Virginia Noxious Weed Assessment Tool – Printable Version

Evaluating Non-Native Plants
for Their Impact on
Virginia's Natural and
Economic Resources

VIRGINIA NOXIOUS WEED ASSESSMENT TOOL – (PRINTABLE VERSION)

This document provides the questions, choices of answers, and accompanying guidance for the Virginia Noxious Weed Assessment Tool. For each species being assessed, the two screening questions (S-1 and S-2) determine whether use of the assessment tool is appropriate. Upon passing the screening questions, the 23 questions (grouped into five sections) should then be answered, to the best of your ability, for each species being formally assessed for proposal as a noxious weed to the Virginia Noxious Weed List. The geographical region of interest for the assessment includes: New Jersey, Delaware, Pennsylvania, Maryland, West Virginia, District of Columbia, Virginia, Kentucky, Tennessee, North Carolina and South Carolina. The expanded region assists in evaluating impacts of species present within Virginia and recognizing potential future noxious weeds.

For each question, include citations of the supporting information. Information may include published peer-reviewed papers, reference works (e.g., *Flora of Virginia*, PLANTS Database), gray literature, web pages, personal observations or personal communications. At the bottom of each web page in the tool, you can expand the page to find **References**, with links for plant species research (print version, see Appendix A: References), **How to Write Citations**, for guidelines to writing citations, and a **Map of Ecological Regions**, which displays the region of interest and ecological regions.

Screening Questions

S-1. Commercial propagation in Virginia

Is the species commercially propagated in Virginia? You may wish to consult Virginia Nursery and Landscapers Association Growers Guide www.vnla.org/Growers-Guide

- Yes. STOP. This species is of commercial importance in Virginia.
- No. Proceed to S-2, below.

S-2. Non-native to and Present in the Region of Interest

Is this species non-native to and present in the region of interest?

- Yes.
- No. STOP. This Noxious Weed Assessment Tool is not applicable to this species

SECTION I. ECOLOGICAL IMPACT: IMPACT ON ECOSYSTEM PROCESSES, COMMUNITIES, AND NATIVE SPECIES

The assessment should apply to the current impact of the species within or near the Commonwealth of Virginia, to the extent it is known. The "region of interest" for this assessment includes the states of New Jersey, Pennsylvania, Delaware, District of Columbia, Maryland, Virginia, West Virginia, Kentucky, North Carolina, South Carolina and Tennessee. Assess the cumulative impact (e.g., over a period of several decades) of the species on agricultural, forestry, and natural areas where it typically occurs in the region. Consider the spatial scale of the impact, and note this in the comments section for each question. For example, state whether the impacts widespread or localized.

1. Impact on Ecosystem Processes and System-Wide Parameters

Some non-native species can alter abiotic ecosystem processes and system-wide parameters in ways that significantly diminish the ecosystem services, as well as the ability of native species to survive and reproduce. Alterations in ecosystem processes and system-wide parameters are of great concern, given the potential range of negative impacts.

Examples of abiotic ecosystem processes include:

- fire occurrence, frequency and intensity
- geomorphological changes (e.g., erosion and sedimentation rates)
- hydrological regimes (including soil water table)
- nutrient and mineral dynamics (e.g., increasing nitrogen in the soil)

Examples of system-wide parameters include:

- system-wide reductions in light availability (e.g., when an aquatic invader covers an entire water body which would otherwise be open)
- changes in salinity, alkalinity, or pH

Select the one letter below that best describes this species' most severe impact on an abiotic ecosystem process or system-wide parameter:

A. Major, possibly irreversible, alteration or disruption of abiotic ecosystem process or system-wide parameters (e.g., the species drains water from open water or wetland systems through rapid transpiration, making these unable to support native wetland plant and animal species; or the species is a nitrogen fixer and invades systems with few or no known native fixers, and consequently causes soil nitrogen availability to increase to levels that favor other non-native invaders at the expense of native species)
B. Significant alteration in abiotic ecosystem processes and system-wide parameters (e.g., increases sedimentation rates along coastlines, reducing open water areas that are important for waterfowl)
C. Influences abiotic ecosystem processes and system-wide parameters (e.g., has perceivable but mild influence on soil nutrient availability)
D. No perceivable impact on abiotic ecosystem processes and system-wide parameters
E. Unknown

Provide examples of processes affected in the comment & citations.

