

Interim Core Map Documentation for Yellow Lance

Version 1

Review Completed: April 2026

Core Map Developer: U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs

Species Summary

The yellow lance (*Elliptio lanceolata*; Entity ID #4074) is a threatened freshwater mussel listed in 2018. This species is dependent on riverine habitats with moderate water velocity and good water quality. It is a sand-associated species, often found burrowed in clean, stable, coarse-to-medium grained sand or gravel. The yellow lance is native to the Atlantic Slope drainages of Maryland, Virginia, and North Carolina. This species requires host fish species to complete its life cycle. Critical habitat was designated for this species in 2021. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for the yellow lance is based on critical habitat. The range of the species includes areas that are unlikely to be occupied by the species, and includes 4,905,427 acres in Maryland, Virginia, and North Carolina. The critical habitat spans approximately 319 river miles within 11 units: Patuxent River, Rappahannock Subbasin, Rapidan Subbasin, South Anna River, Johns Creek, Nottoway Subbasin, Tar River, Sandy/Swift Creek, Fishing Creek Subbasin, Swift Creek, and Little River. The known occurrences of this species fall within the critical habitat; those that are outside of the critical habitat were last observed prior to 2000. EPA did not find evidence that any key areas for this species exist outside of the designated critical habitat. Recovery goals include achieving resilient populations in at least 7 of 8 historically occupied river basins with a minimum of 12 resilient subpopulations across those areas.

Figure 1 depicts the interim core map for the yellow lance. The core map represents approximately 2,826 acres.

The yellow lance is dependent on riverine habitats with moderate water velocity, good water quality, and coarse-to-medium grained sand for burrowing, which is captured in the species' designated critical habitat. The species requires host fish species to complete its life cycle. Landcover categories within the core map area are included in **Table 1**. Landcover within the core map is predominantly woody wetlands, which is consistent with the habitat of this species. Agricultural areas are also located within the critical habitat.

The core map developed for the yellow lance is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the yellow lance. This core map incorporates information developed by the U.S. Fish and Wildlife Service (FWS) and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate expert feedback from FWS. This interim core map has a "limited" (2) best professional judgment classification because it consists of the species' critical habitat without additions or subtractions. EPA did limit the core map only to designated critical habitat based on interpretation of FWS documentation. The core map represents areas important for this species' conservation and contains all known occurrences for this species that have been found within the last 25 years. This

