COASTAL BAYS WETLAND PRIORITIZATION METHODS:

In Maryland Coastal Bays watershed, we will consider all wetland restoration and preservation projects having interested landowners. The below prioritization effort is intended to target locations where we should actively seek restoration or preservation opportunities, and recommend the list for other entities as well. Due to the conditions of this region, with little effort wetlands can be restored in almost any area having hydric soil. Our intent is to predict the areas where restored wetlands would provide the most function.

RESTORATION

Priority 1 restoration sites

- **Hydric soils**: We selected only hydric soils (based on website http://www.sawgal.umd.edu/nrcsweb/Maryland/index.htm) from the NRCS soil survey (*hydric.shp*). Hydric soils are one of the factors suggesting an area is currently a wetland or may have been historically (prior to a change in hydrology). Many of the Coastal Bays wetlands were drained historically for agriculture. In order to have the most cost-effective wetland projects, it is ideal to restore sites where little effort is required to obtain the wetland by restoring the hydrology. Major excavation is expensive and can be minimized in an area where the majority of land has an elevation near the water table, as found in most hydric soils in this region. Therefore, in the Coastal Bays watershed, we were able to select only sites with hydric soils and include the majority of the watershed.
- **Rank hydric soils from #1** (*hydric.shp*): We ranked soil names based on readily obtainable attributes from the 2000 NRCS soil survey. Most wetland restoration projects occurring on hydric soils in the Coastal Bays watershed are successful in creating wetlands, regardless of the soil organic matter or texture. However, wetland functioning may be higher on certain soil types. After discussions with many soil scientists (including Gary Jellick, Al Rizzo, Jim Brewer, John Galbraith, and Marty Rabenhorst), we came up with a soil ranking (Table 1). Location within the landscape was noted, as it will lead to different wetland functions (e.g., soils located within the floodplain will provide different functions than those located in depressions). Soils with a landform = "Estuarine Tidal Marsh" may become acidic when drained. These soils are very poorly drained and many have high organic matter or a histic epipedon. High organic matter in soils results in high nutrient and contaminant retention and is highly beneficial to wetland systems. In general, these soils have not been converted from wetlands, but there are some exceptions. These soils would be ranked top for preservation and restoration. Additional soils with histic epipedons (but not having a landform of estuarine tidal marsh) are also ranked top priority for restoration and preservation. Soils that are very poorly drained with umbric epipedons (also high in organic matter) are ranked next priority. These soils (very poorly drained) were historically very wet, so wetland hydrology may be easier to restore than soils classified as poorly drained. Soils that are poorly drained and have a high amount of organic matter or fine textures are ranked next. The worst ranked are poorly drained soils with low organic matter and coarse texture. Coarse-textured soils may drain too quickly to establish adequate wetland hydrology and may have lower nutrient and contaminant retention. This may not be as large of a factor when there is a high amount of organic matter. While it is often easiest to restore wetlands on soils classified as very poorly drained, it should be noted that soils

classified as poorly drained are more likely to have been drained for agriculture (e.g. Elkton, Othello, Fallsington, etc.). However, it may be possible to find soils classified as very poorly drained in artificially drained forest (Jellick). For the general site prioritization, we only ranked the soils "very poorly drained" and "poorly drained" because we did not want to eliminate other soils at this level. However, a shapefile was created that does rank the NRCS soil data into more fine-tuned ranking as found in the table. This may be useful when comparing between specific on-the-ground sites.

