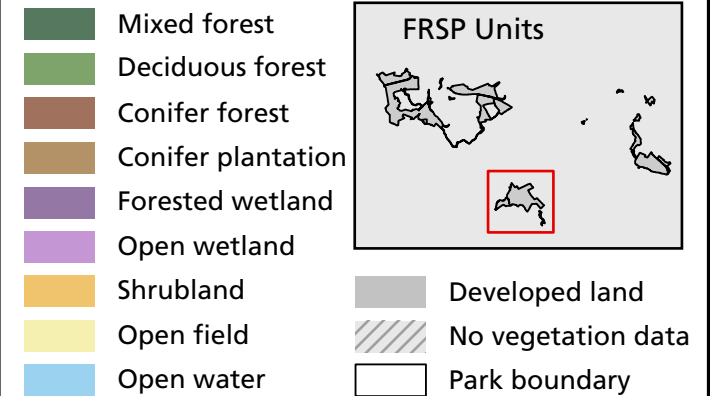
Map 11b. Ash Tree Density by Cycle

Trends in live ash tree density in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 2 stems/400m² and only include individuals >10 cm DBH. Reporting Date: 01/11/2024.

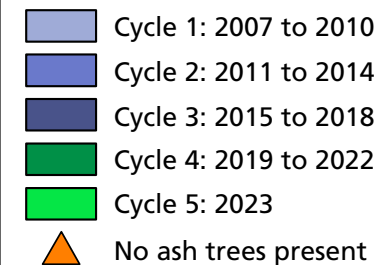
Spotsylvania Courthouse Battlefield



Vegetation types



Ash tree densities





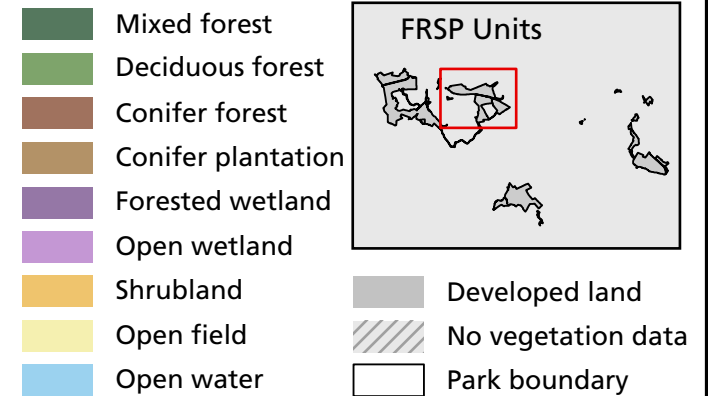
Map 11c. Ash Tree Density by Cycle

Trends in live ash tree density in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 2 stems/400m² and only include individuals >10 cm DBH. Reporting Date: 01/11/2024.

