



## An Example of a Floodplain Species Assessment and Plan

Communities that participate in the Community Rating System of the National Flood Insurance Program are encouraged to develop and implement a floodplain species assessment and a floodplain species plan to support the protection and restoration of threatened and endangered species within their jurisdictions. Credit for an assessment and a plan is provided according to the criteria described in element FSA (floodplain species assessment) and element FSP (floodplain species plan) in Section 512.c under Activity 510 (Floodplain Management Planning) of the *CRS Coordinator's Manual* and the *Addendum to the CRS Coordinator's Manual, 2017 Edition*.

The attached document is an example of multi-jurisdictional floodplain species assessment and floodplain species plan prepared for Gloucester County and James City County, Virginia. The original floodplain species assessment is found on pages 1–18. This was circulated for comments from the agencies and organizations listed on pages 16–17. The counties drafted the subsequent Floodplain Species Plan based on those comments and reviews of the recovery plans. This starts on page 18.

This is not an official document of Gloucester or James City County. It was prepared as a pilot floodplain species assessment and floodplain species plan. The County staff is continuing to work to ensure that the recommendations are viable, especially those that involve other offices, before it can be submitted for adoption. The final document may well look different than this draft. Meanwhile, CRS communities can copy sections of the attached for formatting purposes and know that a document similar to this one would be approved for FSA and FSP credit under 512.c.

More information on FSA and FSP credits can be found in *Preparing a Floodplain Species Assessment and a Floodplain Species Plan for Credit under the Community Rating System*, available on the [CRS Resources website](#).

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# Floodplain Species Assessment and Plan

## Gloucester County and James City County, Virginia

### Introduction

Gloucester County is part of the Middle Peninsula on the Western Shore of the Chesapeake Bay. James City County (JCC) is part of the lower peninsula along the Western Shore of the Chesapeake Bay. Both Counties are part of the Hampton Roads region of Southeastern Virginia. Both Counties are members of FEMA's Community Rating System program and benefit from reduced flood insurance rates as a result of their participation and efforts.

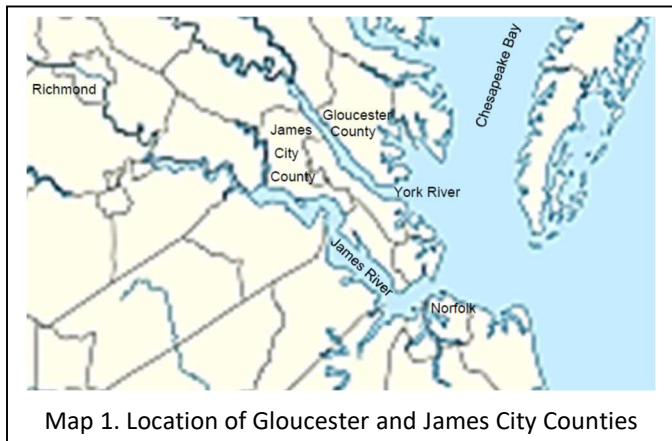
**Note:** This is not an official document of Gloucester or James City County. It was prepared as a pilot Floodplain Species Assessment and Floodplain Species Plan. County staff need more time to ensure that the recommendations are viable, especially those that involve other offices, before it can be submitted for adoption. The final document may well look different than this draft. Meanwhile, readers can copy sections for formatting purposes and know that a document like this would be approved for CRS credit under 512.c.

Gloucester consists of 218 square miles of land and 70 square miles of water. Gloucester has a population of 36,858 (2010 Census) citizens. Gloucester is surrounded by 296 miles of waterways and its borders are largely defined by water such as the York River and Mobjack Bay. Historically Gloucester was a rural community of farmland and fisheries.

The George P. Coleman bridge was constructed in 1952 and allowed for greater job opportunities and growth on the Middle Peninsula. Gloucester experienced rapid growth from 10,343 citizens in 1950 to 30,131 in 1990.

Today, the County consists of concentrated residential development surrounded by agricultural development and forested lands.

James City County is located on the Peninsula between the James and York Rivers upstream of the Chesapeake Bay. The county consists of 144 square miles of land and 37 square miles of water. James City has a population of 67,009 (2010 Census) citizens.



Map 1. Location of Gloucester and James City Counties

James City County is a county of firsts as it was home to the first permanent English settlement in America at Jamestown and also the first colonial government in America. James City has experienced rapid growth increasing in population from 17,583 citizens in 1970 to 75,524 in 2017. The County consists primarily of residential development, tourist, commercial and manufacturing land uses as well as large tracts of forest lands.

## Threatened and Endangered Species

As noted in the box to the right, one set of animals and plants deserving special protection are threatened and endangered species. Because of their declining numbers, these species have been listed by the US Fish & Wildlife Services (FWS) or the National Marine Fisheries Service (NMFS) as needing protection under the provisions of the Endangered Species Act. They “are the esthetic, ecological, education, historical, recreational and scientific value of the Nation and its people.” (Endangered Species Act of 1973)

The FWS describes the status of these species in simple terms:

- Endangered species are at the brink of extinction now.
- Threatened species are likely to be at the brink in the near future.

A review of FEMA’s Flood Risk and Endangered Species Habitat (FRESH) website found three threatened, four endangered and one proposed threatened species listed by FWS and NMFS. FRESH map data comes from FWS and NMFS sources. Note that the Shortnose Sturgeon’s habitat is found offshore of Gloucester County only.

Table 1. Threatened and Endangered Species in Gloucester and James City County, VA			
Species	Scientific Name	Status	Agency
Sensitive Joint-Vetch	Aeschynomene virginica	Threatened	FWS
Candy Darter	Etheostoma osburni	Endangered	FWS
Dwarf Wedgemussel	Alasmodonta heterodon	Endangered	FWS
Small Whorled Pogonia	Isotria medeoloides	Threatened	FWS
Northern Long-Eared Bat	Myotis septentrionalis	Threatened	FWS
Eastern Black Rail	Laterallus jamaicensis ssp. Jamaicensis	Proposed Threatened	FWS
Shortnose Sturgeon *	Acipenser brevirostrum	Endangered	NMFS
Atlantic Sturgeon	Acipenser oxyrinchus	Endangered	NMFS
* The Shortnose Sturgeon’s range is only in Gloucester County			

### Why Save Endangered Species?

“None of these creatures exists in a vacuum. All living things are part of a complex, often delicately balanced network called the biosphere. The earth’s biosphere, in turn, is composed of countless ecosystems, which include plants and animals and their physical environments. No one knows how the extinction of organisms will affect the other members of its ecosystem, but the removal of a single species can set off a chain reaction affecting many others. This is especially true for “keystone” species, whose loss can transform or undermine the ecological processes or fundamentally change the species composition of the wildlife community.” – US FWS at [www.fws.gov/endangered](http://www.fws.gov/endangered)

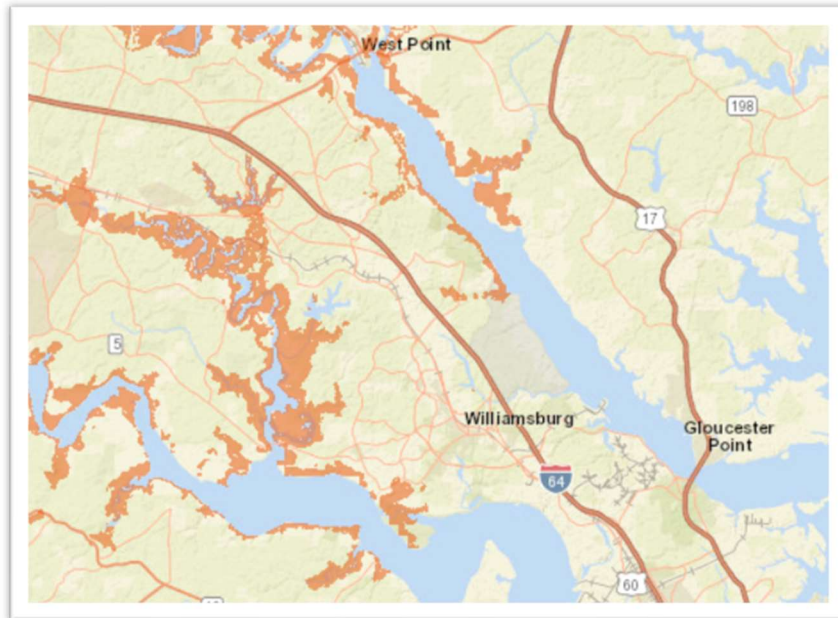
## Range and Critical Habitat

The eight identified species have varying degrees of range map refinement. Four have broad-brush ranges throughout the State or County and four have ranges in parts of the counties. Only the latter are shown on the following maps.