- **Exclude prime farmland when drained on agriculture**: With farmland rapidly being converted to development, it is desirable to preserve the most productive farmland (classified as prime farmland on the NRCS soil survey) when it is currently in agriculture. We selected hydric soils on prime farmland when drained (this was the only prime farmland type on hydric soils - Fallsington) and created the shapefile (hydprime.shp). From Landuse 2002, we selected for land use does not equal agriculture. We erased (xtools) this land from the hydric soils on prime farmland when drained. The remaining polygons were hydric prime soil when drained on agriculture. We used this file to erase the areas from the original hydric soil layer. This resulted in a layer with hydric soil but no prime farmland when drained on agricultural land (*hynoprag.shp*).
- **Within Green Infrastructure network**: MDNR identified Maryland's Green Infrastructure network, natural undeveloped areas they consider to be important in maintaining Maryland's ecological health. It is desirable to convert open land areas and disturbed areas within Green Infrastructure hubs and corridors to natural vegetation where possible (i.e., convert agriculture or barren land to natural vegetation). We selected "very poorly drained" soils from #3 (hynoprag.shp) that were within the Green Infrastructure hub or corridor (xtools clip). This layer (called *hy3gir34.shp*) is the very poorly drained hydric soils, without prime farmland when drained on agriculture, within the GI network.
- **Not currently forest**. Forested land is not a high pollutant source like agriculture. It also provides better habitat for most plants and wildlife. For these reasons, converting upland forested land to wetland may provide fewer benefits than converting agriculture to wetland. We intersected (xtools) hy3gir34.shp with our 2002 MOP land use shapefile, and selected only land use types of urban, agriculture, and barren land. This layer (*hy3girlu.shp*) excludes forest. NRCS projects within the Coastal Bays watershed that do convert drained forest to wetlands have resulted in beautiful wetlands with diverse ecology. Therefore, we do consider restoring forest (especially pine forest) to wetland in priority 2.
- **Not currently wetland**: We unioned the MDNR and NWI wetland layers (excluding MDNR classified farmed wetlands). (Wowet.shp). We erased these wetlands from the layer hy3girlu.shp to get *hy3grlnw.shp*. We deleted areas <1 acre and areas on forest (according to DOQQ, that were mistakenly included when using MDOP data). This layer was used to find some of the priority 1 sites. However, this method excluded some other sites, which we added later.
- **Include zoning with restrictions on development lot size and include protected land**. We wanted to focus on large lots with development restrictions rather than small lots because we thought property owner interest would be higher and the resulting project might be a larger-sized wetland. Zoning classifications of Resource Conservation, Agriculture, or Estate are generally large lots and have some subdivision restriction. For the analysis of priority 1, we wanted to consider only polygons within these three county zoning classifications. Therefore, we selected all zoning other than these three to be our area of non-inclusion. We also wanted to consider additional protected land owned by the county, state, federal, private conservation, and Maryland

Environmental Trust. To that end, from the shapefile, we removed the abovementioned protected lands. We overlayed this resulting shapefile (*Antizpro.shp*) on top of the polygons under consideration, so we would not select priority sites here.

- **Exclude MDE-designated wellhead protection areas.** Excavating or otherwise reducing the depth of soil to the water table may reduce the filtering capacity of the soil, which may be detrimental in well-head protection areas. These areas may be better protected by upland forest. For this reason, we want to avoid restoring wetlands on wellhead protection areas. We overlayed the wellhead protection areas shapefile on top of the other areas, so we would not select priority sites here.

The above eight criteria resulted in one map. All areas within this map may be desirable restoration sites, but some areas are relatively small. While these sites are good locations, this map may be missing some sites. Therefore, we added additional sites.

- **Look for additional sites on orthophoto based on the below criteria.** We basically tried to find areas with the highest concentration of these desirable elements:
    - **Adjacent to or within Green Infrastructure network**. We visually assessed the proximity to GI network, favoring polygons that would contribute to the GI network if restored. If an area was separated from the GI network by a narrow strip of less-desirable soil, it could still be considered for restoration.
    - **Adjacent to streams with no forest/wetland buffer (with pollutant source)**: Vegetated streams buffers improve water quality (through pollutant reduction and decreased water temperature) and provide a habitat corridor and food base for stream organisms. Streams adjacent to agriculture and developed land generally receive higher nutrient and sediment runoff than streams adjacent to naturally vegetated areas. We looked for inadequately buffered streams having an adjacent pollutant source (agriculture, barren, or developed land use). We made a stream buffer (150 ft similar to that used by DNR during the WRAS process) intersected with MDOP 2002 landuse (xtools) to get the landuse type within the 150 foot stream buffer. We selected portions of the stream buffer having urban, agriculture, or barren land. We then intersected this layer with our hydric soil layer to get only sections of the stream with urban, agriculture, or barren land within 150 feet of the stream on hydric soil (*st150luh.shp*). This method was employed in the WRAS characterization for IOW. We used the DNR Coastal Bays stream layer for this procedure. This layer does not include some of the small ditches (largely intermittent) but corresponds well with the orthophotos. The stream layer with the detailed ditches (Tiner data) lined up very poorly with the orthophoto, so we were not able to use it for the GIS analysis (since in some cases, the drawn ditch was >40 meters from the ditch shown on the orthophoto). Many Coastal Bays wetland systems are discharge wetlands, with the water coming up from the water table. Additionally, most precipitation falling to this area infiltrates rather than running off the soil, so wetlands not directly along the stream may also benefit water quality. Wetlands having deep-rooted vegetation (e.g. trees) may be the most effective at removing nutrients from the groundwater. In many cases, wetlands created next to the streams will need to be built off-line to address actual or perceived reduction in upstream drainage.
    - **Adjacent to wetlands or other natural systems** In order to achieve a contiguous protected habitat area, rather than many fragmented wetlands, it is desirable to locate the

site adjacent to other wetlands, forests, or other habitat (e.g. waterways). To assess the surrounding natural systems, we used stream and wetlands shapefiles, and orthophotos.