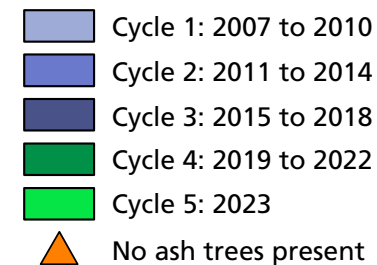
Chancellorsville Battlefield



Vegetation types



Ash tree densities

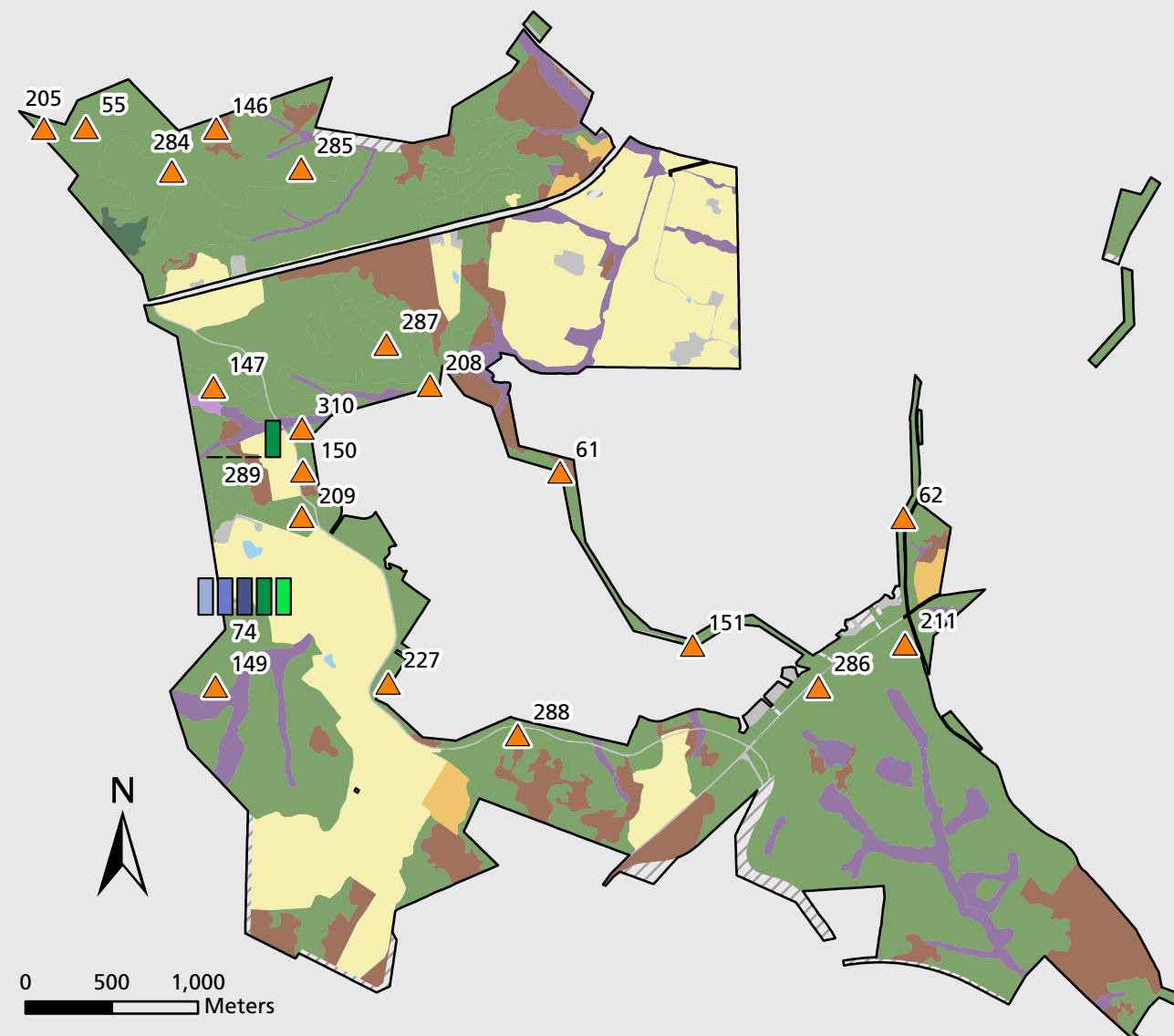




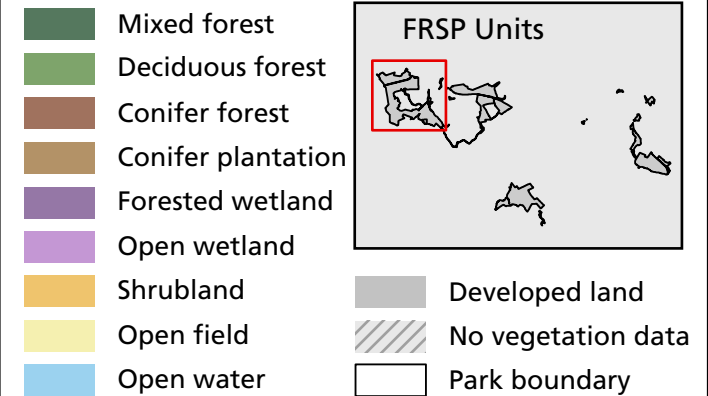
Map 11d. Ash Tree Density by Cycle

Trends in live ash tree density in forest plots sampled from 2007-2023. Each plot is sampled on a 4-year cycle in a rotating panel, with one quarter of the plots sampled every year. Densities range from 0 to 2 stems/400m² and only include individuals >10 cm DBH. Reporting Date: 01/11/2024.

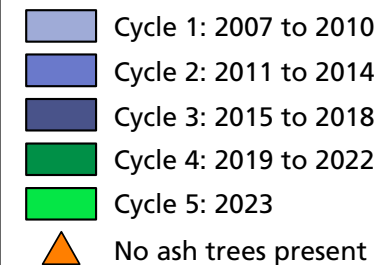
Wilderness Battlefield



Vegetation types



Ash tree densities



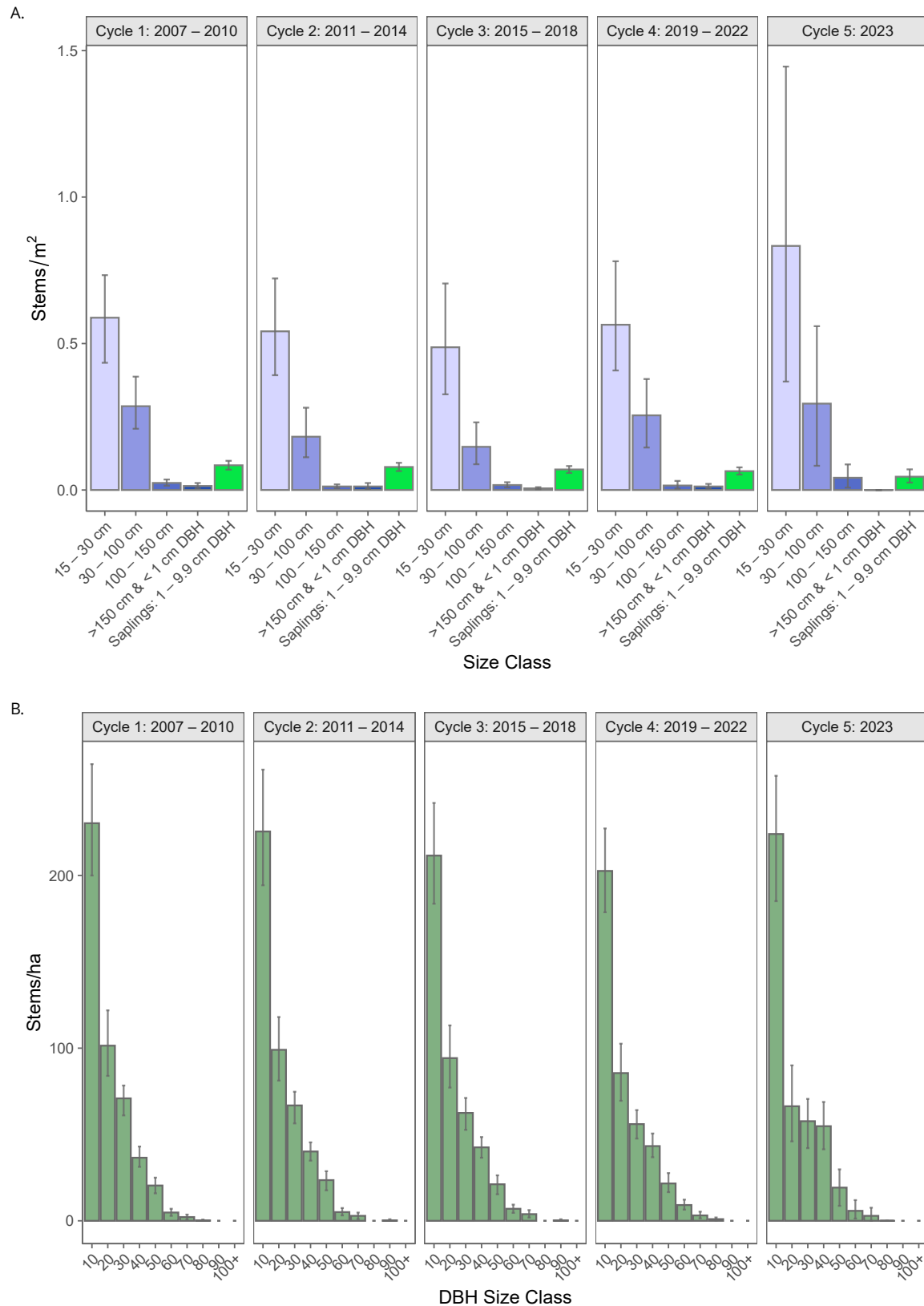


Figure 1. Stem density distributions by cycle in Fredericksburg & Spotsylvania National Military Park (FRSP). Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Note that cycle 5 is only partially complete. Figure A shows regeneration densities by size class. Figure B shows tree density by diameter at breast height (DBH) increments. Error bars are 95% bootstrapped confidence intervals to account for non-normal error. An asterisk denotes a linear DBH distribution that is indicative of long-term recruitment failure.