### Definition: Range

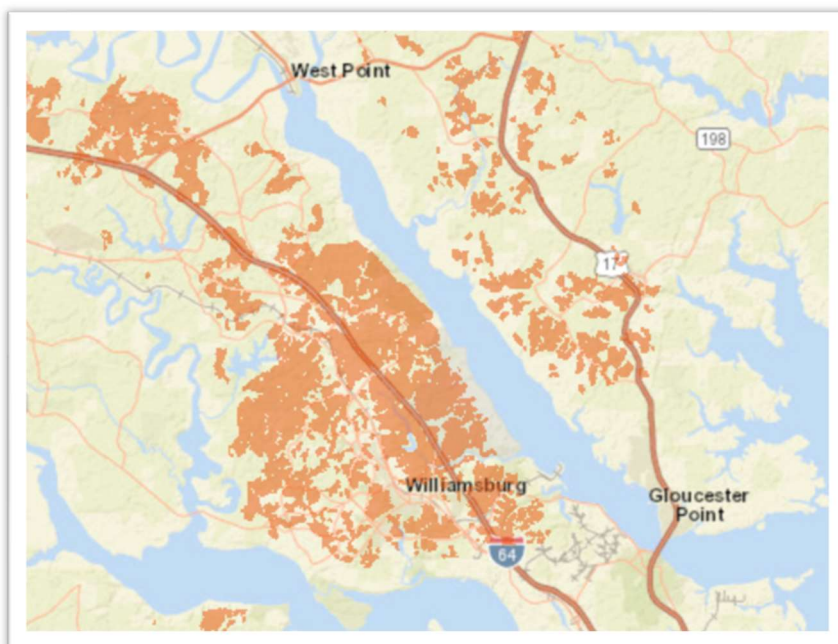
The “range” of a species is defined as the general geographical area within which that species can be found at the time either FWS or NMFS makes a status determination. This range includes those areas used throughout all or part of the species’ life cycle

The sensitive joint-vetch's range is shown in Map 2. It is found in marshes along tidal rivers, mostly along the Morris Bay area of Gloucester on the York River. Map 4 shows this in more detail. Within James City County, the joint-vetch range is along most shorelines as seen below.



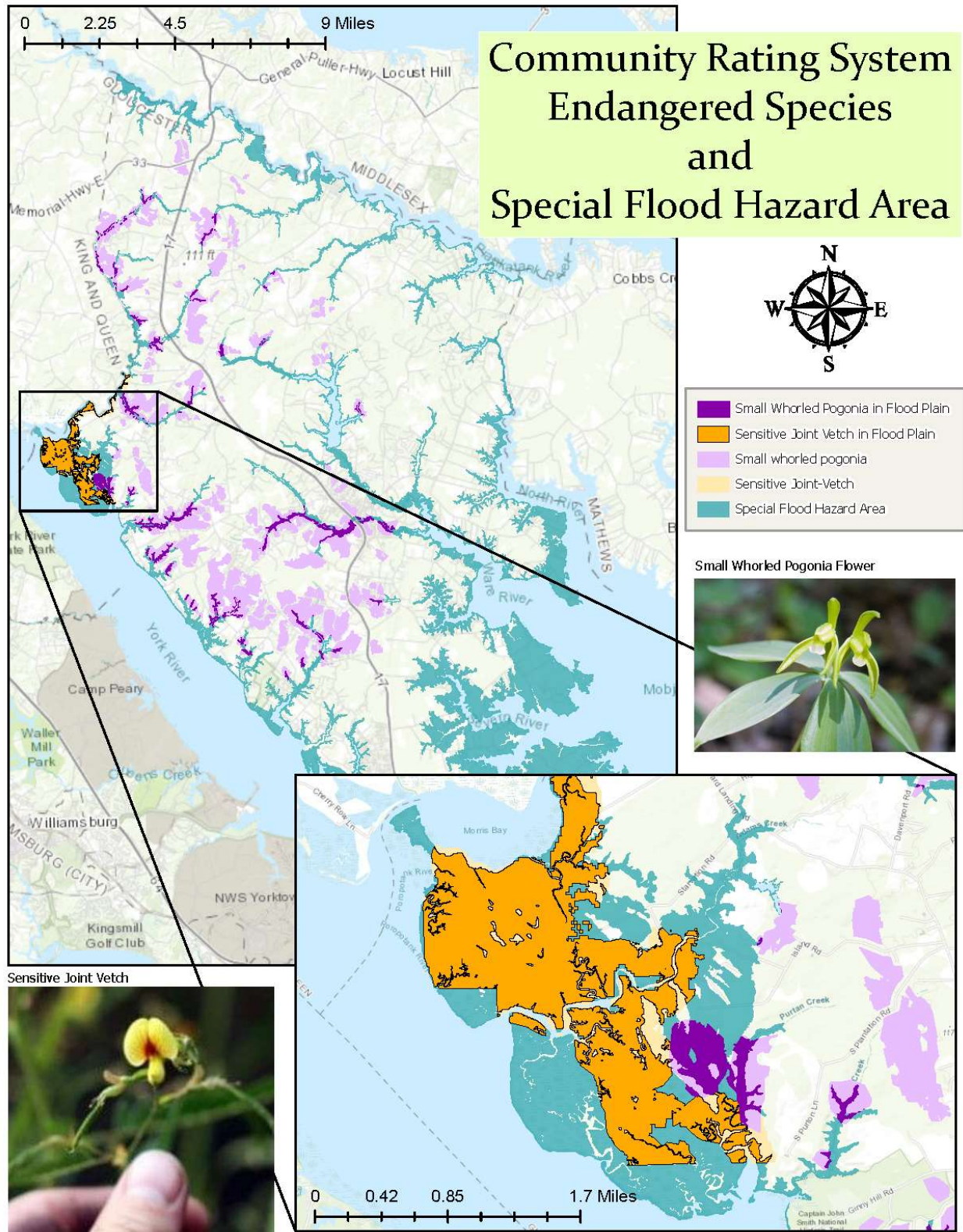
Map 2. Range Map of sensitive joint-vetch within Gloucester and JCC.  
(From FWS' Environmental Conservation Online System (ECOS))

Within Gloucester, the range of the small whorled pogonia is found primarily in forests in the central County areas and west toward the York River. The small whorled pogonia has range throughout James City County.



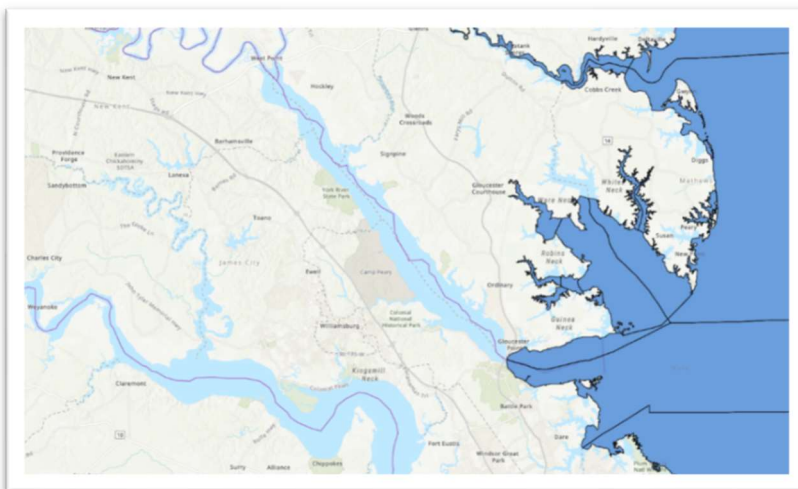
Map 3. ECOS Range Map of small whorled pogonia within Gloucester and JCC.





Map 4. Sensitive joint-vetch and small whorled pogonia ranges and floodplain – Gloucester County

The Shortnose Sturgeon and Atlantic Sturgeon have mapped ranges along Gloucester’s major coastal water bodies. The Shortnose sturgeon’s mapped range does not include James City County, but the County’s waterways are similar to other areas where it has been found.



Map 5. Atlantic Sturgeon critical habitat York and James Rivers indicated by the purple lines. Shortnose Sturgeon range indicated within the dark blue areas. (FEMA, Flood Risk and Endangered Species habitat (FRESH) Map)

As noted above, the Atlantic Sturgeon has critical habitats in the York and James rivers. These critical habitats are breeding locations. However, all major tributaries in both the James and York Rivers support spawning of the Atlantic sturgeon up to the fall lines or dams.

#### **Definition: Critical Habitat**

“Critical habitat” are specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection. Critical habitat may also include areas that are not currently occupied by the species but will be needed for its recovery. – [FWS Environmental Conservation Online System](#)

## **Floodplain and Open Space**

Map 5 shows that the Atlantic and Shortnose Sturgeons’ range and critical habitat are in Chesapeake Bay and its estuaries, which are parts of the counties’ floodplains. All of the range and critical habitat are preserved open space because of state and federal regulations prohibiting filling and construction in these waters.

Almost all terrestrial species prefer habitat in open space rather than in developed areas. For this assessment, both counties reviewed the amount of their floodplains that are preserved as open space.