- **Pollution source**: Some land use types (e.g., agriculture, developed land) contribute more pollutants to the water than others (e.g., forest). Wetlands designed to provide maximum water quality improvement should be located near these high pollutant sources. We looked for areas that were a pollution source themselves or were downstream of a pollution source using orthophotos and MDOP land use data. These were also included in the selection of inadequate stream buffers on agricultural land (see above).
- **MDNR farmed wetlands**. Wetlands that are currently being farmed may be good options for wetland enhancement. It is also likely that these areas are not extremely productive as farmland since they are so wet. We looked for areas with a high concentration of farmed wetlands (*wowetpf.shp*).

After highlighting most desirable sites based on the above criteria, we looked at the property ownership (using the MDOP Propertyview layer). All of the highlighted sites are at least partially on moderate to large sized lots. The site with some of the smallest lots is in Sinepuxent Bay watershed.

In areas of poor water quality: Water quality is a major environmental concern in Maryland's Coastal Bays. Wetlands can improve water quality by reducing nutrients, sediment and heavy metals entering the waterway. Water quality was used to divide the priority 1 sites into two groups, ones in areas of poor water quality and ones in areas of better water quality. Areas with better water quality may not be as desirable for overall Coastal Bays watershed restoration, but for restoration where it is desirable to restore within the same 8-digit watershed as the impact. For instance, most recommendations suggest the Northern Coastal Bays and Newport are most in need of restoration, but if wetland restoration is required in Chincoteague or Sinepuxent Bays, there are still some priority 1 sites to chose from.

We used summary data from State of the Bays Report and TMDL recommendations to create shapefiles (called *wqstofba.shp* and *TMDLrec.shp*). Essentially all areas were on the 303(d) List, so that itself was not a good way to prioritize areas. For the headwater areas, sites with the worst nutrient concentrations during the MDNR synoptic survey were used (called *statloc.shp* and *sinpot.shp*). These coincided with the other recommendations, but were helpful in selecting specific areas within the headwaters.

Map 1 (Isle of Wight, Assawoman, Newport, Sinepuxent Bays) and Map 2 (Chincoteague Bay) show priority 1 restoration sites.

How this compares to the WRAS (IOW) potential restoration sites.

We compared our priority 1 results with the Isle of Wight WRAS results. Our results highlighted most of the sites they chose. Exceptions were Birch #2 (south of Peerless Road) since it is dominated by prime farmland which we excluded, and Bishopsville #1 since it was not within or adjacent to Green Infrastructure. Bishopsville #1 is a site that we ranked as priority 2. This site is in Bishopsville watershed (an area having poor water quality), it has large areas of very poorly drained soils currently in agriculture (including several MDNR classified farmed wetlands), and there are many

streams and ditches without a buffer. This is a site that sticks out as being an exception to the rules of priority 1. From this comparison, we determined that our methods are finding similar results as the WRAS method, but we are finding more sites. Even mimicking the methods employed for the IOW WRAS, we found slightly different results due to the different data sources employed (e.g. we used different stream and soil layers and an additional wetland layer).

Second Priority: Basically, in determining priority 2 sites, we considered many of the same principals as for priority 1, but were less restrictive.

- **Include both poorly and very poorly drained soils.**
- **Still exclude prime farmland and wellhead protection areas.**
- **Include artificially drained forest when it is on very poorly drained hydric soil in or adjacent to Green Infrastructure.** Most forests in this region have been artificially drained and no longer function as natural wetlands. Restoring artificially drained forest to wetland may provide less water quality improvement than converting marginal cropland to wetland (partly because agriculture land use is a much higher pollutant source), but forested wetlands can provide more water quality function than forested upland. Additionally, upland forested areas often provide more habitat than farmland, so it may be less desirable to convert forest to wetland than to convert farmland to wetland. However, when wetland hydrology is restored to these drained forests, they often become beautiful ecologically diverse wetlands. This type of restoration has the benefit of providing immediate forest cover in the wetland (versus wetlands built on agricultural land that may take a few decades to develop forest cover). We selected soils ranked very poorly drained, within the GI network, currently forest but not wetland (called *hygirlu4.shp*).

Map 3 (Isle of Wight, Assawoman, Newport, Sinepuxent Bays) and Map 4 (Chincoteague Bay) show priority 2 restoration sites.