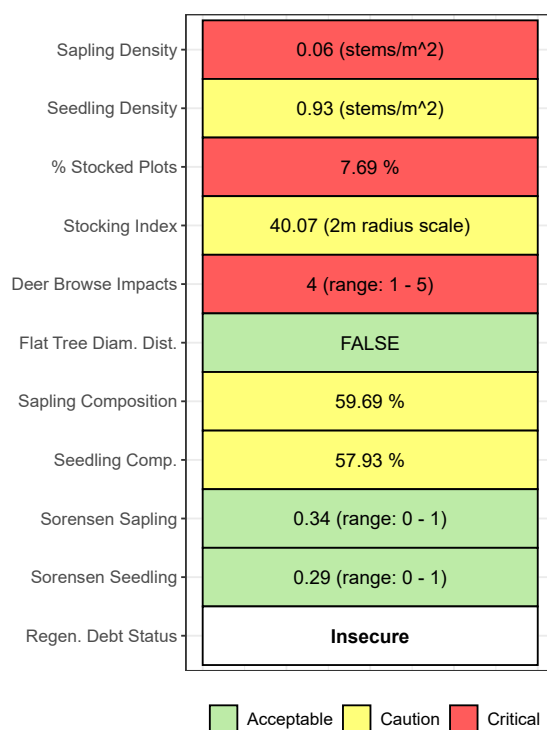


Figure 2. Regeneration Debt status for the most recent 4-year census (2021 – 2023) in Fredericksburg & Spotsylvania National Military Park (FRSP). Flat Tree Diam. Dist. stands for Flat Tree Diameter Distribution. If TRUE, the density of small trees is lower than expected due to chronic regeneration failure. Sapling/Seedling Composition is the % of total stems composed of native canopy-forming species. Sorensen is a measure of how closely the regen. layer matches canopy composition. For more details on metric calculations, thresholds and assessment of status, see Miller et al. 2023 (<https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/eap.2837>).

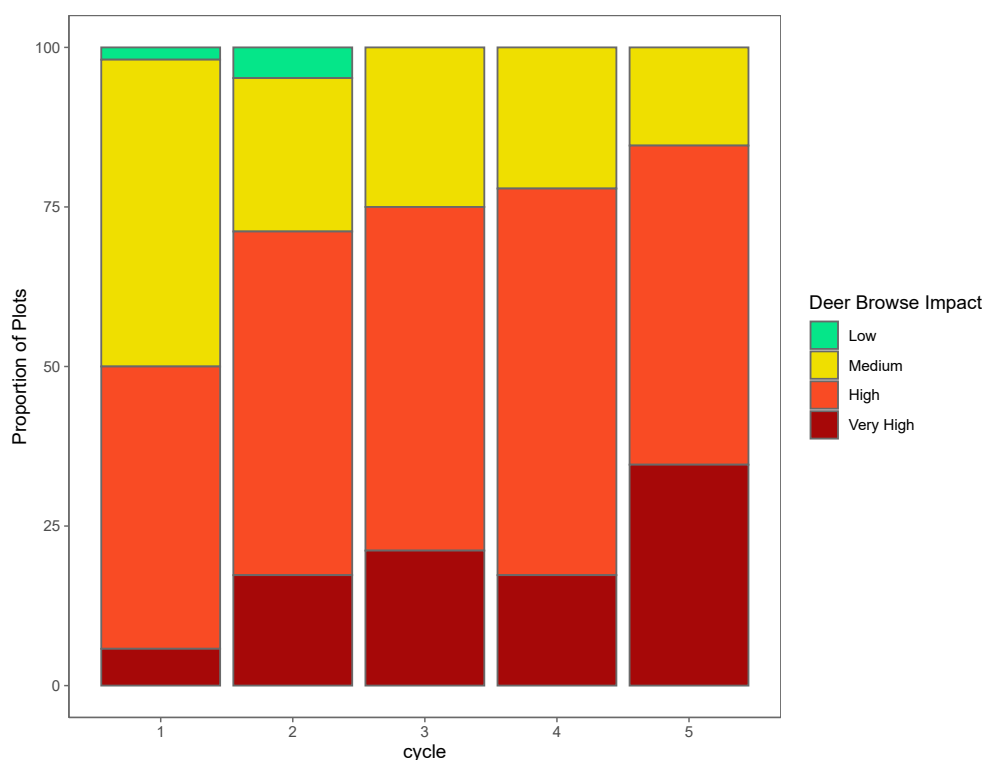


Figure 3. Deer browse impacts by cycle in Fredericksburg & Spotsylvania National Military Park (FRSP). Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Note that cycle 5 is only partially complete.

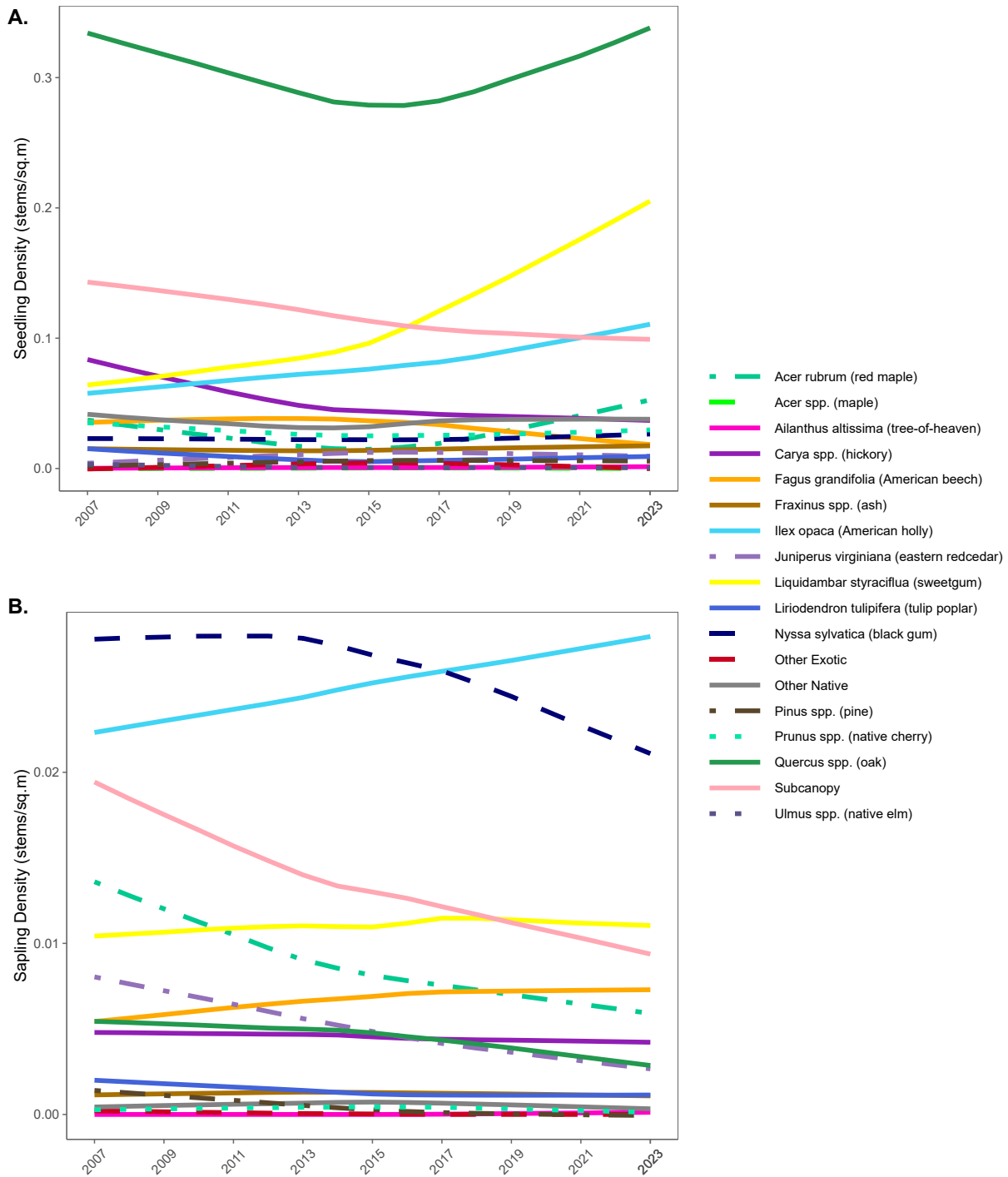


Figure 4. Loess smoothed changes in stem density for seedlings (A) and saplings (B) by species group and sample year in Fredericksburg & Spotsylvania National Military Park. Specified loess span approximated a linear trend between consecutive sample events per panel.