**Gloucester County:** Gloucester County prepared its [Hazard Mitigation Open Space Management Plan](#) in 2014 to guide the County in managing County-owned open space in hazardous areas, such as floodplains. A key point is the Plan’s first recommendation – “Leave acquired properties in their natural state.” The Plan covers 34 parcels with a total acreage of

99.5 acres. They are mostly located in the southeastern corner of the county and almost all but a few of them are in the Special Flood Hazard Area. These parcels will remain open as they have or will have deed restrictions, but they are a relatively small part of the County's floodplain.

Gloucester County has not yet developed a detailed County-wide map of preserved open space in the floodplain. The closest tool to determine open space at the County level is the zoning district map. Map 6 shows the Special Flood Hazard Areas and Map 7 shows the zoning districts. It can be seen the bulk of the SFHA is comprised of the waters that form the north and south boundaries of the County and the land on the eastern boundary.

The waters, e.g., the York and Piankatank Rivers and Mobjack Bay, are certainly open space and state laws prohibit most development there. The land on the east is covered by three zoning districts: C-1 Conservation (light green – no residential development permitted), C-2 Bay Conservation (dark green – One dwelling unit per 5 acres), and RC-2 Rural conservation (blue – One dwelling unit per 5 acres).

While much of these floodplains are vacant, the Zoning Ordinance's land use controls do not prevent new development. Development and buildings are allowed, either on large lots or under special exceptions. Using the Community Rating System's definitions, these lands would not meet the criteria of "preserved open space," but the regulations would likely qualify for CRS credit as "open space incentives" and/or "low density zoning."

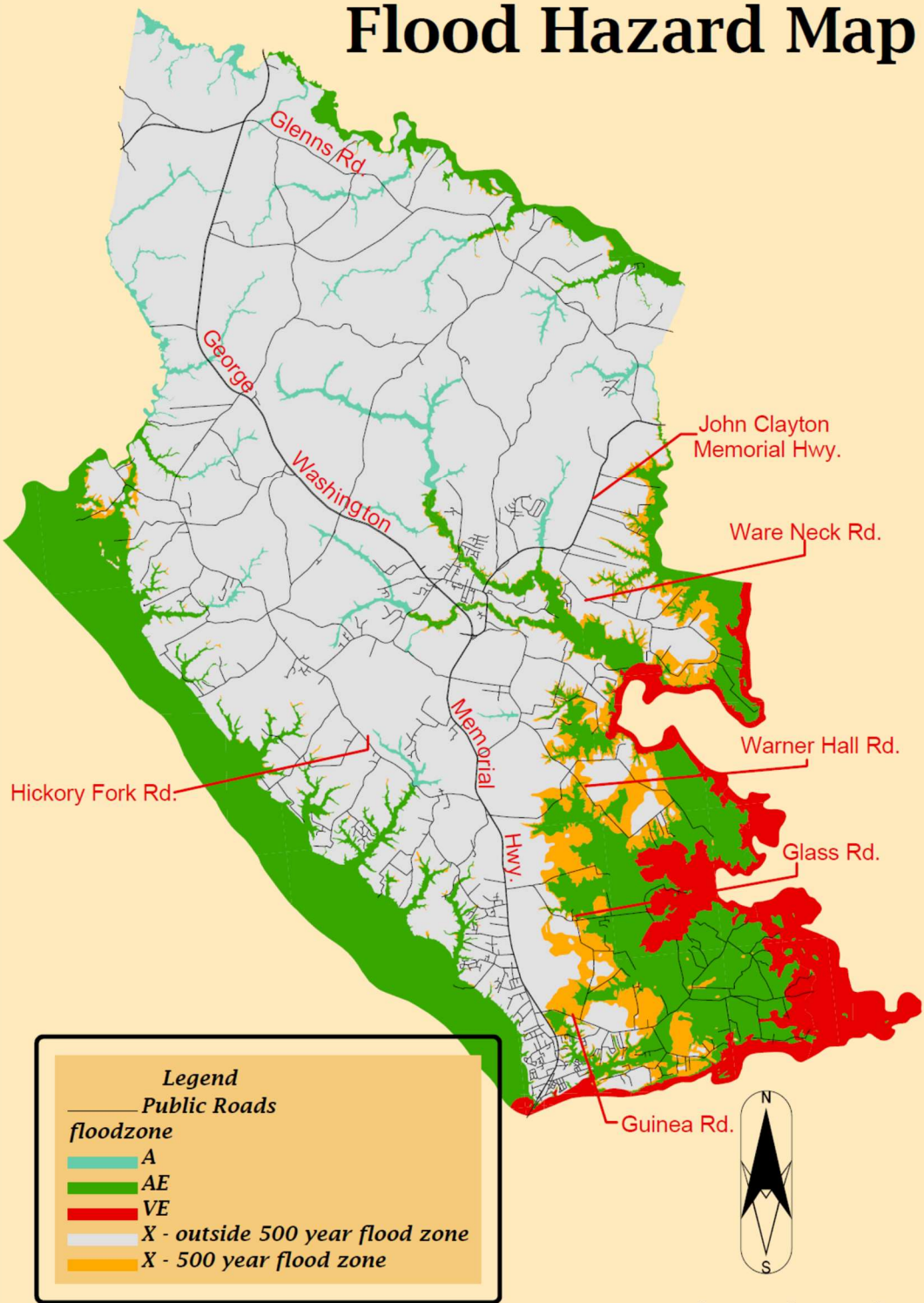
By comparing Maps 6 and 7, it is estimated that 75% of Gloucester County's flood hazard area will have little or no new development because of the restrictions in the three zoning districts. The County will make a more accurate determination of the areas that qualify as preserved open space and the areas where maintaining open areas is encouraged.

**James City County:** James City County's Special Flood Hazard Area covers 21,952 acres. Of that, 1,616 acres (7%) is preserved as open space. The County is working to have additional areas qualify under the CRS. While 7% is not a big number, the open space percent of the floodplain range for the two threatened plants is much larger.

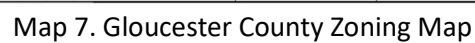
Maps 8 and 9 show how much of the range for the Sensitive joint-vetch and the Small whorled pogonia are within preserved open space in James City County. Map 8 shows that 600 acres of the sensitive joint-vetch range is within the CRS preserved open space. This represents 37% of the floodplain range of the plant. Map 9 presents the same information for the small whorled pogonia, showing that 517 acres or 32% of the floodplain range for the pogonia plant is within CRS preserved open space.



# Gloucester County Flood Hazard Map



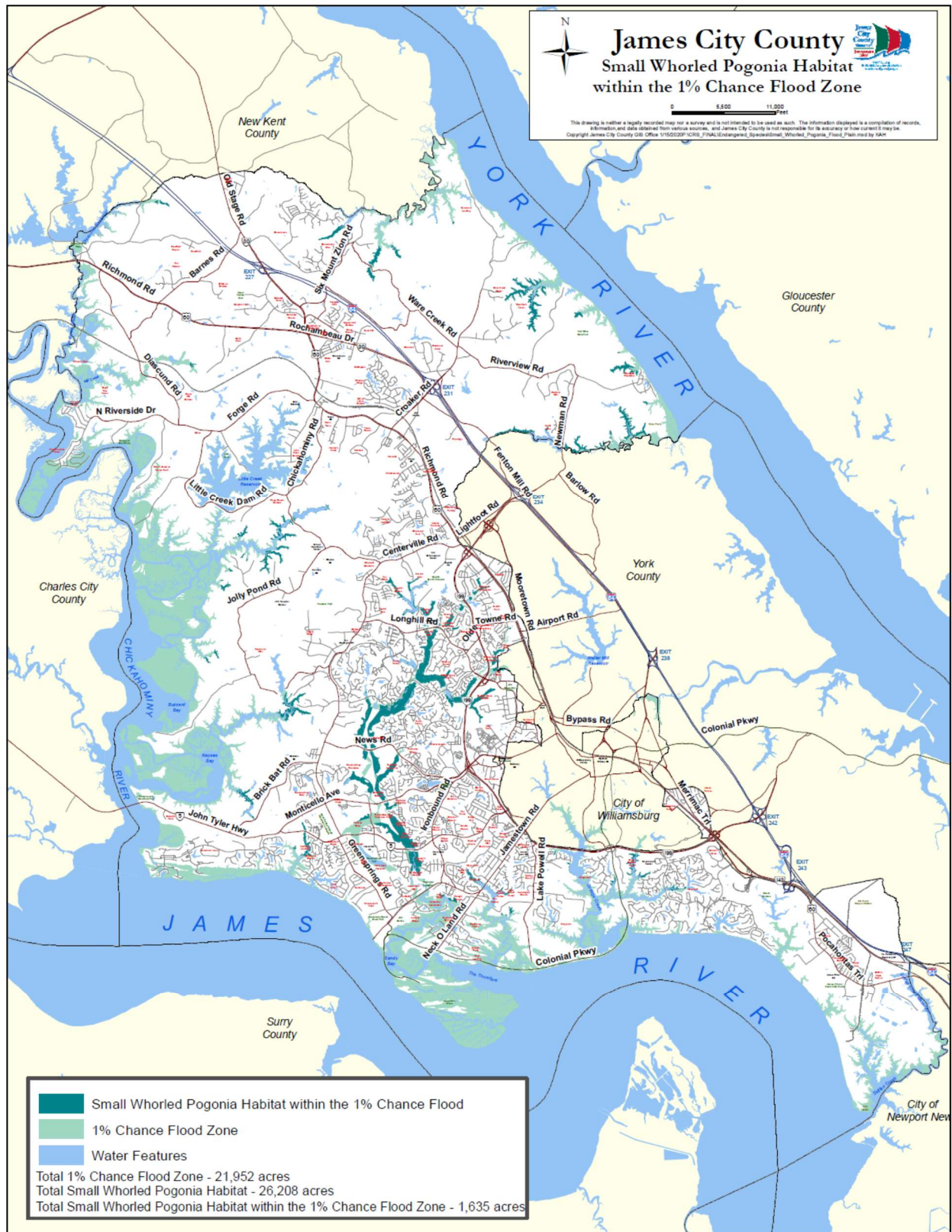
Map 6 Gloucester County Flood Hazard Map