Protected land: Protected land was targeted because owners may be more open to the idea of restoration on their property. We merged the protected land shapefiles including private conservation, Maryland Environmental Trust easements, federal, state, and county land. This also includes MDNR-owned Chesapeake Forest land, which has been recommended for potential wetland restoration. We did not include agricultural easements, CREPs, WRPs, etc. We then selected areas on hydric soil (xtools intersect) and removed the DNR and NWI wetlands (xtools erase) from these sites. This resulted in polygons (*prohynw.shp*) that are protected, on hydric soil, and not currently designated as wetlands.

Map 5 (Isle of Wight, Assawoman, Newport, Sinepuxent Bays) and Map 6 (Chincoteague Bay) show restoration opportunities on currently protected land.

Previous recommendations for restoration sites.

- **Stream "problem" sites as identified through the SCA (IOW, Newport, Sinepuxent) having**:
    - Stream erosion. We selected sites with moderate to severe stream erosion (severity 1 to 3).

        - Inadequate buffers. We selected buffers ranked very severe (severity 1 and 2)
        - Fish barriers. We excluded debris barriers because we felt many of these may be temporary or may be removed by methods easier than restoration. Of the remaining barriers, only one is severe – Bishopsville Dam (which has been removed). The remaining blockages had a low severity (severity 4 and 5). Therefore, identified fish barriers are only a minor variable inhibiting aquatic ecosystem, when compared to other issues.
    - **Tiner.** Sites identified for restoration during the Tiner et al. (2000) study should be considered as enhancement options, especially ditched estuarine and palustrine wetlands, tidally restricted wetlands, and farmed wetlands. As discussed in the background section of the report, palustrine forested wetlands may be overestimated in the Tiner wetlands layer.
    - **Additional recommendations.** In order to address all of the specific site recommendations within the targeting section, ones that were not directly addressed in the previous section are listed below.
        - Isle of Wight, Assawoman, and Newport Bays (these bays also have some of the worst water quality so were generally the target of restoration).
        - Marshes on the northern side of Isle of Wight Island.
        - Dead-end canals (this would likely be an out-of-kind structure).
        - Ocean City Harbor.
        - Manklin Creek, Fenwick Island, Ocean Pines, Assateague Island bayside (due to high wetland loss).
        - Great Cypress Swamp

Map 7 shows additional previous recommendations for restoration.

PROTECTION

Priority 1 protection sites:

- **Nontidal Wetlands of Special State Concern (NTWSSC) or proposed Nontidal Wetlands of Special State Concern** (MDNR, 2004). Since all NTWSSC and proposed NTWSSC either have unique flora or fauna, or provide unique habitat, we ranked all NTWSSC and proposed NTWSSC as priority 1 for protection. We looked for NTWSSC or proposed NTWSSC that were not already protected. Within this priority 1 layer, we ranked these sites further. We wanted to protect wetlands that were surrounded by protected natural land, either currently or planned, since a large contiguous natural system is desirable for habitat function. For this reason, sites were ranked based on Green Infrastructure (GI), ecological ranking, Rural Legacy (RL), surrounding land use (LU), and surrounding protected land.
    - Isle of Wight
        - *West Ocean City Pond*. This site is outside of the GI and RL and is surrounded by residential LU.
    - Newport Bay