core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

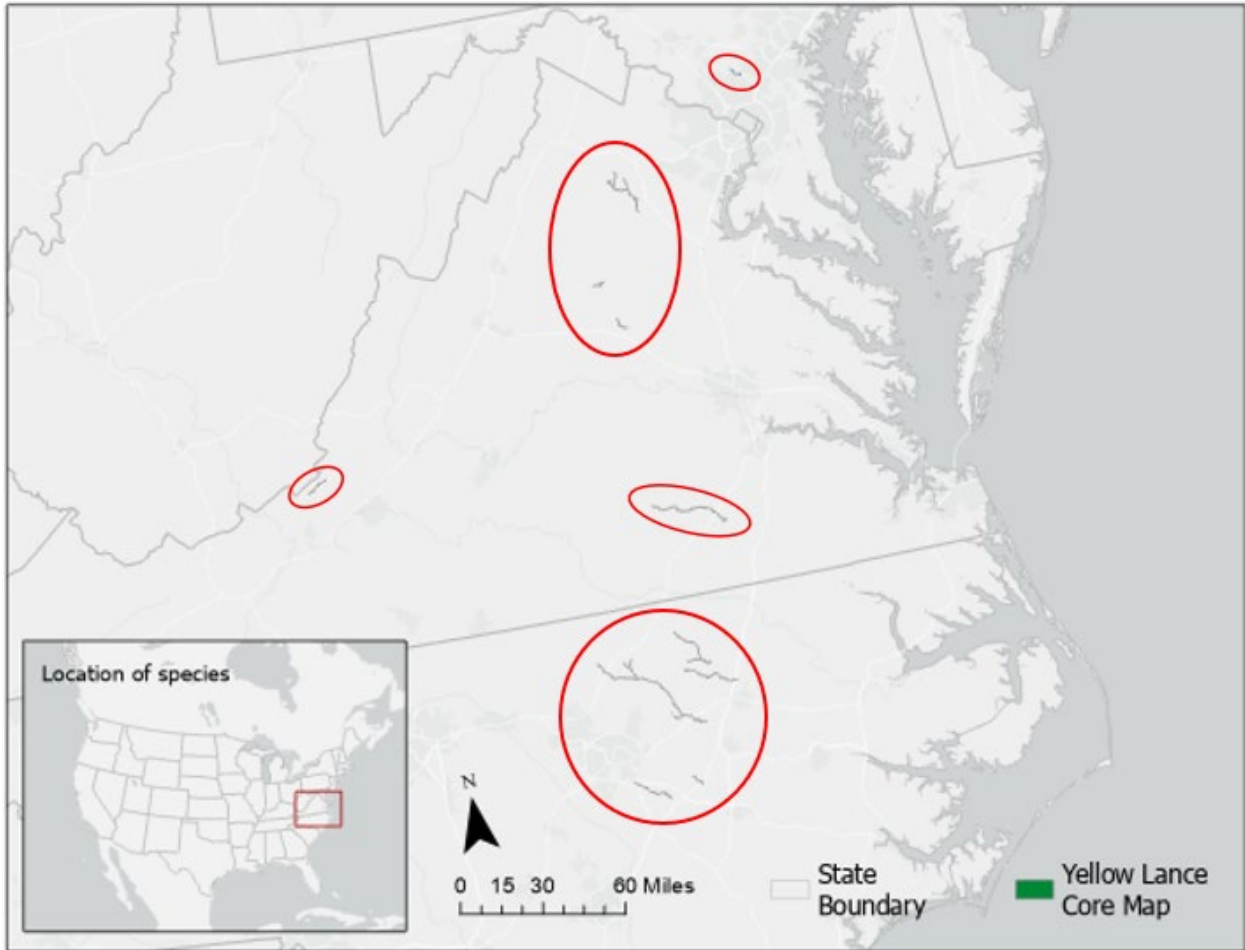


Figure 1. Interim core map for the yellow lance. The total acreage of the core map is approximately 2,826 acres. These designated rivers are circled in red for enhanced visibility.

Table 1. Percentage of Interim Core Map Represented by NLCD¹ Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover
Forestry	Deciduous Forest (41)	23%
Forestry	Evergreen Forest (42)	1%
Forestry	Mixed Forest (43)	6%
Agriculture	Pasture/Hay (81)	4%
Agriculture	Cultivated Crops (82)	1%
Mosquito adulticide, residential	Open space, developed (21)	1%
Mosquito adulticide, residential	Developed, Low intensity (22)	0%
Mosquito adulticide, residential	Developed, Medium intensity (23)	0%
Mosquito adulticide, residential	Developed, High intensity (24)	0%
Invasive species control	Woody Wetlands (90)	61%
Invasive species control	Emergent Herbaceous Wetlands (95)	1%
Invasive species control	Open water (11)	2%
Invasive species control	Grassland/herbaceous (71)	0%
Invasive species control	Scrub/shrub (52)	0%
Invasive species control	Barren land (rock/sand/clay; 31)	0%
Total Acres	Interim Core Map Acres	~ 2,826

Evaluation of Known Location Information

There are four datasets with known location information for this species:

- Descriptions of locations provided by FWS
- Occurrence locations in iNaturalist
- Occurrence locations in the Global Biodiversity Information Facility (GBIF)
- Occurrence locations in NatureServe

EPA evaluated these sets of data before selecting the type of and developing the core map. FWS appeared to have the best available occurrence information, providing a map that depicted the current known locations with names and descriptions of river basins. The FWS known occurrences are in 7 of the 8 historical populations across Maryland, Virginia, and North Carolina (**Figure A1-3 in Appendix 1**). The range of the species spans northeastern North Carolina, Virginia, and central Maryland (**Figure A1-1. in Appendix 1**). Occurrences in iNaturalist, GBIF, and NatureServe did not support further expanding the core map outside of the FWS range, critical habitat, and known occurrences. **Appendix 1** includes more information on the available known location information.