2. Impact on Ecological Community Structure

Select the one letter that best describes this species' impact on community structure:

A. Major alteration of ecological community structure by overtopping the canopy (i.e., covers canopy and changes or eliminates most or all layers of vegetation below)
B. Adds a layer or significantly alters structure of at least one layer of the vegetation below the canopy (e.g., creation of a new layer, substantial change in density or total cover of an existing layer)
C. Influences structure of at least one layer (e.g., changes density or total cover of a layer)
D. No impact; establishes within existing layers without influencing their structure
E. Unknown

Provide examples of alterations affected in the comments & citations field.

3. Impact on Ecological Community Composition

Select the one letter that best describes this species' impact on community composition:

A. Causes major alteration in ecological community composition. For example, results in:
    - the extirpation or sharp reduction in abundance of >1 native plant, animal, or fungal species, or
    - significant increases in the proportion of other non-native species in the community, or
B. Significantly alters ecological community composition (e.g., produces a significant reduction in the population size of one native species in the ecological community)
C. Influences ecological community composition (e.g., reduces recruitment of one or more native species which will likely result in significant reduction in the abundance of these species in the long-term)
D. No known changes to the native community
E. Unknown

Provide examples of effects on ecological community composition in the comments & citations field.

4. Impact on Individual Native Plant or Animal Species

Non-native species often impact the native species of an area broadly, in rough proportion to their local abundance. However, some non-native species disproportionately affect particular native species.

Examples of such disproportionate individual impacts on particular native species include:

- Hybridizes with a native species
- Parasitizes a native species
- Poisons a native species
- Hosts a non-native disease which damages a native species
- Distracts pollinators from a native species

Select the one letter that best describes this species' impact on individual native species:

A. Major impacts on particular native species (e.g., has negative impacts on more than 50% of the individuals of one or more native species)
B. Significant impact on particular native species (e.g., has negative impacts on 20 to 50% of the individuals of one or more native species)
C. Occasional impact on particular native species (e.g., has negative impacts on 5 to 20% of the individuals of one or more native species)
D. Little or no known impact on particular native species (e.g., no known reports of suppression, hybridization, parasitism, or other particular disproportionate negative impacts)
E. Unknown

Provide examples of impacts on specified individual native species in comments & citations field.

5. Conservation Significance of the Ecological Communities and Native Species Threatened

Many non-native plants occur in disturbed, low quality habitats that are dominated by other non-native species. Non-native plants have a greater impact if they:

(i) directly or indirectly threaten native species or ecological communities that are considered rare or vulnerable (e.g., legally protected in the region (such as federally listed in the U.S.) or designated G1-G3 by NatureServe), or

(ii) threaten outstanding, high quality occurrences of common ecological communities (e.g., NatureServe Element Occurrence Ranks A & B).

Select the one letter that best describes the conservation significance of native species and communities impacted by this non-native species within its established range (however large or small):

A. High significance (e.g., often threatens one or more rare or vulnerable native species or ecological communities, and/or high-quality occurrences of more common ecological communities)

B. Moderate significance (e.g., occasionally threatens one or more rare or vulnerable native species or ecological communities, and/or high-quality occurrences of more common ecological communities)

C. Low significance (e.g., usually inhabits common, unthreatened habitats and rarely threatens rare or vulnerable native species or ecological communities, and/or high-quality occurrences of more common ecological communities)

D. Insignificant (e.g., found primarily or only in human-disturbed habitats or not known to threaten any rare or vulnerable native species or ecological communities, and/or any high-quality occurrences of more common ecological communities)

E. Unknown

Provide examples of affected species or ecological communities in the comments & citations field.

DCR Natural Heritage Program Rare Species and Natural Community information:

Rarity Ranks
http://www.dcr.virginia.gov/natural-heritage/help

Rare Species and Natural Community information
http://www.dcr.virginia.gov/natural-heritage/rare-species-com

SECTION II. CURRENT DISTRIBUTION AND ABUNDANCE

6. Current Range Size in Region of Interest

The range size used here is the entire range where the species is non-native and occurs outside cultivation, not just the range where it has its greatest impacts. The area of the range is usually much greater than actual acreage infested.