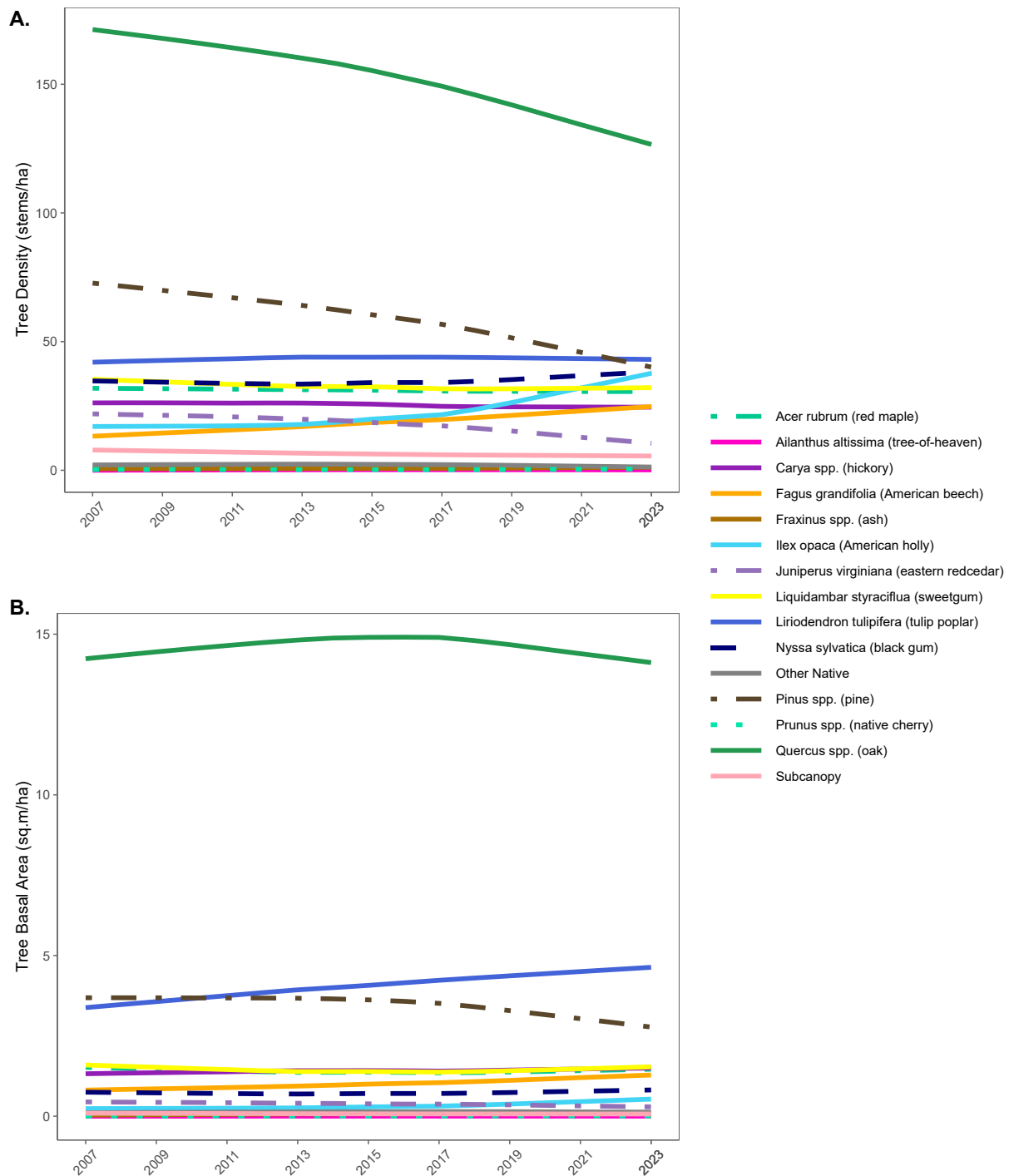


Figure 5. Loess smoothed changes in tree stem density (A) and basal area (B) by species group and sample year in Fredericksburg & Spotsylvania National Military Park. Specified loess span approximated a linear trend between consecutive sample events per panel.

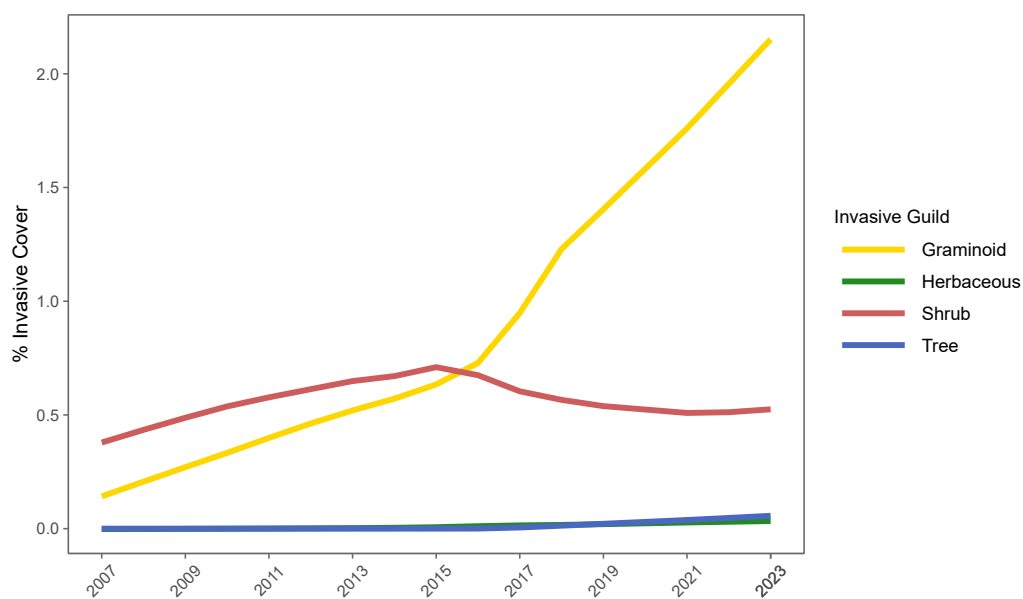


Figure 6. Loess smoothed changes in invasive plant percent cover by guild and sample year in Fredericksburg & Spotsylvania National Military Park. Specified loess span approximated a linear trend between consecutive sample events per panel.