¹ Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, <https://doi.org/10.5066/P9JZ7AO3>

Approach Used to Create Core Map

The core map was developed using the “Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats”² (referred to as “the process”). This core map was developed by EPA and was developed using the four steps described in the process document:

1. Compile available information for a species
2. Identify core map type
3. Develop the core map for the species
4. Document the core map

For step 1, EPA compiled available information for the yellow lance from FWS as well as observational information available from various publicly available sources. The information compiled for the yellow lance is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Current existing populations occur in locations consistent with the critical habitat
- The species’ critical habitat is highly refined

For step 2, EPA used the compiled information to identify the core map type, including the species range, critical habitat, and known location information. EPA compared known location data to the range and critical habitat and found that the FWS known locations of currently existing (extant) populations are consistent with the location of the designated critical habitat. The species range is not likely limited to the areas containing habitat of the species and is much larger than the areas where known locations occur. Based on this information, EPA used the designated critical habitat as the yellow lance core map.

For step 3, EPA used the designated critical habitat provided by FWS for the yellow lance. EPA downloaded the critical habitat from FWS’s Environmental Conservation Online System (ECOS) (<https://ecos.fws.gov/ecp/>).

Discussion of Approaches and Data that were Considered but not Included in Core Map

EPA did not explore approaches other than those described in this documentation.

² Dated 2024, available online at: <https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas>

Appendix 1. Information Compiled for Species

1. Recent FWS Documents/Links

- [Species Status Assessment v1.5](#) (SSA, 2019) – (05/01/2019)
- [Draft Recovery Plan](#) (Draft Recovery Plan, 2022) – (11/21/2022)
- [Five Year Status Review 2023](#) (Five Year Review, 2023) – (08/28/2023)
- [Designation of Critical Habitat](#) (Designation of CH, 2021) – (04/08/2021)

2. Background information

- Status: Federally listed as threatened in 2018
- Resiliency, redundancy, and representation (the 3Rs) -- SSA, 2019
 - Resiliency needs: Excellent water quality, flowing river ecosystems, suitable substrate (clean, coarse sands and gravels), multiple occupied managements units per population.
 - Redundancy needs: Genetic variation is assumed to exist between river basin populations; Ecological variation exists between small streams and larger rivers, and between physiographic provinces.
 - Representation needs: Multiple resilient management units within populations in each area of representation.
- **Habitat, Life History, and Ecology**
- **Habitat:**
 - Native to the Atlantic Slope drainages of Maryland, Virginia, and North Carolina
 - Patuxent, Potomac, Rappahannock, York, James, Chowan, Tar-Pamlico, and Neuse drainages
 - Presumed extirpated in the Potomac River basin
 - “Dependent on riverine (i.e., flowing water) habitats with moderate water velocity and good water quality, and is a sand-associated species, often found burrowed in clean, stable, coarse- to medium grained sand or gravel. It does not occur in impounded waters and is intolerant of standing water (i.e., lentic) habitats” (Five Year Review, 2023).
- **Reproduction/pollinators:**
 - “Requires appropriate host fish species to complete its life cycle; the parasitic larval life stage must attach to a host for transformation to the juvenile life stage” (Five Year Review, 2023).
- **Taxonomy**
 - Freshwater mussel (Family: Unionidae)
 - EPA Species Group: Aquatic invertebrates, Mollusk-Clams
- **Essential Physical Biological Features (PBFs) for Designated Critical Habitat** (Designation of CH, 2021):
 - “1. Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (i.e., channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussels and native fishes (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates).