Map 8. Sensitive joint-vetch Range in CRS Open Space – James City County



Map 9. Small whorled pogonia range in CRS Open Space – James City County



## Community Rating System Credit for Conservation and Recovery

A number of conservation and recovery actions that local governments can implement can be credit under the Community Rating System (CRS). The CRS provides reduced flood insurance premiums in communities that undertake activities to prevent or reduce flood losses and protect natural floodplain functions.

### Gloucester County CRS

Gloucester County is currently a CRS Class 6, saving floodplain residents and businesses \$275,920 annually. Implementing more activities, such as threatened and endangered species recovery actions, could help the County move to a better CRS class.

Table 2 for Gloucester County reviews general CRS-credited recovery actions that are applicable to most threatened and endangered species. The “Credited” column shows the County’s current status. In most cases, the County is implementing the activity, but efforts are not specifically targeting endangered species. The Feasible column indicates the feasibility to conduct additional element work. The actions in Table 2 are generally appropriate for all threatened and endangered species.

**300 (Public Information Activities):** The County is implementing all of the public information activities and elements listed in Table 2. It would take a minor effort to adjust them to better address threatened and endangered species. We could use the FRESH maps for credit under Activity 320 (Map Information Service), MI7. The outreach projects, library references, and website could also be revised or expanded to provide more information on protecting threatened and endangered species. However, we should first confer with the appropriate experts and agencies to identify the most appropriate messages, references, and websites to link to.

**Activity 420 (Open Space Preservation)** – Gloucester’s OSP program is currently under development. This includes County and State-owned lands, Resource Protection areas and deed restricted open space. Given that much of these lands overlap with known endangered species habitat, the OSP effort will help document lands that are safe havens for some endangered species

**420 – Natural shoreline protection (NFP):** Gloucester does not receive credit for NFP but may receive credit following efforts with the OSP program. Following this development, the County could consider shoreline management practices although resources are unlikely to be available.

**Activity 430 (Higher Regulatory Standards)** – If the Resource Protection Area regulations do not qualify for CRS credit for open space preservation, they would likely qualify as a development limitation (DL).

Table 2. CRS Credited Conservation and Recovery Actions - Gloucester			
Activity/Element	Doing?	Credited?	Feasible?
<b>300 Public Information Activities</b>			
Providing information on areas that serve natural floodplain functions, such as wetlands (MI7)	Yes	(a)	Max Credit Received
Outreach projects (OP) with messages on protecting natural functions	Yes	(a)	Max Credit Received
Designing and disseminating messages on protecting natural floodplain functions in a Program for Public Information (PPI)	Yes	(a)	Yes, 9 pts available.
Having materials in the local public library (LPD) on protecting local natural floodplain functions	No		Yes, In Progress
Having materials on protecting local natural floodplain functions in the community's website (WEB)	Yes	(a)	Nearly Max Credit Received
<b>420 (Open Space Preservation)</b>			
Preserving open space in the floodplain (OSP)	Yes	(a)	Yes, In Progress.
Preserving open space in the flood- plain in its natural state (NFOS)	Yes	(a)	Yes, In Progress.
Preserving open space on eroding shorelines (CEOS)	No		No.
Offering incentives to developers to keep the floodplain open (OSI)	Yes	(a)	Yes.
Zoning floodprone areas for large lot sizes to preserve low density uses (LZ)	Yes	(a)	No.
Preserving stream banks and shore- lines in their natural state (NSP)	No		No.
<b>430 (Higher Regulatory Standards)</b>			
Prohibiting filling in the floodplain (DL1a)	No		Possible credit for RPA.
Regulating development in areas subject to coastal erosion (CER)	No		No.
Other regulations to protect natural floodplain functions not specifically listed in the Coordinator's Manual	No		No.
<b>450 (Stormwater Management)</b>			
Requiring new developments in the watershed to account for the total volume of runoff released (SMR-DS)	No		No.
Requiring new developments to use low impact development techniques (SMR-LID)	No		No.
Setting stormwater management standards based on an overall plan for the watershed (WMP)	No		No.
<b>510 (Floodplain Management Planning)</b>			
Adopting one or more plans that address protecting natural floodplain functions (NFP)	No	(a)	Potentially.
<b>540 (Drainage System Maintenance)</b>			
Having a habitat-friendly program to clear debris in drainageways (CDR)	No.		No.
(a) The County is implementing this activity, but current efforts do not specifically address threatened and endangered species			

**450 (Stormwater Management) – Design Storm (DS):** The Commonwealth requires stormwater runoff control for development (9VAC25-870-66). For additional credit, the County could develop higher standards to the 100-year design storm.

**450 – Low impact development (LID):** Gloucester has an ordinance that requires LID techniques to manage stormwater quantity prior to utilizing conveyance or detention facility. The County could receive full LID credit if all new development, including single family homes, were required to use low-impact development techniques.

**450 – Watershed master plan (WMP):** Gloucester County is given credit for watershed master planning.

**Activity 540 (Drainage System Maintenance):** Gloucester receives no credit for Drainage System Maintenance. Gloucester is not an MS4 community and does not possess a public drainage system.

### **James City County CRS**

Table 3 reviews for James City County the general CRS-credited recovery actions that are applicable to most threatened and endangered species. The “Credited” column shows the County’s current status. In several cases, the County is implementing the activity, but efforts are not specifically targeting endangered species. The Feasible column indicates the feasibility to conduct additional element work. The actions in Table 3 are generally appropriate for all threatened and endangered species.

Concerning the County’s CRS classification, James City County is currently a Class 7 CRS community saving residents and businesses an estimated \$75,000 in flood insurance premiums. However, based on a draft verification report, the County should become a Class 5 community in October 2020 saving the community over \$100,000 in flood insurance premiums.

**300 (Public Information Activities):** James City County is currently implementing all of the public information activities and elements listed in Table 3 except for a Program for Public Information (PPI). The county is receiving 145 points of credit for Activity 330 (Outreach Projects). It would not require major efforts to adjust the outreach projects to better address threatened and endangered species.

We could use the FRESH maps for credit under Activity 320 (Map Information Service), MI7. The outreach projects, library references, and website could also be revised or expanded to provide more information on protecting threatened and endangered species. However, we would first confer with the appropriate experts and agencies to identify the most appropriate messages, references, and websites to link to.

Table 3. CRS Credited Conservation and Recovery Actions – James City County			
Activity/Element	Doing?	Credited?	Feasible?
<b>300 Public Information Activities</b>			
Providing information on areas that serve natural floodplain functions, such as wetlands (MI7)	Yes	(a)	Yes
Outreach projects (OP) with messages on protecting natural functions	Yes	(a)	Yes
Designing and disseminating messages on protecting natural floodplain functions in a Program for Public Information (PPI)	No	No	Potentially
Having materials in the local public library (LPD) on protecting local natural floodplain functions	Yes	(a)	Yes
Having materials on protecting local natural floodplain functions in the community's website (WEB)	Yes	(a)	Yes
<b>420 (Open Space Preservation)</b>			
Preserving open space in the floodplain (OSP)	Yes	(a)	Yes
Preserving open space in the flood- plain in its natural state (NFOS)	Yes	(a)	Yes
Preserving open space on eroding shorelines (CEOS3)	No	No	No
Offering incentives to developers to keep the floodplain open (OSI)	Yes	No	Potentially
Zoning floodprone areas for large lot sizes to preserve low density uses (LZ)	No	No	No
Preserving stream banks and shore- lines in their natural state (NSP)	No	No	No
<b>430 (Higher Regulatory Standards)</b>			
Prohibiting filling in the floodplain (DL1a)	Yes	(a)	Potentially
Regulating development in areas subject to coastal erosion (CER)	No	No	No
Other regulations to protect natural floodplain functions not specifically listed in the Coordinator's Manual	No	No	Potentially
<b>450 (Stormwater Management)</b>			
Requiring new developments in the watershed to account for the total volume of runoff released (SMR-DS)	Yes	Yes	Yes
Requiring new developments to use low impact development techniques (SMR-LID)	Yes	(a)	Yes in certain watersheds in the County
Setting stormwater management standards based on an overall plan for the watershed (WMP)	Yes	No	Yes in certain watersheds in the County
<b>510 (Floodplain Management Planning)</b>			
Adopting one or more plans that address protecting natural floodplain functions (NFP)	No	(a)	Potentially
<b>540 (Drainage System Maintenance)</b>			
Having a habitat-friendly program to clear debris in drainageways (CDR)	No	No	Potentially in regard to stream restoration projects
(a) The County is implementing this activity, but current efforts do not specifically address threatened and endangered species			



**Activity 420 (Open Space Preservation)** – James City County has an extensive OSP program implemented through its development regulations earning 1,457 credits (1,278 without the growth factor). There are requirements to preserve a 100-foot Resource Protection Area (RPA) natural buffer around all perennial streams. Also, the county’s stormwater management criteria allows compliance credit for open space areas preserved in Natural Open Space Easements; a large amount of these easements are RPA buffer areas and sensitive natural areas.