Table 1. Average plot-level seedling and sapling stem densities (stems per m²) and stocking index (at the 2m radius scale) by cycle. Only native, canopy-forming species are included. Note that *Fraxinus* spp. (ash species) are no longer considered canopy-forming species. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. Cells highlighted in green are plots that meet the minimum management target of 0.25 seedlings/m² and 0.14 saplings/m² or have a stocking index >100. These are the same thresholds used in Figure 2 and are described in Miller et al. 2023. Note that cycle 5 is only partially complete.

Plot	Panel	Seedlings per sq.m					Saplings per sq.m					Stocking Index				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
1	1	0.00	0.00	0.17	0.33	0.92	0.05	0.04	0.04	0.02	0.02	7.41	0.00	2.14	6.28	55.54
2	1	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14
3	1	0.17	0.00	0.08	0.42	1.75	0.14	0.11	0.09	0.09	0.06	39.08	29.66	1.01	13.70	23.00
8	1	1.00	0.25	0.42	0.42	2.42	0.05	0.06	0.04	0.04	0.02	54.66	25.38	12.69	12.69	40.97
13	1	0.42	0.58	1.17	4.67	5.58	0.21	0.20	0.19	0.18	0.22	60.19	51.77	54.79	115.61	290.79
14	1	2.58	1.58	1.83	2.33	2.83	0.06	0.05	0.06	0.05	0.05	86.08	34.68	35.69	43.98	69.12
17	1	1.67	0.25	0.17	0.17	0.08	0.06	0.04	0.00	0.00	0.00	89.22	10.56	2.14	2.14	1.01
18	1	0.25	0.17	0.33	0.08	0.25	0.00	0.00	0.00	0.00	0.00	4.15	3.14	4.15	2.14	5.28
43	1	0.58	0.75	0.25	0.33	0.42	0.14	0.12	0.12	0.11	0.11	31.67	26.39	26.39	12.69	13.70
44	1	3.58	2.17	0.83	1.50	0.50	0.12	0.08	0.08	0.04	0.04	200.56	55.79	36.95	31.54	23.25
45	1	1.75	0.33	0.17	0.17	0.17	0.02	0.01	0.01	0.02	0.01	45.11	5.28	2.14	10.56	3.14
46	1	0.50	0.00	0.17	0.08	0.08	0.07	0.05	0.05	0.04	0.01	74.52	22.24	24.38	15.83	1.01
47	1	4.17	2.58	0.58	0.75	0.42	0.11	0.11	0.07	0.07	0.06	69.24	34.56	7.29	17.84	13.70
48	1	0.67	0.08	0.33	0.17	0.17	0.13	0.09	0.09	0.09	0.11	45.24	8.42	25.13	21.99	10.56
49	1	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.04	0.04	0.04	22.24	22.24	14.83	14.83	7.41
54	1	0.08	0.00	0.00	2.00	3.00	0.01	0.01	0.01	0.00	0.00	1.01	0.00	0.00	33.55	115.23
55	1	2.75	1.67	0.17	0.08	0.00	0.05	0.04	0.02	0.02	0.02	38.70	23.00	2.14	1.01	0.00
56	1	3.08	2.67	7.33	6.75	9.00	0.04	0.04	0.04	0.02	0.02	50.27	39.84	125.66	122.52	152.93
57	1	0.17	0.08	0.58	0.33	0.83	0.07	0.07	0.08	0.08	0.07	9.55	16.96	23.25	12.69	18.98
58	1	1.17	0.42	0.08	0.00	0.00	0.11	0.14	0.20	0.19	0.19	165.88	119.00	98.39	74.02	59.31
59	1	1.50	0.08	0.08	0.33	0.58	0.00	0.00	0.00	0.00	0.00	72.26	1.01	1.01	4.15	7.29
60	1	0.08	0.08	0.00	0.08	0.08	0.02	0.01	0.01	0.01	0.01	1.01	1.01	0.00	1.01	1.01
61	1	0.92	0.33	0.17	0.33	0.83	0.01	0.01	0.00	0.00	0.00	20.99	12.69	2.14	4.15	10.43
62	1	0.25	0.42	0.17	0.08	0.08	0.06	0.06	0.07	0.06	0.07	11.56	33.55	24.38	24.38	8.42
74	1	0.42	0.25	0.33	0.17	0.25	0.06	0.05	0.04	0.02	0.02	12.69	10.56	4.15	2.14	3.14
75	1	0.00	0.00	0.00	0.00	0.00	0.15	0.11	0.07	0.05	0.02	22.24	7.41	7.41	7.41	0.00
106	2	0.00	0.00	0.25	3.58	-	0.04	0.04	0.04	0.04	-	7.41	7.41	10.56	54.54	-
112	2	0.08	0.08	1.17	2.42	-	0.01	0.01	0.01	0.01	-	2.14	1.01	14.70	34.56	-
113	2	0.33	0.17	0.17	0.00	-	0.41	0.27	0.14	0.09	-	36.95	26.39	18.98	0.00	-
114	2	0.25	0.25	0.17	0.42	-	0.02	0.02	0.04	0.02	-	12.69	10.56	17.97	13.70	-



Table 1 (cont.). Average plot-level seedling and sapling stem densities (stems per m²) and stocking index (at the 2m radius scale) by cycle. Only native, canopy-forming species are included. Note that *Fraxinus* spp. (ash species) are no longer considered canopy-forming species. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. Cells highlighted in green are plots that meet the minimum management target of 0.25 seedlings/m² and 0.14 saplings/m² or have a stocking index >100. These are the same thresholds used in Figure 2 and are described in Miller et al. 2023. Note that cycle 5 is only partially complete.