- 2. Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species is found and to maintain connectivity of streams with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussels' and fish hosts' habitat, food availability, spawning habitat for native fishes, and the ability of newly transformed juveniles to settle and become established in their habitats.
 - 3. Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.
 - 4. The presence and abundance of fish hosts necessary for yellow lance recruitment".
- **Relevant Pesticide Use Sites in FWS Documents**
 - No specific pesticide use sites were described in FWS documents, although potential sensitivity of freshwater mussels to chemicals were described (SSA, 2019).
- **Relevant Recovery Criteria and Actions**
 - Delisting Criteria (Draft Recovery Plan, 2022):
 1. "Resilient populations are present in at least seven (7) of eight (8) historically occupied river basins (i.e., Patuxent, Potomac, Rappahannock, York, James, Chowan, Tar, and Neuse), as evidenced by stable or increasing abundance, with sufficient numbers to support ongoing natural recruitment and multiple age classes, observed and recorded over a 15-year period.
 2. At least 12 resilient subpopulations (i.e., as described above for populations) are present across the species' range, distributed such that at least five (5) of the river basin populations each contain two (2) or more subpopulations. Geographically, at least two (2) subpopulations occur in each of the three (3) historically occupied physiographic provinces of the Coastal Plain, Piedmont, and Mountains.
 3. Threats identified in the 2018 listing rule (83 FR 14189) and since then have been addressed and/or managed to the extent that water quality, water quantity, instream habitat, and connectivity between and among populations will be maintained at levels meeting life history requirements of the species (i.e., conditions support achievement and maintenance of Criteria 1 and 2 above). Additionally, invasive species, pathogen prevalence, and disease incidence occur at sufficiently low levels such that effects on population growth and demography are minimized (i.e., also supports achieving Criteria 1 and 2). Finally, there is reasonable assurance of mechanisms to prevent a resurgence of existing threats or emergence of foreseeable threats to the species and its habitat".
 - Actions Needed (Draft Recovery Plan, 2022):
 1. Continue captive propagation efforts to support augmentation and reintroduction of populations within the species' current and historical range
 2. Develop a species propagation, augmentation, and reintroduction plan, in accordance with the USFWS Controlled Propagation Policy (65 FR 56916)
 3. Develop and implement a long-term population and habitat monitoring program

4. Develop a rangewide genetics program
5. Increase knowledge of species' biology and ecological needs, particularly in response to threats, and apply relevant knowledge from other mussel taxa, as appropriate (e.g., congeners, associate species, Unionidae)
6. Maintain, enhance, and restore habitat
7. Monitor host fish abundance, population structure, and recruitment in watersheds
8. Identify and evaluate the magnitude of existing stressors and sources of threats, and manage for their abatement
9. Coordinate with local, state, and federal entities to promote yellow lance recovery
10. Implement protective water quality standards, classifications, and protections to address ongoing threats from a variety of land use practices
11. Develop and adopt a rangewide species distribution model
12. Reduce threats in unoccupied watersheds within the species' range to support increased future redundancy and representation through reintroduction or natural range expansion
13. Search for undocumented occurrences within the species' current and historical range

3. Description of the species range

- The range was last updated 01/05/2026
- The range is 4,905,427 acres.
- Maryland, Virginia, and North Carolina