The County also has a cluster development ordinance, a Purchase of Development Rights program and other legislative tools such as requirements for natural resource inventories for large developments to identify among other things potential critical habitat area for threatened and endangered species. These items could potentially earn credit under OSI. As these programs often involve known endangered species habitat, the OSP effort helps to identify lands that are safe havens for some endangered species.

**420 – Natural shoreline protection (NFP):** James City County does not receive credit for NFP. The county does implement and encourage living shoreline projects and stream restoration projects but these do not appear to meet the NSP requirements as these projects do utilize riprap rock structures to help stabilize the streams and shorelines.

**430 Higher Regulatory Standards (DL1a):** James City County prohibits filling in the riverine floodplain to create a buildable site for a structure. The ordinance prohibits the creation of a lot that does not have a natural, unfilled building site at least one foot above the 100-year floodplain. However credit was not given for this activity. We could explore amending this provision so that it would be eligible for credit. In reviewing 432.0 (OHS), there are provisions in our subdivision ordinance that could be reviewed to determine if they would qualify for credit such as land must be suitable for development including access roads and restrictions on septic systems relating to the floodplain.

**450 (Stormwater Management) – Design Storm (DS):** The Commonwealth requires stormwater runoff control for development (9VAC25-870-66). For additional credit, the County could develop higher standards requiring controls on up to the 100-year design storm.

**450 – Low impact development (LID):** James City County uses the Virginia Runoff Reduction Method (VRRM) to demonstrate stormwater management compliance. This method requires the use of LID techniques to manage stormwater quantity prior to utilizing a retention or detention facility. In addition, in certain watershed management plans developed and adopted by the County, there is a requirement for sensitive watersheds to implement Special Stormwater Criteria (SSC). To meet the SSC requirements, LID features are required in addition to the standard stormwater management requirements. The SSC requirements could be more broadly applied to all new development, including single family homes.

**450 – Watershed master plan (WMP):** James City County has developed watershed management plans for several watersheds. However, these plans are not hydrologic / hydraulic

studies that determine flood flows and how to manage them. Rather, they are for the purpose of identifying wetlands, natural area, and conducting stream and floodplain assessments to improve their condition. These watershed studies have direct relevance to the identification and protection of critical habitat for threatened and endangered species.

**Activity 510 Floodplain Management Planning (NFP):** James City County receives credit under this activity for its participation in the regional Hazard Mitigation Plan. The County has adopted other plans that may qualify for credit under this activity. The watershed management plans incorporate many of the provisions presented in 512c. The county has also adopted a green infrastructure plan that can also be examined to see if it meets the goals of the habitat protection effort or can be modified to meet those goals.

**Activity 540 (Drainage System Maintenance):** James City County receives some credit for Drainage System Maintenance for inspection and maintenance of its stormwater management facilities. However, the county only maintains the drainage systems located on its own properties so there is limited opportunity to do habitat friendly maintenance. The Virginia Department of Transportation maintains the public roads and drainages in the county. However, the county has undertaken several stream restoration projects which improve the habitat of the streams for aquatic life.

## **Relevant Agencies and Organizations**

There are a number of state and federal agencies and private organizations that have goals and programs to protect threatened and endangered species and help them recover. The following could assist in defining appropriate activities and, possibly, help implementation.

### **Department of Wildlife Resources**

7870 Villa Park Drive, Suite 400

Henrico, VA 23228

(804) 367-1000

<https://dwr.virginia.gov/wildlife/>

### **Virginia Department of Conservation and Recreation**

Virginia Natural Heritage Program

600 East Main Street; 24th Floor

Richmond, VA 23219

804-786-7951

<https://www.dcr.virginia.gov/natural-heritage>

### **Federal Emergency Management Agency**

615 Chestnut Street

One Independence Mall, Sixth Floor

Philadelphia, PA 19106-4404

(215) 931-5500

**US Fish & Wildlife Service**

Virginia Fish and Wildlife Conservation Office  
11110 Kimages Road  
Charles City, Virginia 9823030-2844  
(804) 829-5627

<https://www.fws.gov/offices/Directory/OfficeDetail.cfm?OrgCode=52330>

**National Marine Fisheries Service****Greater Atlantic Regional Fisheries Office**

55 Great Republic Drive  
NOAA Fisheries Service  
Gloucester, MA 01930  
(978) 281-9300

<https://www.fisheries.noaa.gov/region/new-england-mid-atlantic>

**Wetlands Watch**

2601 Granby Street  
Norfolk, Virginia 23517  
757-621-1185

<http://wetlandswatch.org/>

**Historic Virginia Land Conservancy**

5000 New Point Road, Suite 3101  
Williamsburg, VA 23188  
757- 565-0343

<http://historicvirginalandconservancy.org/>

**Feedback**

Pages 1 – 17 of this document were sent to the relevant agencies and organizations on March 27, 2020. They were asked to either comment directly to community staff or attend a conference call held on April 6. All of the recipients voiced an interest. Four participated in the call, where they were asked if the list of species in Table 1 was appropriate or if some species deserved more attention than others. They were also asked to recommend recovery actions.

Those not on the call did not provide separate comments. The participants on the conference call and their main concerns are provided here.

**National Marine Fisheries Service Headquarters**, Jason Kahn. Both sturgeons warrant attention. Manatees and turtles could be added as they have been seen near the counties. He reviewed the major threats to the sturgeon and its habitat. A major concern is that stormwater runoff and fluctuations in flows are important, but they are best managed by communities upstream of the sturgeon habitat in Gloucester and James City Counties.

**US Fish & Wildlife Service, Virginia Field Office,** Amarylis Irizarry. The prime concerns should be the small whorled pogonia and sensitive joint-vetch. They need floodplains and wetlands. Both are threatened with exotic plants and development in their areas.

**Virginia Department of Conservation and Recreation, Division of Natural Heritage,** Tyler Meader and Rene Hypes. The Division explained their current activities and how they can provide assistance to the Counties' programs, especially with technical data that can help prioritize areas for attention and protection and support permit review.

**Wetlands Watch,** Mary-Carson Stiff. Controlling development is very important for any species, especially in shoreline buffer areas that filter sediment and are more resistant to bank erosion. Public information messages would be more effective if they focused on the habitat instead of a particular species and if they showed how protecting certain species is good for the economy.

**Federal Emergency Management Agency,** Region III, Environmental and Historic Preservation Office. While FEMA participated on the call, staff received the notice too late to comment.

Both NMFS and Wetlands Watch recommended actions that address floodplain and aquatic habitat in general, rather than have similar actions fine tuned to specific species. The advisors provided more detailed recommendations and provided useful documents after the call. Their recommendations resulted in some changes to the previous pages and are incorporated into the rest of this document.

***Note:** A community can stop here, after identifying the threatened and endangered species, mapping their ranges and critical habitats, reviewing relevant CRS activities, and summarizing the feedback from the technical reviewers. What is done up to this point would qualify for CRS credit as a Floodplain Species Assessment (FSA). The rest of the pages in this document are what is need for a Floodplain Species Plan (FSP) credited by the CRS.*

## **Floodplain Species Plan**

The following pages were developed based on the input from the above technical advisors and reviews of the referenced recovery plans. The advisors were sent a draft of the full plan and their comments have been incorporated into the rest of this document.

### **Selected Species**

Two of the eight species were dropped from attention because they are not likely to be found in the counties – FWS' data bases do not show the Candy Darter or the Dwarf Wedgemussel to have range in either county. Both the Eastern Black Rail and the Northern Long-Eared Bat have a very large range mapped – covering many states.

While other listed species that don't currently have range in the counties were suggested, it was concluded that the species that would be most helped by a floodplain management program are the two plants and the two sturgeons. This section provides more information about them and the threats they face.