Plot	Panel	Seedlings per sq.m					Saplings per sq.m					Stocking Index				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
115	2	1.08	0.92	0.67	0.58	-	0.17	0.19	0.19	0.14	-	47.38	49.64	48.51	16.84	-
116	2	5.33	5.83	7.50	6.25	-	0.01	0.01	0.00	0.00	-	80.68	89.10	96.38	88.97	-
117	2	1.75	0.25	0.17	0.08	-	0.24	0.20	0.14	0.08	-	72.76	42.22	25.38	15.83	-
118	2	0.67	1.67	4.33	7.83	-	0.02	0.04	0.04	0.14	-	13.57	65.09	155.07	592.38	-
119	2	0.25	0.17	0.25	0.42	-	0.15	0.11	0.06	0.06	-	89.22	10.56	30.41	66.10	-
120	2	0.00	0.08	0.00	0.67	-	0.09	0.07	0.02	0.00	-	22.24	16.96	0.00	8.42	-
121	2	2.33	2.92	1.50	1.58	-	0.09	0.09	0.09	0.08	-	52.65	53.53	33.68	27.27	-
122	2	0.25	0.83	1.50	1.42	-	0.04	0.01	0.01	0.01	-	10.56	12.57	20.99	21.99	-
123	2	0.17	0.25	0.00	0.08	-	0.02	0.05	0.04	0.04	-	3.14	10.56	7.41	8.42	-
124	2	0.33	0.08	0.00	0.08	-	0.07	0.06	0.05	0.04	-	15.83	8.42	0.00	1.01	-
125	2	0.50	0.50	0.25	0.33	-	0.20	0.21	0.21	0.20	-	46.50	70.37	46.37	33.55	-
126	2	0.17	0.42	0.17	0.17	-	0.09	0.07	0.06	0.04	-	16.96	6.28	2.14	4.15	-
127	2	0.00	0.00	0.00	0.00	-	0.09	0.09	0.09	0.09	-	14.83	14.83	0.00	0.00	-
128	2	0.00	0.00	0.00	0.00	-	0.15	0.13	0.13	0.11	-	29.66	37.07	29.66	22.24	-
142	2	0.42	0.25	0.25	0.17	-	0.09	0.09	0.08	0.08	-	82.06	65.22	65.22	95.50	-
145	2	0.50	0.33	0.17	0.33	-	0.08	0.07	0.07	0.07	-	44.11	12.69	29.41	11.56	-
146	2	0.58	0.25	0.00	0.00	-	0.12	0.11	0.06	0.05	-	51.77	48.63	22.24	14.83	-
147	2	0.42	0.17	0.00	0.00	-	0.11	0.11	0.09	0.09	-	27.52	9.55	7.41	7.41	-
149	2	0.58	0.25	0.08	0.17	-	0.11	0.04	0.02	0.01	-	37.95	10.56	1.01	2.14	-
150	2	0.42	0.75	0.42	0.25	-	0.02	0.02	0.01	0.00	-	13.70	17.84	5.28	4.15	-
151	2	1.25	0.67	0.83	1.17	-	0.13	0.13	0.11	0.12	-	72.51	68.49	33.80	46.37	-
152	2	5.42	6.42	5.00	6.08	-	0.14	0.17	0.18	0.25	-	195.28	280.36	256.23	290.03	-
180	3	0.33	0.00	0.00	0.00	-	0.12	0.12	0.09	0.09	-	44.36	29.66	22.24	14.83	-
197	3	0.25	0.25	0.33	0.17	-	0.04	0.04	0.04	0.04	-	11.56	12.69	12.69	9.55	-
199	3	0.58	0.17	0.08	0.17	-	0.00	0.00	0.00	0.02	-	9.42	4.15	1.01	16.96	-
200	3	0.25	0.58	0.75	0.42	-	0.02	0.01	0.02	0.02	-	62.96	15.83	25.26	13.70	-
201	3	0.83	1.08	1.67	1.75	-	0.04	0.05	0.04	0.04	-	11.56	22.12	32.55	89.10	-
202	3	0.00	0.08	0.17	1.42	-	0.01	0.01	0.01	0.01	-	0.00	1.01	2.14	18.85	-
204	3	0.08	0.00	0.00	0.08	-	0.18	0.19	0.13	0.13	-	38.08	37.07	14.83	15.83	-
205	3	3.08	2.58	2.25	1.08	-	0.08	0.12	0.12	0.08	-	217.02	74.77	80.05	35.81	-



Table 1 (cont.). Average plot-level seedling and sapling stem densities (stems per m²) and stocking index (at the 2m radius scale) by cycle. Only native, canopy-forming species are included. Note that *Fraxinus* spp. (ash species) are no longer considered canopy-forming species. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. Cells highlighted in green are plots that meet the minimum management target of 0.25 seedlings/m² and 0.14 saplings/m² or have a stocking index >100. These are the same thresholds used in Figure 2 and are described in Miller et al. 2023. Note that cycle 5 is only partially complete.

Plot	Panel	Seedlings per sq.m					Saplings per sq.m					Stocking Index				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
206	3	0.83	1.08	0.50	0.92	-	0.09	0.08	0.09	0.09	-	113.35	44.23	46.50	69.49	-
208	3	0.67	0.58	0.75	1.67	-	0.00	0.00	0.00	0.00	-	9.42	8.42	11.56	24.13	-
209	3	1.17	2.08	2.17	2.33	-	0.07	0.06	0.06	0.06	-	27.27	28.27	36.69	44.11	-
210	3	1.92	0.67	0.08	0.00	-	0.19	0.17	0.15	0.11	-	62.20	50.52	23.25	7.41	-
211	3	0.75	0.33	0.42	0.42	-	0.01	0.01	0.01	0.00	-	38.83	11.56	32.55	5.28	-
213	3	0.42	0.58	0.50	1.08	-	0.09	0.09	0.09	0.09	-	12.69	34.68	33.55	64.97	-
216	3	0.42	0.17	0.00	0.25	-	0.07	0.06	0.06	0.07	-	15.83	3.14	0.00	4.15	-
220	3	0.00	0.42	0.25	0.33	-	0.07	0.09	0.08	0.05	-	37.07	44.36	33.80	11.56	-
221	3	0.00	0.00	0.00	0.00	-	0.11	0.11	0.09	0.09	-	7.41	7.41	0.00	0.00	-
222	3	0.92	1.08	0.25	0.17	-	0.12	0.12	0.11	0.09	-	59.06	43.23	25.38	25.38	-
223	3	1.00	1.33	0.42	0.33	-	0.13	0.12	0.11	0.11	-	63.08	57.93	36.95	27.52	-
224	3	6.00	3.75	1.00	0.25	-	0.05	0.05	0.05	0.04	-	127.93	99.53	32.42	3.14	-
225	3	0.42	0.42	0.67	0.58	-	0.07	0.06	0.02	0.04	-	32.55	64.97	31.42	17.84	-
227	3	1.17	1.25	0.75	0.50	-	0.02	0.02	0.02	0.02	-	50.39	16.71	30.41	58.68	-
228	3	0.58	0.75	0.42	0.25	-	0.05	0.05	0.08	0.07	-	16.84	18.98	35.94	32.80	-
232	3	1.00	0.83	0.17	0.33	-	0.35	0.31	0.20	0.18	-	173.67	190.13	90.48	93.62	-
234	3	0.00	0.00	0.00	0.00	-	0.12	0.11	0.09	0.07	-	37.07	29.66	22.24	7.41	-
235	3	4.25	4.83	3.83	6.08	-	0.15	0.15	0.21	0.26	-	394.46	481.42	261.63	280.73	-
272	4	0.00	0.08	0.08	0.17	-	0.02	0.02	0.02	0.01	-	7.41	1.01	1.01	2.14	-
273	4	0.33	0.25	0.50	0.33	-	0.09	0.12	0.13	0.11	-	20.11	26.39	36.95	23.25	-
274	4	0.17	0.25	0.42	0.58	-	0.02	0.02	0.02	0.02	-	3.14	5.28	6.28	30.41	-
275	4	0.83	1.67	1.67	1.00	-	0.08	0.09	0.09	0.09	-	76.91	120.89	116.62	99.78	-
276	4	0.17	0.33	0.33	1.83	-	0.21	0.22	0.20	0.13	-	53.91	48.63	33.80	54.79	-
277	4	0.00	0.17	0.00	0.08	-	0.04	0.02	0.02	0.02	-	0.00	3.14	0.00	1.01	-
278	4	0.42	0.58	1.17	1.25	-	0.13	0.13	0.12	0.12	-	75.02	76.15	99.02	126.17	-
279	4	0.00	0.08	0.00	0.00	-	0.01	0.01	0.01	0.01	-	0.00	1.01	0.00	0.00	-
280	4	0.42	0.17	0.17	0.17	-	0.08	0.09	0.09	0.09	-	21.11	16.96	16.96	3.14	-
281	4	0.00	0.00	0.00	0.00	-	0.05	0.07	0.06	0.04	-	0.00	7.41	0.00	0.00	-
282	4	0.00	0.17	0.08	0.25	-	0.02	0.01	0.01	0.01	-	7.41	2.14	1.01	3.14	-
283	4	0.00	0.00	0.08	0.00	-	0.21	0.18	0.15	0.13	-	51.90	37.07	30.66	14.83	-