Select the letter that best describes the current range in the region of interest:

A. Widespread in region (e.g., >30% of region).
B. Substantial part of region (e.g., 10-30% of region).
C. Small part of region (e.g., 0.1-10% of region).
D. Isolated or spotty range in region (e.g., <0.1% of region).
E. Unknown

If available, specify approximate date(s) of range-size information in the comments & citations field, especially if estimated from multiple sources.

The region of interest for this assessment is defined as the states of New Jersey, Delaware, Maryland, District of Columbia, Pennsylvania, West Virginia, Kentucky, Virginia, North Carolina, South Carolina, and Tennessee.

Several online references provide range information, such as PLANTS Database, Early Detection and Distribution Mapping System, and the Digital Atlas of the Virginia Flora. See the resource list in Appendix A: References.

7. Proportion of Current Range Where the Species Has a Negative Ecological Impact
Within what proportion of the species' range (from Question 6 above) is the species causing negative ecological impacts?

Select the one letter below that best describes the portion of the species' range in the region, within which this species has been identified as having a negative ecological impact:

A. Impacts occur in >50% of the species' current range
B. Impacts occur in 20 to 50% of the species' current range
C. Impacts occur in 5 to 20% of the species' current range
D. Impacts occur in <5% of the species' current range
E. Unknown

8. Proportion of Ecological Regions Invaded
For this section, use Bailey's (1995) ecological regions. See map in Appendix C: Map of Region of Interest.

Select the letter that best describes the proportion of the region of interest's biogeographic units in which the species is currently established:

A. Present in most ecological regions (e.g., 9+)
B. Present in many ecological regions (e.g., 6-8)
C. Present in a few ecological regions (e.g., 2-5)
D. Present in only one ecological region
E. Unknown

In the comments & citations field, specify the number of ecological regions the species is present in. See map in Appendix C: Map of Region of Interest.

9. Diversity of Habitats or Ecological Systems Invaded in Region

General habitat types for this assessment are:

- coastal dunes
- marsh
- swamp
- grassland
- deciduous forest
- mixed forest
- evergreen forest
- aquatic
- managed lands (e.g., agricultural lands, rights of way)

Select the one letter below that best describes the number of habitats or ecological systems that this non-native species invades within the region of interest:

A. Four or more distinct habitats or ecological systems invaded
B. Three habitats, or ecological systems invaded
C. Two habitats or ecological systems invaded
D. Only a single habitat or ecological system invaded
E. Unknown

Provide examples of habitats this species has invaded in the comments & citations field.

SECTION III. TREND IN DISTRIBUTION AND ABUNDANCE

10. Current Trend in Total Range Within the Region of Interest

Select the letter that best describes the current trend within the last ten years:

A. Range expanding in most or all directions, and/or spreading into new portions of the region
B. Range increasing in some directions but not all
C. Range stable, or areas of range contraction balancing areas of expansion
D. Range decreasing
E. Unknown

See Appendix C for map of the region of interest.

11. Proportion of Potential Range Currently Occupied

The question is intended to compare the species' current range within the region of interest with the potential range it is considered to be capable of occupying if it is not prevented from spreading.

Select the one letter below that best describes the proportion of potential range occupied:

A. Less than 10% of potential range currently occupied
B. 10-30% of potential range currently occupied
C. 31-90% of potential range currently occupied
D. Greater than 90% of potential range currently occupied
E. Unknown

12. Long-Distance Dispersal Potential within Region of Interest

For a typical population, what is the potential for long-distance dispersal by humans or equipment, other animals, or by abiotic factors (e.g., wind, rivers, floods, etc.)?

Select the one letter below that best describes the long-distance dispersal potential:

A. Long-distance dispersal frequent (e.g., seed or other propagules frequently carried long distances by humans, wide-ranging birds or mammals, wind [spores or small seeds], or water currents)
B. Long-distance dispersal infrequent (e.g., propagules carried occasionally by unusually strong winds, more localized birds or mammals, or periodic floods)
C. Long-distance dispersal rare but known (e.g., major floods, hurricanes, or other unusual weather events)
D. Long-distance dispersal seldom or never
E. Unknown

Provide examples of known long-distance dispersal mechanisms in the comments & citations field.