## Small Whorled Pogonia

The small whorled pogonia is an orchid with a greenish-white stem that grows to between three and 13 inches tall. It gets its common name from the five or six grayish-green leaves that are displayed in a single whorl around the stem. When the leaves are well developed, a single flower or sometimes a pair rises from the center of the circle of leaves. The flowers are yellowish-green with a greenish-white lip.



**Life cycle:** The pogonia produces fruit that ripens in the fall. The thousands of dust-like seeds contain very little food reserves and therefore need to fall on soil containing fungi in order for the seed to germinate and seedlings to become established. Plants that are large one year are likely to bloom the next year, while plants that are small are more likely to be vegetative, go dormant, or die.

**Habitat:** Pogonia live in upland sites, in deciduous or deciduous-coniferous forests with a relatively open canopy. The soils in which it lives are usually acidic, moist, and have very few nutrients. As seen in Map 3, page 3, the pogonia's range is extensive in James City County and limited to the higher elevations of Gloucester County. Maps 4 and 9 also show a relatively small relation between the range and the mapped floodplain.

**Threats:** Habitat destruction is the primary threat to small-whorled pogonia. Commercial and residential development have encroached upon populations and eliminated what once was productive habitat.

Other threats include recreational use of hiking trails, off-road vehicles, slug damage, and grazing by mammals. Development has decreased the amount of available habitat for deer, concentrating their numbers, which in turn increases the concentration of deer that browse the plants. Small-whorled pogonia also appears to suffer from low rates of seedling establishment, meaning new plants do not replace older ones as they die.

**Recovery measures:** Given the primary threat, the primary measure would be requiring new developments to survey their lands to identify and avoid clusters of pogonias. Managing identified clusters would also help, but such work is not usually undertaken by a local government, unless it owns the land. A public information program to advise people of their appearance and what to do if they see one is also recommended in the Recovery Plan.

**Sources:** FWS [Southeast Region website](#); [Small Whorled Pogonia Recovery Plan, First Revision](#), FWS, 1992; "The Small Whorled Pogonia – A Recovering Endangered Species," FWS brochure, 1995; NatureServe [Explorer website](#).

## Sensitive Joint-Vetch

This plant is an annual that usually attains a height of three to six feet in a single growing season, but may grow as tall as eight feet. The flowers are yellow, streaked with red and the fruit is a pod, turning dark brown when ripe.

**Life cycle:** Germination takes place from late May to early June. Plants flower from July through September and occasionally into October. Fruits form shortly after the first signs of flowering in July. Seed maturation begins in August and continues through October. Seedlings grow quickly, approximately doubling in size every 2 weeks during the first 6 weeks.

**Habitat:** The Joint-Vetch occurs in fresh to slightly brackish tidal river systems, within the intertidal zone where populations are flooded twice daily. It typically occurs at the outer fringe of marshes or shores, where plant diversity is high and annual species are prevalent. It also can be found along rivers with new deposits of soil that have not yet been colonized by perennial species and in the estuarine meander zone of tidal rivers where sediments transported from upriver settle out and extensive marshes are formed.

**Threats:** The greatest threat to the sensitive joint-vetch has been habitat destruction. Many of the marshes where it occurred historically have been dredged and/or filled and the riverbanks stabilized with bulkheads or riprap. If water levels, tidal flow or salinity levels change, the species would be threatened at its existing sites. Rising sea levels and saltwater intrusion could further impact existing populations as the plant depends on open freshwater tidal habitat.

Other threats include sedimentation, competition from exotic plant species, recreational activities, agricultural activities, mining, runoff from upland development with associated pollution and sedimentation, impoundments, water withdrawal projects and introduced insect pests.

**Recovery measures:** “Three factors are key to conservation of sensitive joint-vetch: conservation of marsh sites in which it grows, protection of water quality and water levels, and upland buffer zones bordering these marshes.” – VA Dept of Conservation and Development Fact Sheet. Local governments can regulate development and shoreline alteration in and near such areas, as well as the runoff into them. A program to inform property owners and the general public would also help.

**Sources:** FWS [Southeast Region website](#); Sensitive Joint-Vetch [Recovery Plan](#), FWS, 1992; Sensitive Joint-Vetch [5-Year Review: Summary and Evaluation](#), FWS, 2013; “Sensitive Joint-Vetch – A Threatened Species,” FWS brochure, 1999; “Natural Heritage Resources Fact Sheet, Sensitive Joint-Vetch,” Virginia Department of Conservation and Development, 1997.

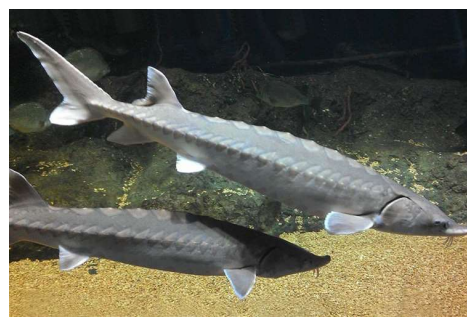


## Sturgeons

The shortnose sturgeon is rarer than the Atlantic sturgeon in the York River, but they are treated together here because actions to protect one will protect the other.

**Life cycle:** Female sturgeon lay thousands of eggs on the rocky bottoms of freshwater rivers. They hatch during February through April. Most juveniles remain in their river of birth for at least several months before migrating out to the coastal waters, often spending time up freshwater streams. They return to their birth-place periodically to lay eggs. Spawning may not happen during high flows, e.g., a flood or dam release.

**Habitat:** These sturgeon live in the counties' rivers and coastal waters. They live in their birth river, make short feeding or migratory trips into salt water, and then return to freshwater to feed and escape predation. They need clean water and hard bottom areas for spawning. The York River has been designated as critical habitat for the Atlantic Sturgeon (Map 5, page 5).



[Atlantic sturgeon](#)



[Shortnose sturgeon](#)

**Threats:** Sturgeon were once found in abundance, but their populations have declined greatly due to overfishing and habitat loss. The most significant threats to these sturgeon are unintended catch in some commercial fisheries, dams that block access to spawning areas, poor water quality (which harms development of sturgeon offspring), dredging of spawning areas, water withdrawals from rivers, and vessel strikes. Water quality, fluctuations in flows, sedimentation, unscreened intakes for agricultural water supplies along riverbanks, and discharges from a paper mill on the York River were reported as important by the technical advisors.

**Recovery measures:** Water quality improvement and reduction of sedimentation came out as the most important recovery measures for the sturgeons. While regulating fishing is also important, it is beyond the jurisdiction of local governments. The counties have land use authority over stormwater runoff facilities and construction along waterways that could increase bank erosion. They also have the ability to inform the public about what they can do to protect sturgeon habitat.

**Sources:** NMFS' Atlantic sturgeon [website](#) and shortnose sturgeon [website](#); Chesapeake Bay Program's shortnose sturgeon [website](#) and Atlantic sturgeon [website](#); "Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes," Mark B. Bain, and "Sturgeon rivers: an introduction to acipenseriform biogeography and life history," William E. Bemis & Boyd Kynard, both in *Environmental Biology of Fishes*, 1997.

## Summary of Recovery Measures

While fish and plants may not appear to have much in common, their conservation and recovery can be facilitated by several of the same measures. Here are the common themes for recovery measures for the four selected species:

1. They all need clean water, with minimal pollutants, sedimentation, and variations in flows throughout the year. A comprehensive stormwater management program that addresses these threats would help recovery.
2. The number one threat to the plants is loss of habitat. Regulating new developments and construction in undeveloped areas is vital.
3. Maintaining areas of where clusters of the plants currently exist is important. Preserving these areas as open space would greatly help.
4. Protecting shorelines from erosion and hardening would reduce sedimentation and preserve the marsh habitats for the sensitive joint-vetch.
5. Public information programs targeted to property owners would convey the importance of the above measures.
6. Informing the general public about the threats and actions individuals can take would be useful, but the messages may need to be species-specific.

## Recovery Action Phases

Some of the recovery measures summarized above, such as the public information activities, can be implemented in a relatively short time at a relatively low cost. However, others, especially revising programs that regulate development on private land, require funding, strong public support, or both. It is not clear that the public support is present because most residents of the counties are not aware of the habitat and threats to the plants and sturgeons.

Therefore, this Floodplain Species Plan takes a two phase approach:

- Phase 1 will work to educate the public and key staff about the information and issues presented in this Plan. This will be done with outreach projects and providing more detailed information at the library and online.

The outreach and information efforts will be incorporated in, and monitored by, the Program for Public Information process. Each year, the PPI activities are evaluated and the Counties' PPI committees review how effective the messages and projects have been. This is the perfect vehicle to formally and periodically assess public knowledge and attitudes toward protecting threatened and endangered species.

- Phase 2 would start when it is perceived that the necessary public support exists. It doesn't make sense to spend time and effort on data collection and developing new regulatory standards when no one sees the need for them. Once the annual PPI evaluations conclude that there is likely to be support for Phase 2, staff (or a stakeholder organization) can inventory sites worthy of protection and evaluate the key regulatory programs that govern open space preservation, shoreline modification, land development, stormwater runoff, and erosion and sedimentation. The result would be appropriate regulatory standards that the public (and developers) would support.