Table 1 (cont.). Average plot-level seedling and sapling stem densities (stems per m²) and stocking index (at the 2m radius scale) by cycle. Only native, canopy-forming species are included. Note that *Fraxinus* spp. (ash species) are no longer considered canopy-forming species. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. Cells highlighted in green are plots that meet the minimum management target of 0.25 seedlings/m² and 0.14 saplings/m² or have a stocking index >100. These are the same thresholds used in Figure 2 and are described in Miller et al. 2023. Note that cycle 5 is only partially complete.

Plot	Panel	Seedlings per sq.m					Saplings per sq.m					Stocking Index				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
284	4	2.50	0.42	0.08	0.00	-	0.32	0.31	0.28	0.29	-	195.91	87.71	65.35	51.90	-
285	4	1.67	0.08	0.00	0.00	-	0.07	0.06	0.06	0.06	-	33.55	1.01	0.00	0.00	-
286	4	0.67	0.33	0.50	0.25	-	0.04	0.04	0.01	0.01	-	10.43	5.28	8.42	4.15	-
287	4	0.00	0.00	0.00	0.00	-	0.01	0.01	0.00	0.00	-	7.41	7.41	0.00	0.00	-
288	4	3.17	1.58	0.42	0.17	-	0.09	0.08	0.08	0.07	-	69.24	39.96	27.52	17.97	-
289	4	2.50	2.17	1.75	1.67	-	0.21	0.24	0.24	0.19	-	241.78	201.94	198.93	140.99	-
290	4	0.00	0.17	0.08	0.00	-	0.01	0.02	0.00	0.00	-	7.41	16.96	1.01	0.00	-
291	4	0.17	0.08	0.00	0.08	-	0.02	0.04	0.04	0.04	-	2.14	1.01	0.00	1.01	-
310	4	0.42	2.17	0.25	0.42	-	0.00	0.00	0.00	0.00	-	5.28	52.40	5.28	6.28	-
312	4	1.08	1.33	1.00	1.67	-	0.08	0.06	0.06	0.06	-	32.67	24.13	20.99	29.28	-
315	4	0.25	0.25	0.08	0.08	-	0.07	0.06	0.05	0.05	-	27.52	17.97	1.01	1.01	-
316	4	1.67	1.83	1.50	1.08	-	0.05	0.09	0.09	0.09	-	61.83	69.37	57.93	55.92	-
318	4	0.08	0.00	0.00	0.08	-	0.02	0.01	0.01	0.01	-	1.01	0.00	0.00	1.01	-
319	4	0.58	0.42	0.50	0.58	-	0.02	0.04	0.04	0.05	-	34.68	72.38	74.52	86.96	-



Table 2. Average % cover and number of invasive species detected in each plot by cycle. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). Note that cycle 5 is only partially complete. Plots with at least 10% average cover or 4 or more invasive species present are in yellow. Average cover and species counts may be increasing over time due to protocol changes, including additions to the indicator species list over time, a plot search for indicator species starting in 2009 and all woody species being sampled in quadrats starting in 2019. More details can be found in the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>)

PlotCode	PanelCode	Average % Cover					Number of Species per Plot				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
1	1	0.00	0.00	0.00	0.01	0.00	0	0	0	1	0
2	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
3	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
8	1	0.00	0.00	0.00	0.00	0.00	0	0	0	1	0
13	1	0.98	0.62	15.68	3.53	5.77	1	1	3	5	5
14	1	0.00	0.00	0.00	0.00	0.00	0	0	0	2	2
17	1	0.00	0.00	0.00	0.00	0.00	0	0	0	1	0
18	1	0.00	0.00	0.00	0.00	0.00	0	0	1	2	2
43	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
44	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
45	1	0.00	0.01	0.02	0.00	0.00	0	1	1	1	1
46	1	0.00	0.00	0.00	0.00	0.00	0	0	1	0	0
47	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
48	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
49	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
54	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
55	1	0.00	0.00	0.00	0.00	0.00	0	0	0	1	1
56	1	0.00	0.00	0.00	0.01	0.00	0	1	0	1	0
57	1	0.00	0.06	0.28	0.03	0.05	0	1	1	1	1
58	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
59	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
60	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
61	1	0.00	0.00	0.00	0.54	0.44	0	1	2	2	4
62	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
74	1	0.00	0.00	0.00	0.00	0.00	0	0	0	2	2
75	1	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
106	2	0.00	0.02	0.02	0.32	-	0	1	3	5	-
112	2	0.00	0.00	0.01	3.68	-	0	1	3	4	-
113	2	0.00	0.00	0.00	0.07	-	0	1	2	1	-
114	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-



Table 2 (cont.). Average % cover and number of invasive species detected in each plot by cycle. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). Note that cycle 5 is only partially complete. Plots with at least 10% average cover or 4 or more invasive species present are in yellow. Average cover and species counts may be increasing over time due to protocol changes, including additions to the indicator species list over time, a plot search for indicator species starting in 2009 and all woody species being sampled in quadrats starting in 2019. More details can be found in the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>)