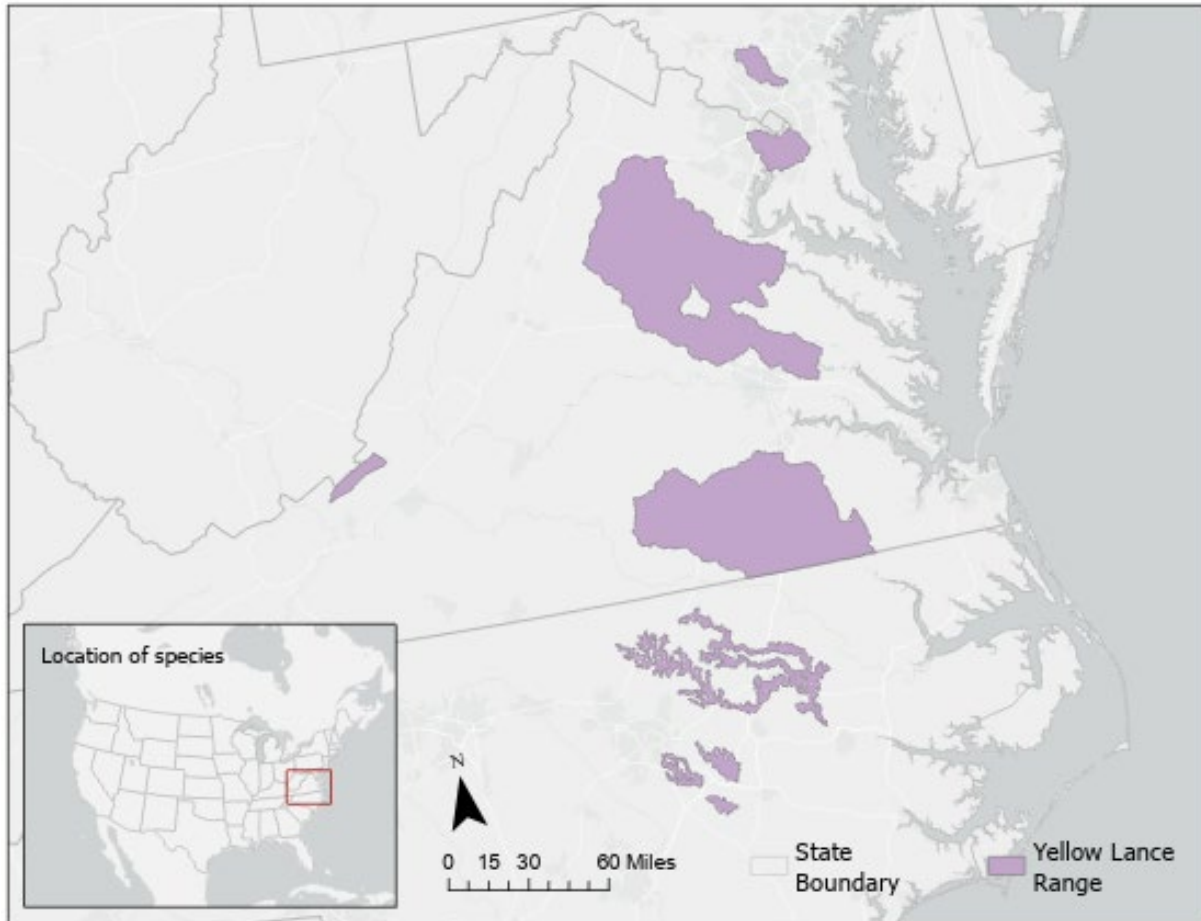


Figure A1-1. FWS Range of the yellow lance.

4. Critical Habitat (Designation of CH, 2021).

- The critical habitat was designated in 2021.
- “In total, approximately 319 river miles (mi) (514 kilometers (km)) fall within 11 units of critical habitat in Franklin, Granville, Halifax, Johnston, Nash, Vance, Wake, and Warren Counties, North Carolina; Brunswick, Craig, Culpeper, Dinwiddie, Fauquier, Louisa, Lunenburg, Madison, Nottoway, Orange, and Rappahannock Counties, Virginia; and Howard and Montgomery Counties, Maryland”.
- “This critical habitat designation does not include all streams known to have been occupied by the species historically; instead, it focuses on streams and rivers within the historical range that have also retained the necessary physical or biological features that will allow for the maintenance and expansion of existing populations and that were occupied at the time of listing”.
- All designated areas are within the range.
- **Figure A1-2** depicts the current critical habitat.