## Action Items

The current conservation and recovery activities that are receiving CRS credit should be continued (pages 11 – 16). The action items recommended here expand on each counties' existing efforts. They are appropriate for both counties and both counties should follow the two phase approach described above.

There are 11 action items that include 7 CRS activities and 16 credit elements. Table 4 lists them and identifies their timetable under the two phases.

Table 4. Action Items	
Action Items	CRS Credit
<b>Phase 1</b>	
1. Natural floodplain functions plan	510 – NFP/FSA
Public Information Actions	
2. Program for Public Information	330 – PPI
3. Map information	320 – MI7
4. Threatened species brochure	330 – OP
5. Reference materials	350 – LPD, WEB
<b>Phase 2</b>	
Data Collection	
6. Habitat identification and preservation	420 – OSP, NFOS
Regulatory Review	
7. Open space incentives	420 – OSI
8. Shoreline protection	420 – NSP
9. Development regulations	430 – DL, OHS
10. Stormwater management regulations	450 – SMR, WMP, WQ
11. Erosion and sedimentation control	450 – ESC

- 1. Natural floodplain functions plan:** A natural floodplain functions plan can guide and coordinate public and private programs that address one or more natural functions in a community's floodplain. This Plan qualifies for credit as a natural floodplain functions plan under CRS Activity 510 (Floodplain Management Planning), provided it is adopted and updated at least every 10 years. This action calls for adoption of this Plan and its recommendations for adequate resources to ensure implementation and evaluation.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: the major threats caused by human activity

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: As soon as the Board of Supervisors can address this. Each County should set its own pace, but coordinating with the other could be helpful.

Funding: Staff time

Supporting programs: N/A

CRS credit: Activity 510 (Floodplain Management Planning) natural floodplain functions plan (NFP) / Floodplain Species Assessment (FSA) and Floodplain Species Plan (FSP)

### **Public Information Actions**

2. **Program for Public Information:** Gloucester County has a PPI. James City County's will start one in 2021 per an action item in its floodplain management plan. When Gloucester County's is evaluated in November 2021 and when James City County's is drafted, their committees should review and adopt messages appropriate for the conservation and recovery of one or more of the species. The PPI committees would also determine if other media and outreach projects should be added to convey these messages.

The PPI committees are required to evaluate their projects and messages at least once each year. An annual report must be sent to the respective Boards of Supervisors and to the CRS. The PPI must be updated at least every five years. Under this recovery action, each year the PPI Committees would assess if the level of understanding and support is sufficient to warrant moving to Phase 2. Their findings would be in the annual reports.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: the major threats caused by human activity

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: Gloucester County: at the next annual PPI review meeting. James City County: during preparation of the County's PPI.

Funding: Staff time, possible new expenses for new projects

Supporting programs: PPI Committees

CRS credit: Activity 330 (Outreach Projects) Program for Public Information (PPI)

3. **Map information:** Add a layer to the current maps used for advising inquirers about flood hazards. The layer would be taken from FEMA's FRESH site, similar to the maps used earlier in this report. It would include the ranges for the two plants and the floodplain. The stream reaches where sturgeon may be found (larger streams up to a dam or fall line) would need to be added. Any person asking about the flood or other hazard on a parcel in these areas,



along the James or York Rivers, or next to one of the stream reaches would be given a copy of the threatened species brochure (next action) or otherwise provided information about the species and appropriate messages.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: the major threats caused by human activity

Lead office, Gloucester County: GIS

Lead office, James City County: Stormwater and Resource Protection

Timetable: in coordination with preparation of the threatened species brochure

Funding: Staff time

Supporting programs: Engineering Services, County GIS staff, Virginia Natural Heritage (for more detailed maps of areas warranting protection)

CRS credit: Activity 320 (Map Information Service) natural floodplain functions information (MI7)

4. **Threatened species brochure:** Develop a trifold or other short brochure that summarizes the information on the species on the preceding pages. It would include clear messages on what a property owner should do, what individuals can do, and how conservation and recovery measures help sport fishing and the local economy. One brochure may cover all four species or it may prove more effective to have one brochure for the plants and one for the sturgeons. The brochure(s) would be set out at public places, handed out at relevant events, and otherwise distributed as appropriate.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: the major threats caused by human activity

Lead office, Gloucester County: Community Engagement and Public Information Office

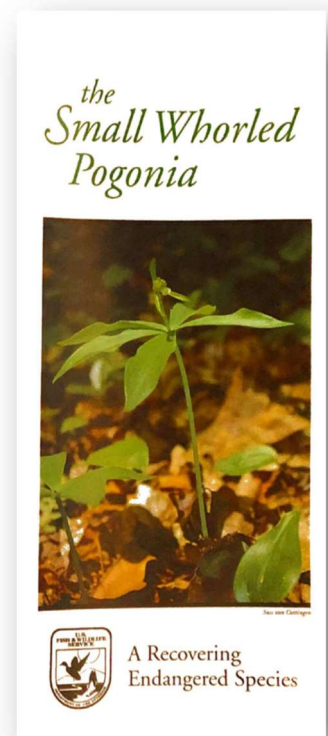
Lead office, James City County: Stormwater and Resource Protection

Timetable: within one year of adoption of this Plan

Funding: Staff time plus \$500 for final design and reproduction

Supporting programs: Information and graphics are available from the references listed in the species summaries. FWS has a brochure on the pogonia (right) and Virginia Natural Heritage has one on the Sensitive Joint-Vetch.

CRS credit: Activity 330 (Outreach Projects) Outreach Projects (OP)



## How You Can Help



### Know the Law Before You Fish

It is illegal to fish for, catch, or keep sturgeon.

[Learn how to identify them and how to release them safely \(PDF, 1 page\) >](#)

[Learn how to release them safely \(PDF, 2 pages\) >](#)

[View the sturgeon safe release sticker \(PDF, 1 page\) >](#)



### Report a Stranded, Injured, or Dead Sturgeon

If you find a stranded, injured, or dead sturgeon, please report it to NOAA Fisheries at (978) 281-9328 or in the Southeast at (844) STURG-911 or (844) 788-7491.



### Report a Violation

Call the NOAA Fisheries Enforcement Hotline at (800) 853-1964 to report a federal marine resource violation. This hotline is available 24 hours a day, 7 days week for anyone in the United States.

You may also contact your closest [NOAA Office of Law Enforcement field office](#) during regular business hours.

<https://www.fisheries.noaa.gov/species/atlantic-sturgeon>

- Reference materials:** Relevant references, such as those listed in this document (including this Floodplain Species Plan) should be provided to the Gloucester County Public Library and Williamsburg Regional Library. Where the references and other information on the species are online, links and a short explanation should be added to the counties' websites. The threatened species brochure and this Plan should be included, too.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: the major threats caused by human activity

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: within one year of adoption of this Plan

Funding: Staff time

Supporting programs: County librarian, County webmaster

CRS credit: Activity 350 (Flood Protection Information) flood protection library locally pertinent documents (LPD) and flood protection website (WEB)

## Data Collection

- Habitat identification and preservation:** The small whorled pogonia and sensitive joint-vetch thrive in undeveloped areas, i.e., open space. The more open space preserved in their range, the better. Both counties have mapped and measured open space preserved in their floodplains. Much of those lands are publicly owned, but some are considered preserved because of development regulations.

Gloucester County is reviewing its open space programs. James City County has an extensive program implemented through its development regulations, but it could also benefit from a review of undeveloped sites that are not yet preserved. In both counties, the sites in the range of one or both plants should be identified and flagged for when the owner applies for a development permit. At that time, the James City County requirements for natural open space easements and other tools will pay off.

Undeveloped parcels in the mapped ranges that are not preserved should also be identified so they become priorities for funding acquisition of more open space. A list of possible funding sources, their criteria, and their contacts would also be developed to facilitate seeking funding from Federal and state agencies and private organizations and foundations.

This action could also address areas of known clusters of small whorled pogonia and sensitive joint-vetch. They should be the top priority areas to be preserved through acquisition. However, this would have to be done carefully because such areas are often not publicized in order to deter rare species collectors who may want to harvest such sites.

Species: small whorled pogonia, sensitive joint-vetch

Threat addressed: loss of habitat

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: start within six months of the start of Phase 2. This will be an ongoing effort as funding opportunities arise.

Funding: Staff time for the review. Purchase of properties are dependent on the sites and outside sources of funding.

Supporting programs: County GIS staff, James City County's Purchase of Development Rights program, and organizations supporting preservation of open space, such as Wetland Watch, The Historic Virginia Land Conservancy, and the Department of Conservation and Recreation's Natural Heritage Program (box).