13. Local Range Expansion or Change in Abundance
Is the species increasing in abundance (cover, density, frequency, etc.) within its current range and/or expanding its local range (peripheral expansion), based on trends of the past 10-20 years?

Select the one letter below that best describes the local range expansion or change in abundance:

A. Local range and/or species abundance increasing rapidly (e.g., area occupied likely to double within 10 years in most areas where it doesn't already fully occupy its potential habitat, and/or abundance increasing by >25% in the area that it has already invaded)
B. Local range expanding at a moderate rate (e.g., area occupied likely to increase by 50% in 10 years or to double within 50 years) and/or species abundance increasing significantly in 25%-75% of the area that it has already invaded
C. Local range expanding slowly and/or abundance increasing significantly in only a small portion (<25%) of the area that it has already invaded
D. Species abundance and local range stable or decreasing across the entire area it has already invaded within the region
E. Unknown

14. Ability to Invade Natural Habitats
Consider information indicating whether or not the species has invaded natural habitats, such as forests or marshes. If possible, use information from areas where the species is known to be naturalized/invasive (including both the region of interest and other parts of the world). If no information is available on the species' behavior in its non-native range, use information from its native range but be aware that this may yield a conservative view of its potential behavior since pathogens, predators, and competitors likely limit the species' population expansion in its native range.

Select the one letter below that best describes the species' ability to invade natural habitats:

A. Often establishes in intact or otherwise healthy plant communities
B. Often establishes in mid- to late-successional native vegetation where minor disturbances may occur (e.g., tree falls, hiking trails, streambank erosion), or in minor disturbances within otherwise mature vegetation, but not establishing in intact mature native vegetation
C. Establishes only in areas where major human-caused or natural disturbance has occurred in last 20 years (e.g., post-hurricane sites, landslides, highway corridors)
D. Not known to spread into new habitat on its own (e.g., species may persist from former cultivation, or be present along edges)
E. Unknown

15. Naturalized in Similar Habitats Elsewhere
Is this species established outside its native range in places besides the region of interest? If so, has this species naturalized in habitats/agricultural lands that are similar to habitats/agricultural lands that exist in the region of interest, but which it has not yet invaded?

Select the one letter below that best describes the number of similar habitats or ecosystem types invaded in other regions: e.g., forests, wetlands, grasslands in Eastern U.S.; northern Europe; coastal marshes of California.

A. Naturalized in 3 or more similar habitats outside Virginia
B. Naturalized in 1 or 2 similar habitats outside Virginia
C. Naturalized elsewhere but only in habitat types which it has already invaded in the region of interest
D. Not known as a naturalized species outside its native range except in the region of interest
E. Unknown

In comments & citations, provide examples of other regions (continents, countries, or island groups) where escaped, with pertinent habitats where known.

16. Reproductive Characteristics
The following are some reproductive characteristics typical of potential noxious weeds; consider which of these characterize this species.

- Reproduces readily both vegetatively and by seed or spores
- Produces over 1,000 seeds or spores per plant annually
- Reproduces more than once per year
- Grows rapidly to reproductive maturity for its life form
- Has seeds (or spores) that remain viable in soil for three or more years
- Has quickly spreading rhizomes that may root at nodes
- Re-sprouts readily when cut, grazed, or burned
- Fragments easily, with fragments capable of becoming established elsewhere
- Has other comparable reproductive factors suggesting potential aggressiveness *(Explain in comments)*

Select the letter that best describes the reproductive characteristics of this species:

A. Exhibits three or more of the above characteristics
B. Exhibits two of the above characteristics
C. Exhibits one of the above characteristics
D. Has none of the above characteristics or weakly exhibits a few characteristics
E. Unknown

See the resources in Appendix A for species biology information.

SECTION IV. ECONOMIC LOSSES/COSTS/DAMAGES

In addressing the questions in this section, consider how this species inflicts economic losses, damages, or costs in the region of interest.