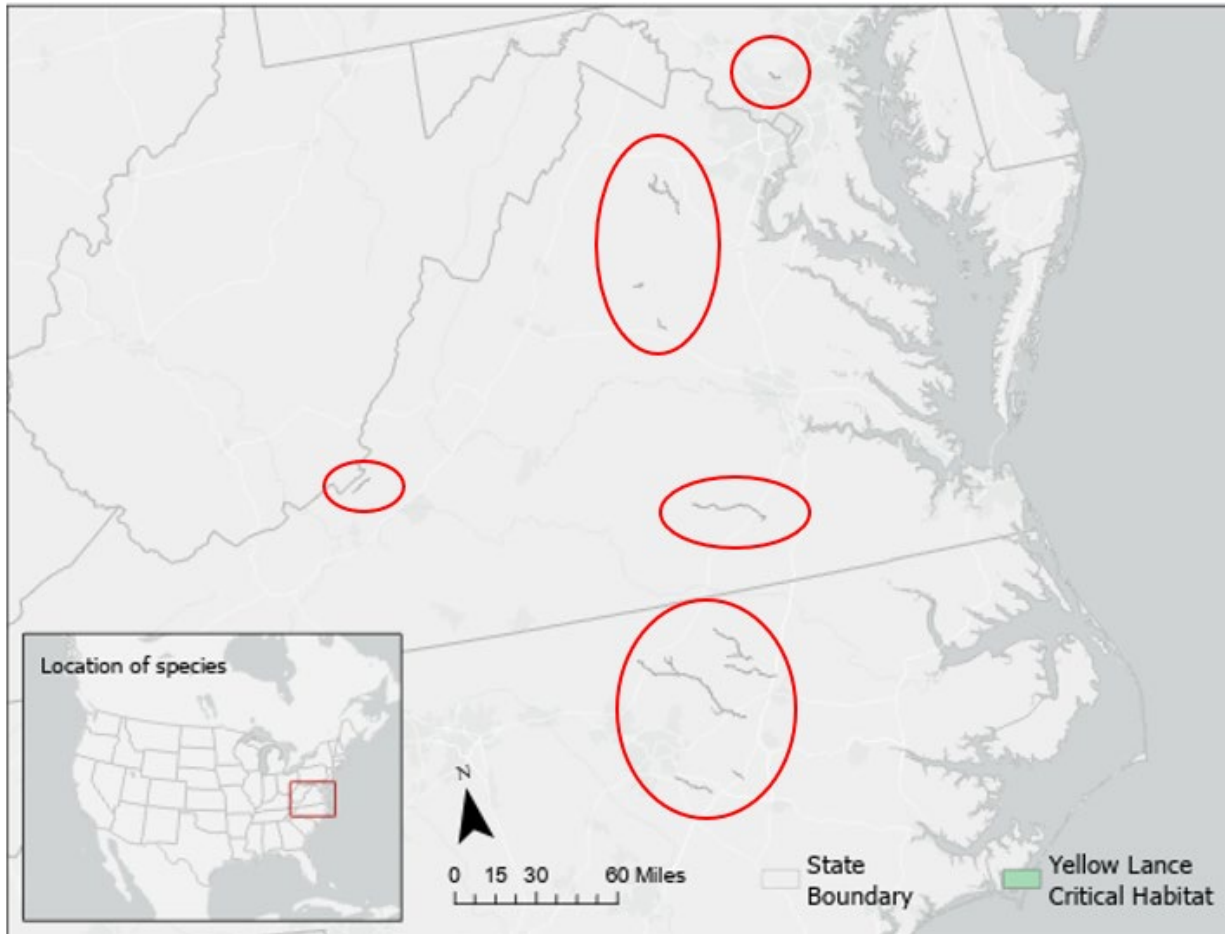


Figure A1-2. FWS critical habitat of the yellow lance. The critical habitat is approximately 319 river miles (~2,826 acres). These designated rivers are circled in red for enhanced visibility.

5. Known Locations

- **Known Locations Described in FWS Recovery Documents**

- Of the eight historical populations across Maryland, Virginia, and North Carolina, seven are known to have had a yellow lance occurrence from 2005-2018. Several of these occurrences were limited to a single location within the river basin.
 - Patuxent River (MD): In 2018, 23 individuals were found over 6+ km of the Hawlings River.
 - Rappahannock River (VA): Observed most recently in 2011 (13 individuals).
 - York River (VA): One individual observed as recent as 2007.
 - James River (VA): Last observed in 2009.
 - Chowan River (VA): Seen as recently as 2011, albeit in extremely low (5) numbers.
 - Tar River (NC): Seen as recently as 2016 with 45 live individuals.
 - Neuse River (NC): One individual observed in 2015.
- **Figure A1-3** depicts the known location data from FWS' SSA (2019).
- When considering the locations of the current (2005-2018) extant populations (**Figure A1-3**), they are consistent with the location of the critical habitat designation (**Figure A1-2**).