PlotCode	PanelCode	Average % Cover					Number of Species per Plot				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
115	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
116	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
117	2	0.01	0.01	0.01	0.01	-	1	1	2	2	-
118	2	0.29	0.22	1.03	27.71	-	1	2	5	5	-
119	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
120	2	0.00	0.00	0.00	0.01	-	0	1	1	2	-
121	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
122	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
123	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
124	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
125	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
126	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
127	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
128	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
142	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
145	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
146	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
147	2	0.02	0.00	0.00	0.00	-	1	0	0	0	-
149	2	0.32	0.01	0.03	0.04	-	2	1	2	2	-
150	2	1.37	0.30	0.20	0.73	-	2	1	2	4	-
151	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
152	2	0.00	0.00	0.00	0.00	-	0	0	0	0	-
180	3	0.01	0.00	0.00	0.00	-	1	1	1	2	-
197	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
199	3	0.07	0.29	3.33	3.98	-	3	5	5	5	-
200	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
201	3	0.00	0.00	0.00	0.00	-	0	1	1	2	-
202	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
204	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
205	3	0.01	0.00	0.00	0.00	-	2	1	2	3	-



Table 2 (cont.). Average % cover and number of invasive species detected in each plot by cycle. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). Note that cycle 5 is only partially complete. Plots with at least 10% average cover or 4 or more invasive species present are in yellow. Average cover and species counts may be increasing over time due to protocol changes, including additions to the indicator species list over time, a plot search for indicator species starting in 2009 and all woody species being sampled in quadrats starting in 2019. More details can be found in the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>)

PlotCode	PanelCode	Average % Cover					Number of Species per Plot				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
206	3	0.00	0.00	0.01	0.00	-	0	0	1	1	-
208	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
209	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
210	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
211	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
213	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
216	3	0.00	0.01	0.03	0.75	-	1	1	1	1	-
220	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
221	3	0.02	0.00	0.00	0.00	-	1	0	1	0	-
222	3	0.00	0.00	0.00	0.00	-	0	0	2	2	-
223	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
224	3	0.00	0.01	0.01	0.00	-	1	1	2	1	-
225	3	0.00	0.00	0.00	0.00	-	1	1	1	2	-
227	3	3.67	6.98	2.43	3.13	-	2	3	4	6	-
228	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
232	3	0.00	0.00	0.00	0.00	-	0	1	1	2	-
234	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
235	3	0.00	0.00	0.00	0.00	-	0	0	0	0	-
272	4	0.02	0.01	0.00	0.01	-	1	3	3	3	-
273	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
274	4	0.00	0.13	0.02	0.15	-	0	1	1	3	-
275	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
276	4	0.01	2.04	0.48	3.80	-	1	4	2	4	-
277	4	7.38	6.97	7.03	6.63	-	3	3	2	3	-
278	4	0.00	0.00	0.00	0.00	-	0	1	0	0	-
279	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
280	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
281	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
282	4	0.22	0.22	0.45	0.09	-	2	2	1	2	-
283	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-



Table 2 (cont.). Average % cover and number of invasive species detected in each plot by cycle. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Plots are sampled in 4-year rotations, with a quarter of the plots sampled each year (i.e. a panel). Note that cycle 5 is only partially complete. Plots with at least 10% average cover or 4 or more invasive species present are in yellow. Average cover and species counts may be increasing over time due to protocol changes, including additions to the indicator species list over time, a plot search for indicator species starting in 2009 and all woody species being sampled in quadrats starting in 2019. More details can be found in the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>)

PlotCode	PanelCode	Average % Cover					Number of Species per Plot				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
284	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
285	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
286	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
287	4	0.00	0.00	0.00	0.00	-	0	0	0	2	-
288	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
289	4	0.00	0.01	0.01	0.03	-	0	1	1	3	-
290	4	0.00	0.00	0.00	0.00	-	1	0	1	0	-
291	4	0.01	0.00	0.00	0.00	-	1	0	0	0	-
310	4	0.30	0.35	0.29	2.52	-	2	2	3	5	-
312	4	0.00	0.00	0.00	0.00	-	0	0	1	1	-
315	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
316	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
318	4	0.00	0.00	0.00	0.00	-	0	0	0	0	-
319	4	0.00	0.00	0.05	0.00	-	0	1	2	3	-



Table 3. Number of plots out of 104 where priority invasive species were detected. Cycle 1: 2007 – 2010; Cycle 2: 2011 – 2014; Cycle 3: 2015 – 2018; Cycle 4: 2019 – 2022; Cycle 5: 2023. Species on the list include all exotic vascular plant species that are capable of dominating Eastern US forest habitats, and does not include all exotic species detected in MIDN forest plots. Note that cycle 5 is only partially complete. Average cover and species counts may be increasing over time due to additions to the protocols, including a plot search for additional indicator species starting in 2009 and all woody species being sampled in quadrats starting in 2019. Species have also been added to the indicator list over time. More details can be found in the MIDN Summary of Major Protocol Changes (<https://irma.nps.gov/DataStore/Reference/Profile/2297098>)

Latin Name	Common Name	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
<i>Ailanthus altissima</i>	Tree of heaven	0	2	1	9	1
<i>Berberis thunbergii</i>	Japanese barberry	2	1	5	3	0
<i>Celastrus orbiculatus</i>	oriental bittersweet	1	1	4	13	2
<i>Euonymus</i>	burningbush	0	0	0	2	1
<i>Euonymus fortunei</i>	climbing euonymus	1	0	0	0	0
<i>Ligustrum</i>	privet	2	4	8	13	3
<i>Lonicera - Exotic</i>	honeysuckle - exotic	3	2	0	0	0
<i>Lonicera japonica</i>	Japanese honeysuckle	12	22	26	24	4
<i>Microstegium vimineum</i>	Japanese stiltgrass	2	7	12	21	3
<i>Persicaria longiseta</i>	Oriental lady's thumb	1	2	3	5	2
<i>Persicaria perfoliata</i>	Asiatic tearthumb	1	0	0	0	0
<i>Rosa multiflora</i>	multiflora rose	6	6	9	11	2



Table 4. Invasive plant and pest/pathogen early detections in Fredericksburg & Spotsylvania National Military Park observed in the most recent census of each plot. Coordinates are in UTM NAD83 Zone 18N.

Plot	Year	X	Y	Latin Name	Common Name	Type
FRSP-201	2021	285601	4236795	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-018	2023	273601	4232788	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-227	2021	260103	4242325	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-310	2022	259603	4243804	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-225	2021	268850	4243047	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-222	2021	270369	4232806	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-118	2021	271349	4232798	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-199	2021	283859	4239800	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-276	2022	286349	4235792	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-150	2021	259608	4243556	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-319	2022	271352	4234320	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-272	2022	284845	4237301	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-013	2023	287101	4236049	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-232	2021	271590	4234299	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-112	2021	284351	4236549	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-061	2023	261100	4243550	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-277	2022	286603	4236554	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-106	2021	285095	4237292	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-216	2021	271849	4233795	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-180	2021	273093	4232813	<i>Microstegium vimineum</i>	Japanese stiltgrass	graminoid
FRSP-118	2021	271349	4232798	<i>Albizia julibrissin</i>	silk tree	tree
FRSP-112	2021	284351	4236549	<i>Albizia julibrissin</i>	silk tree	tree
FRSP-289	2022	259350	4243545	<i>Agrilus planipennis</i>	emerald ash borer	pest