17. Losses/Damages/Costs to Agricultural, Forestry, or Horticultural Production.

Given the current state of knowledge regarding impacts of this species, select the one letter below that best describes the level of economic impact to production:

A. Causes, or has potential to cause, high impacts to production by reducing yield, commodity value, or increasing productions costs
B. Causes, or has potential to cause, moderate impacts to production by reducing yield, commodity, value, or increasing productions costs
C. Causes, or has potential to cause, low impacts to production by reducing yield, commodity, value, or increasing productions costs
D. Causes few, if any, economic impacts to production
E. Unknown

In the comments and citations field, comment on… production suffering impact and the losses, damages or management costs due to the species under assessment.

18. Losses/Damages/Costs to Outdoor Recreation

Given the current state of knowledge regarding impacts of this species, select the one letter below that best describes the level of economic impact to outdoor recreation:

A. Causes, or has potential to cause, high negative impacts to outdoor recreation
B. Causes, or has potential to cause, moderate negative impacts to outdoor recreation
C. Causes, or has potential to cause, low negative impacts to outdoor recreation
D. Causes few, if any, economic impacts to outdoor recreation
E. Unknown

In the comments and citations field, describe how the species impacts recreational values such as ability of a site to support recreation or aesthetic enjoyment (for example, does the species impact user experience of birding, wildlife watching, hunting, fishing, boating, swimming, hiking, nature appreciation, etc.).

19. Losses/Damages/Costs to Private* Property, Human Safety, or Public Infrastructure?

Given the current state of knowledge regarding impacts of this species, select the one letter below that best describes the level of economic impact to personal property, human safety, or public infrastructure:

A. Causes, or has potential to cause, high impacts to private property, human safety, or public infrastructure
B. Causes, or has potential to cause, moderate impacts to private property, human safety, or public infrastructure
C. Causes, or has potential to cause, low impacts to private property, human safety, or public infrastructure
D. Causes few, if any, impacts to private property, human safety, or public infrastructure
E. Unknown

*Property not captured in Item 17

In the comments and citations field, comment on how the species may damage housing, driveways, lawns, gardens, and other property; how human safety may be impacted (for example, an increase in fire severity by a Phragmites or cogon grass infestation; dune destabilization by beach vitex; etc.); or damages to public infrastructure such as roadways, pipelines, utilities equipment, etc.

20. Losses/Damages/Costs to Natural Areas/Parks/Public Lands

Select the one letter below that best describes the level of economic impact to natural areas:

A. Causes, or has potential to cause, high impacts to natural areas/parks/public lands by reducing value or increasing management costs
B. Causes, or has potential to cause, moderate impacts to natural areas/parks/public lands by reducing value or increasing management costs
C. Causes, or has potential to cause, low impacts to natural areas/parks/public lands by reducing value or increasing management costs
D. Causes few, if any, economic impacts to natural areas/parks/public lands
E. Unknown

In the comments and citations field, comment on costs to manage the species in order to meet the conservation or recreational goals of public lands.

SECTION V. MANAGEMENT DIFFICULTY

In addressing the questions in this section, consider how feasible and appropriate known controls are for use in conservation areas and other native species habitats.

21. General Management Difficulty

Given the current state of knowledge regarding management methods, how difficult is it to control an established stand of this species?

Select the one letter below that best describes the difficulty to control an established stand:

A. Managing this species normally requires a major, long-term investment of human and/or financial resources or is not possible with available technology (e.g., >$500 per acre/year)
B. Management requires a major short-term investment of human and financial resources, or a moderate long-term investment (e.g., $100-500/acre/year)
C. Management is relatively easy and inexpensive; requires a minor investment in human and financial resources (e.g., <$100 per acre/year)
D. Managing this species is not necessary (e.g., species does not persist without repeated human disturbance and/or reintroduction or will not survive natural succession)
E. Unknown

In the comments and citations field, comment on both the difficulty of control and on the extent of existing knowledge regarding the management of this species. Keep such comments brief -- do not provide detail on control methods.

22. Minimum Time Commitment

What is the minimum time commitment needed to control this species (e.g., reduction to acceptable levels which can be maintained with little effort), including follow-up survey and monitoring? Consider longevity of propagule (e.g. seed, shoots, or roots) banks as appropriate, and include time necessary for restoration if this is necessary.