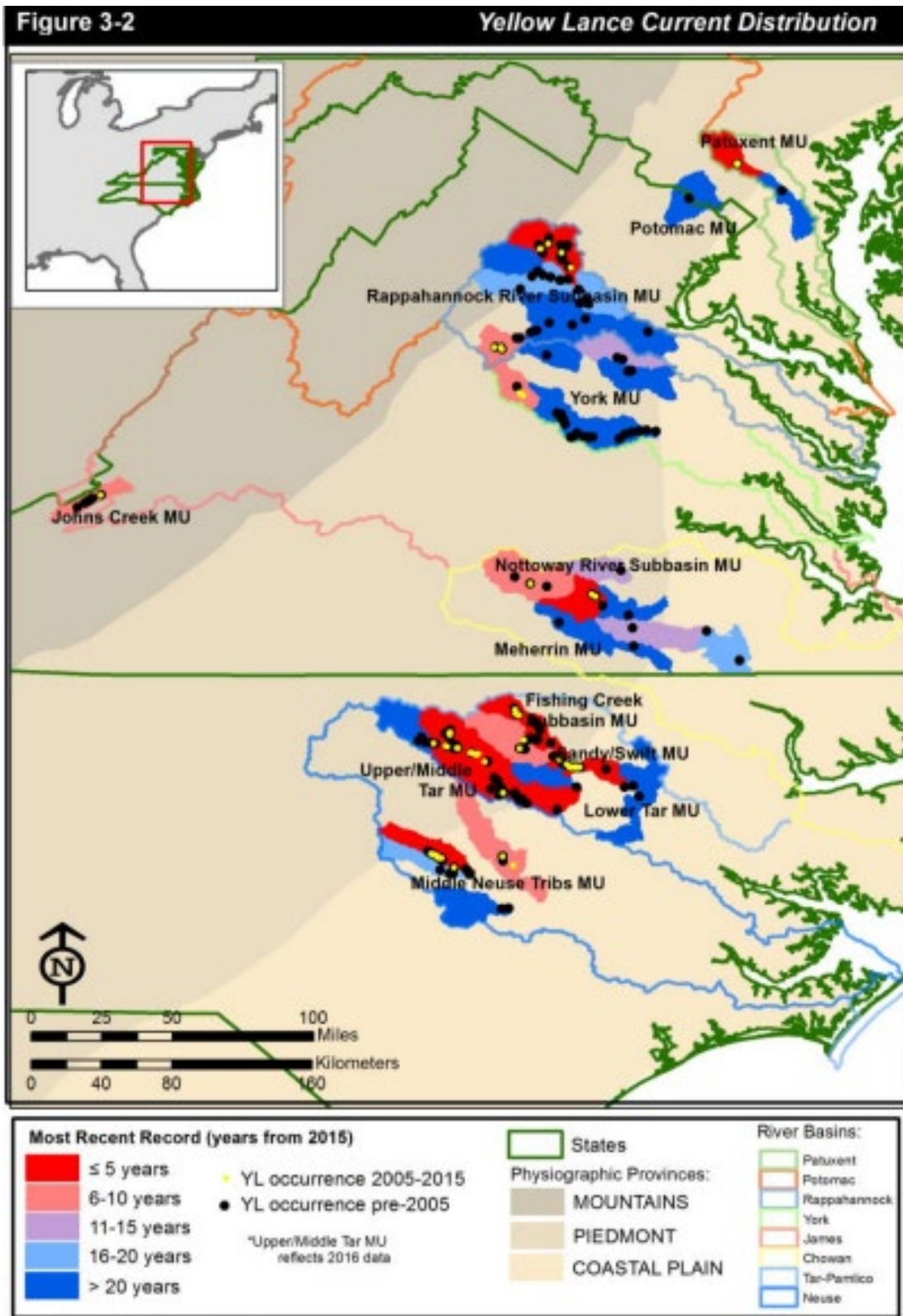


Figure A1-3. Known locations of yellow lance as of 2015 (SSA, 2019; Figure 3-2, p. 13). Note that the 2005-2015 records were used to inform the critical habitat designation.

- **Occurrences Described in Public Datasets**
 - **iNaturalist**
 - Accessed [here](#) on 12/30/2025
 - There are 3 research grade observations available from 2020-2023.
 - Coordinates are obscured due to the species status but appear to be within the critical habitat when accounting for the public positional accuracy of the data points
 - **Occurrences in GBIF**
 - Accessed [here](#) on 12/30/2025
 - There are 92 research grade, human observations in the United States available from 1926-2023. However, only one observation from 2023 included location coordinates.
 - The coordinates of this singular data point are obscured due to the species status but appear to be within critical habitat and critical habitat when accounting for the coordinate uncertainty.
 - **Occurrences in NatureServe**
 - Accessed [here](#) on 12/30/2025
 - There are 70 occurrences in the database from 1994-2024, but only 5-9 of these are considered good to excellent viability.
 - These buffered locations are generally consistent with the location of the range. One documented distribution on the Eastern Shore of Maryland is outside the species range. However, this data is from an observation in 1995.
 - Due to the coarse resolution of this data, it is unclear if these occurrences align with the range and critical habitat. Locations generally appear to be consistent with the range except for one occurrence on the Eastern Shore of Maryland and two occurrences near Lynchburg, VA. Since these three occurrences are sparse and are over 25 years old, they do not likely represent current known locations and do not support expanding the core map to areas outside the range.

Collectively, the occurrence data from iNaturalist, GBIF, and NatureServe do not support expanding the core map beyond the critical .