#### Natural Heritage Data

DCR-DNH has several resources that can help identify and prioritize conservation lands. These include:

- Lists of rare plants and animals and natural communities, which are updated as often as four times a year
- The Managed Conservation Lands Map, that delineates areas managed by public and private owners, and
- The Natural Heritage Data Explorer, a GIS application that provides access to the conservation status and conservation values of lands

CRS credit: Activity 420 (Open Space Preservation) open space preservation (OSP) and natural functions open space (NFOS)

## Regulatory Review

7. **Open space incentives:** Undeveloped land not preserved as open space can be developed. There are ways to encourage owners and developers to set aside habitat or areas in the designated range of one or more species. These include tools like encouraging cluster development (currently in James City County's regulations), density transfers that give the developer the ability to build more houses in trade for dedicating the habitat to open space, or simply prohibiting construction in the floodplain if the parcel has room for development on high ground (also in James City County's regulations).

This action calls for reviewing the current and possible incentives to see if the range and habitat of the four species are or could be considered as a factor for not developing certain

areas. This and the other regulatory reviews should also check whether they only impact large developments and recommend if they should apply to smaller ones.

Species: small whorled pogonia, sensitive joint-vetch

Threat addressed: loss of habitat

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Community Development

Timetable: Conduct the review and ordinance drafting in coordination with the other regulatory review actions, which may take up to two years after the start of Phase 2.

Funding: Staff time

Supporting programs: organizations supporting preservation of open space

CRS credit: Activity 420 (Open Space Preservation) open space incentives (OSI)

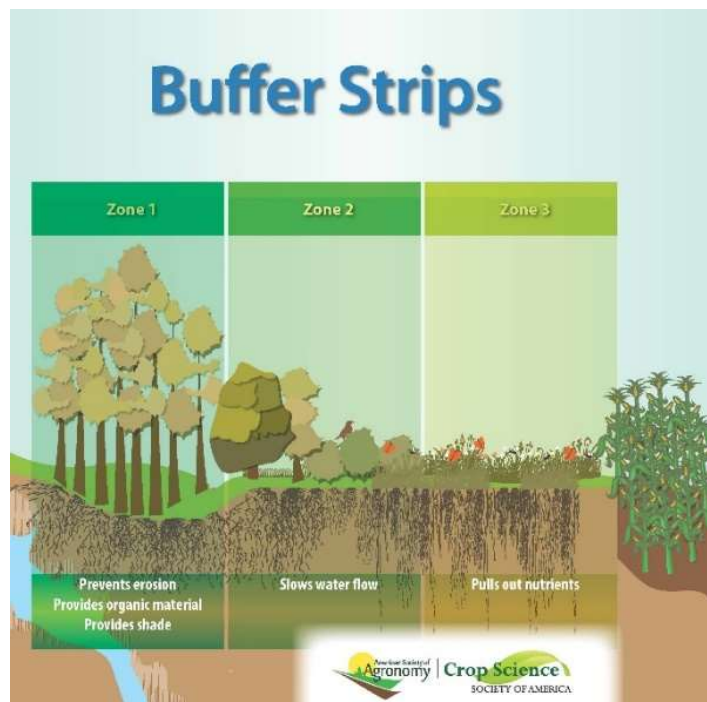
### Revising Regulations

Certain regulations on land development are administered by the Virginia Department of Environmental Quality under the Virginia Stormwater Act. Virginia Code Section [62.1-44.15:33](#) makes it challenging for a local government to adopt a requirement more restrictive than the state regulations.

The community must document that the standard is “based upon factual findings of local or regional comprehensive watershed management studies or findings developed through the implementation of a MS4 permit or a locally adopted watershed management study and are determined by the locality to be necessary...” This requires more background and more work plus a mandate to seek approval that are not required for other ordinance amendments. Therefore, the timetables for Action Items 7 – 11 require up to two years to complete.

8. **Shoreline protection:** Shorelines are very important for both wetland plants and fish. Natural shorelines provide needed shade and are more effective than disturbed areas at resisting erosion and filtering sediment laden runoff.

This action calls for reviewing the required 100-foot Resource Protection Area (RPA) natural buffer around all perennial streams. Do the rules adequately prevent development or ground alterations alongside stream shorelines? Should other set back rules be designated, similar to the example to the right?



This approach provides multiple benefits – preserving natural banks to minimize erosion, managing the amount of runoff, and filtering out pollutants and sediment.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: sedimentation, loss of water quality, flow fluctuation

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: Conduct the review and ordinance drafting in coordination with the other regulatory review actions, which may take up to two years after the start of Phase 2.

Funding: Staff time

Supporting programs: organizations interested in environmental protection and fishing

CRS credit: Activity 420 (Open Space Preservation) natural shoreline protection (NSP)

9. **Development regulations:** Where open space is not preserved and land can be developed, the counties have regulations to ensure new developments meet certain standards. Both have regulations that exceed the minimum standards of the National Flood Insurance Program that are designed to protect new buildings from flood damage.

James City County prohibits filling to create a buildable lot (all lots must have natural high ground at least one foot above the base flood elevation). This can have a very beneficial impact on natural floodplain functions and is recommended for all communities.

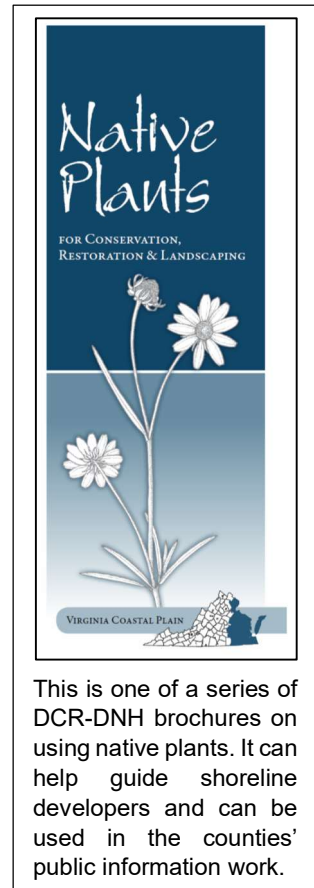
Permit applicants for new developments that require rezoning or other legislative action are required to inventory their sites for the presence of rare, threatened, and endangered species. If found, there must be consultation with FWS or NMFS to determine how to minimize the impact of the development on those species. Action item 9 calls for a review of the procedures to ensure that the species in this Plan and their likely habitat are included in this process.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: loss of habitat

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Community Development



Timetable: Conduct the review and ordinance drafting in coordination with the other regulatory review actions, which may take up to two years after the start of Phase 2.

Funding: Staff time

Supporting programs: planning and building code administration, Action Items 3 and 6, including the natural heritage data support noted in Action Item 6.

CRS credit: Activity 430 (Higher Regulatory Standards) development limitations (DL), other higher standards (OHS), and regulations administration (RA).

**10. Stormwater management regulations:** As noted earlier, clean water and consistent flows are important for all four of the selected species. One of the best ways to get clean and consistent runoff is to require developed areas to manage the stormwater that falls on them. Stormwater management utilizes storage basins, natural storage areas like wetlands, low impact development, and similar measures to clean and control the water that leaves their areas. Five elements credited in CRS Activity 450 (Stormwater Management) provide good guidance on how this can be done:

- (1) Apply the rules to even the smallest development projects
- (2) Manage water from all storms up to at least the 100-year storm
- (3) Incorporate low impact development measures that use swales, native plants, and rain gardens to mimic natural conditions and have more runoff soak into the ground instead of running off quickly. This reduces pollutants and fluctuations of flows. See also the Chesapeake Bay Foundation's [guidance](#).
- (4) Ensure that there is a public agency responsible for continued operations and maintenance of the measures.
- (5) Develop a watershed master plan to set more specific standards and approaches for different types of areas.

A review of the counties' CRS credits shows that each could get better scores in all of these elements, meaning there is room for improvement of their stormwater management standards. This action calls for a review of their stormwater ordinances to determine what more effective standards should be adopted.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: flow fluctuation, loss of water quality, sedimentation

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: Conduct the review and ordinance drafting in coordination with the other regulatory review actions, which may take up to two years after the start of Phase 2.

Funding: Staff time

Supporting programs: organizations interested in environmental protection and fishing

CRS credit: Activity 450 (Stormwater Management) stormwater management regulations (SMR), watershed master plan (WMP), and water quality (WQ)

11. **Erosion and sedimentation control:** Erosion of land produces sedimentation. Sedimentation has been called the number one pollutant of America's waters. The counties have the authority to require erosion and sedimentation control measures when developers strip the ground surface for construction projects. The counties should review their erosion and sedimentation control regulations to see if they could be improved.

Species: small whorled pogonia, sensitive joint-vetch, sturgeon

Threat addressed: sedimentation, loss of water quality

Lead office, Gloucester County: Engineering Services

Lead office, James City County: Stormwater and Resource Protection

Timetable: Conduct the review and ordinance drafting in coordination with the other regulatory review actions, which may take up to two years after the start of Phase 2.

Funding: Staff time

Supporting programs: organizations interested in environmental protection and fishing

CRS credit: Activity 450 (Stormwater Management) erosion and sedimentation control (ESC)