Select the one letter below that best describes the minimum time commitment for controlling a 1-acre site:

A. Control requires at least 10 years
B. Control requires 7-10 years
C. Control requires 3-7 years
D. Control can normally be accomplished in 3 years
E. Unknown

23. Impacts of Management on Non-Target Species

Do the effective methods for managing this species normally cause significant and persistent reductions in the abundance of non-target species (i.e., native species, crops, etc. Sometimes referred to as collateral or non-target damage)?

Select the one letter below that best describes the collateral damage of control methods:

A. Management impacts often severe, with the only effective methods for managing this species normally causing significant and persistent reductions in the abundance of native species (>75% of the time)
B. Management impacts moderate, with the only effective methods for managing this species reducing native species abundance or causing other unacceptable damage 25 – 75% of the time
C. Management impacts minor, with the only effective methods causing significant persistent reductions in native species abundance <25% of the time
D. Management impacts insignificant or rare, with effective control methods rarely or never causing significant reductions in native species abundance, or causing only ephemeral reductions (lasting <2 years)
E. Unknown

Appendix A

Resources for Plant Research

Atlas of the Virginia Flora
Accepted botanical names, reported distribution in Virginia, nativity, habitat and growth characteristics, photos
www.vaplantatlas.org

PLANTS Database
Accepted botanical names plus helpful crosswalk of synonyms; distribution, species status (listed as noxious or invasive, etc.), photos, and often illustrations
https://plants.usda.gov/

Invasive and Exotic Species of North America
THE portal to everything invasive
www.invasive.org

Early Detection and Distribution Mapping System
Citizen scientists and other contribute species locations
www.EDDMapS.org

The Biota of North American Project – Vascular Flora
Botanical names, maps, etc.
www.bonap.org

Most large universities library website will allow anyone to search journals. Abstracts are usually accessible without a login. Without access, you can go to the library and request the article. I use
VCU Cabell Libraries
www.library.vcu.edu/about/libraries/cabell/
University of Richmond Boatwright Library
www.library.richmond.edu

Bailey's Ecoregions
http://maps.tnc.org/gis_data.html
https://www.environment.fhwa.dot.gov/ecosystems/veg_mgmt_rpt/vegmgmt_ecoregional_approach.asp
http://go.galegroup.com/ps/anonymous?p=AONE&sw=w&issn=00063568&v=2.1&it=r&id=GALE%7CA88581803&sid=googleScholar&linkaccess=fulltext&authCount=1&isAnonymousEntry=true

Natural Heritage Data Explorer
https://vanhde.org/

Additional Resources

Virginia Cooperative Extension(VCE) – https://ext.vt.edu/
Local VCE offices - https://ext.vt.edu/offices.html
Virginia Department of Agriculture and Consumer Services/office of Plant Industry Services – (804) 786-3515
Department of Conservation and Recreation - (804) 786-7951

Appendix B

How to Write Citations for the Assessment

Clear, complete citations allow others to find your sources of information and verify them. People write books (or websites: http://www.bibme.org/citation-guide/apa/) on how to write citations, but generally:

Who (wrote/said it). **When** (the year). **What** (title of article or book). **Where** (was it published/where can I find it).
Author(s). **Date** of publication (year). **Title**. **Publication** name. Volume (Number): page number range.

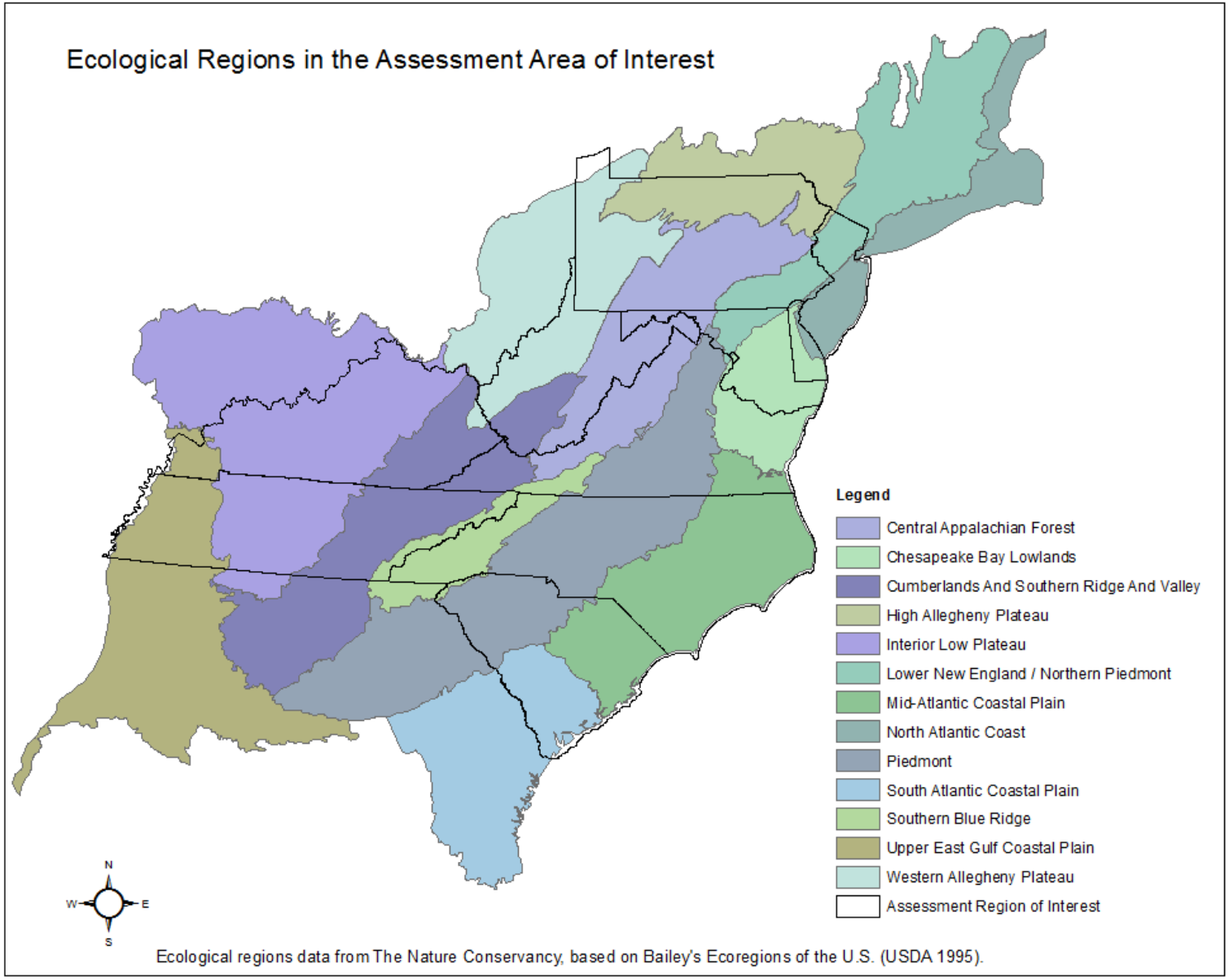
Examples:
Articles
Fahrig L. 2013. Rethinking patch size and isolation effects: the habitat amount hypothesis. Journal of Biogeography 40:1649-1663
Vitousek PM, D'Antonio CM, Loope LL, Westbrooks R. 1996. Biological invasions as a global environmental change. Am. Sci.; 84:468–478

Book
Begon M, Townsend CR, Harper JL. 2005. Ecology: From individuals, to ecosystems. 4th Edition. Oxford, UK: Wiley-Blackwell

Website
IUCN. 2015. The IUCN red list of threatened species. http://www.iucnredlist.org/ [Accessed 13 April 2017]
Author, A.A. (Year, Month Date of Publication). Article title. Retrieved from URL

Personal communication
Heffernan, K. 2017. Personal communication.

Appendix C


Ecological Regions in the Assessment Area of Interest
Legend
Central Appalachian Forest
Chesapeake Bay Lowlands
Cumberlands And Southern Ridge And Valley
High Allegheny Plateau
Interior Low Plateau
Lower New England / Northern Piedmont
Mid-Atlantic Coastal Plain
North Atlantic Coast
Piedmont
South Atlantic Coastal Plain
Southern Blue Ridge
Upper East Gulf Coastal Plain
Western Allegheny Plateau
Assessment Region of Interest
N
W
E
S
Ecological regions data from The Nature Conservancy, based on Bailey's Ecoregions of the U.S. (USDA 1995).