        - *Porter Neck Bog* (Ironshire Swamp, as listing in COMAR, is now included under this name). This site is within the GI but outside of RL. It is mostly surrounded by forest and some agriculture.
        - *Icehouse Branch*. This proposed NTWSSC is within the GI but outside of RL. It is mostly surrounded by forest and some agriculture.
        - *Massey Branch*. This proposed NTWSSC is within the GI but outside of RL. It is mostly surrounded by forest and some agriculture.
        - *St. Lawrence Neck*. This proposed NTWSSC is within the GI but outside of RL. It is mostly surrounded by forest and some agriculture.
    - Chincoteague Bay
        - *Waterworks Creek*. This proposed NTWSSC is within GI but outside of RL. It is surrounded by mixed forest and wetlands.
        - *Spencer Pond*. This proposed NTWSSC is within GI but outside of RL. It is surrounded by mixed forest.
        - *PawPaw Creek*. This NTWSSC is within GI but outside of RL. It is surrounded by mostly pine forest.
        - *Tanhouse Creek*. This NTWSSC is within GI. Although it is outside of the RL, it is very close. Some nearby RL land is protected. It is surrounded by mixed forest and some agriculture.
        - *Scotts Landing Pond* – This NTWSSC is within GI but outside of RL (surrounded by it). It is surrounded by pine forest and wetland.
        - *Truitt Landing*. This proposed NTWSSC is protected by a MET.
        - *Scarboro Creek Woods*. This site is within GI and RL. It is partially protected by E.A Vaughn WMA and is surrounded by mixed forest and agriculture.
        - *Pikes Creek Woods*. This proposed NTWSSC is not within GI, but is adjacent to it. It is within RL. The ecological ranking was not as high as the other sites. This site is next to a lot of protected land (E.A. Vaughn WMA, MDNR-owned Chesapeake Forest land, and a MET). This site is largely surrounded by agriculture.
        - *Pikes Creek*. Over half of this site is protected by Chesapeake Forest land and the other portion is adjacent to E.A. Vaughn WMA and a MET. This site is within GI and RL, and is surrounded by pine forest and agriculture.
        - *Stockton Powerlines*. The majority of the site is protected by MDNR-owned Chesapeake Forest land. This site is within GI and RL, and is surrounded by mixed forest and agriculture.
        - *Riley Creek Swamp*. This site is within GI and RL, and is surrounded by mainly agriculture (and a thin strip of mixed forest).
        - *Hancock Creek Swamp*. This site is within GI and RL, and is surrounded by forest. It is partially protected and has some protected land around it.
        - *Powell Creek*. This site is within RL but outside of GI. It is surrounded by agriculture and was given a relatively low ecological ranking.
        - *Little Mill Run*. A small amount of this site (in the NE) is protected by MDNR-owned Chesapeake Forest land. This site is within GI, but the GI is mainly agriculture. It is outside of RL. It is mostly surrounded by agriculture, with thin strips of forest.

Although all of the above sites should be ranked priority 1, some of the most desirable NTWSSC and proposed NTWSSC sites for protection include Tanhouse Creek, Scotts Landing Pond, and sites within both designated Green Infrastructure network and Rural Legacy. The sites Pikes Creek, Pikes Creek Woods, Scarboro Creek Woods, and Stockton Powerlines are close together and are near large areas of protected land. If these areas were all protected, it would create a large protected area, which is desirable. NTWSSC sites with lowest preservation priority include West Ocean City Pond, Powell Creek and Little Mill Run.

Additional sites were added to priority 1 protection. These are **all within or adjacent to designated Rural Legacy area and other protected land**. Other considerations included:

- **Wetlands within MDNR-designated Ecologically Significant Areas (ESA)**. We selected wetlands that were not yet protected that intersected (xtools) with the ESA layer.
- **Within or adjacent to Green Infrastructure or corridor**. Consider ecological ranking and development risk. Look for remaining wetlands in high ecological ranking area.
- **Adjacent to waterways or other natural systems** (i.e. wetlands, hardwood forests).
- **Areas identified by the Emergency Wetlands Resources Act of 1986**
- **Church Branch Cypress Swamp**

Most of the priority 1 protection sites fall within Newport Bay and Chincoteague Bay, areas identified by Unified Watershed Assessment as being high priority for preservation. Only one site is within Isle of Wight (West Ocean City Pond) and none are within Sinepuxent or Assawoman.

Map 8 shows priority 1 protection sites.

Priority 2 protection sites: priority 2 uses many of the same factors as priority 1, but is not as strict. For instance, if some of the criteria were met, the site would be considered (e.g. Priority 2 sites within Isle of Wight watershed are not within or adjacent to RL or protected land, but are within the GI network and are the largest wetland systems in that watershed).

- **Within or adjacent to Rural Legacy.**
- **Adjacent to protected land.**
- **Wetlands within MDNR-designated Ecologically Significant Areas (ESA)**. We selected wetlands that were not yet protected that intersected (xtools) with the ESA layer.
- **Areas identified as being important in the Aquatic Sensitive Species Report**.
- **Within or adjacent to Green Infrastructure or corridor**. Consider ecological ranking and development risk. Look for remaining wetlands in high ecological ranking area. We also considered ecological ranking, which was closely related to Green Infrastructure. All priority two sites are in areas of high ecological ranking. This layer may be more useful in comparing areas outside of the Green Infrastructure network.
- **Adjacent to waterways or other natural systems** (i.e. wetlands, hardwood forests).
- **Large wetland systems.**
- **Tiner wetland functional assessment.** We added two sites that Tiner classified as being important for biodiversity since they were large wetland complexes. These areas do not have

many MDNR or NWI wetlands identified on them. Therefore, further site investigation will determine if these sites are actually wetlands.

- **Headwater wetlands.** Existing headwater wetlands with high estimated function for maintaining water quality should also be protected. These may largely include headwater wetlands in Isle of Wight and the northern half of Newport Bay.
- **Once priority 1 restoration areas are restored, they should be protected.** There are currently few extensive wetland areas within Isle of Wight watershed, but many priority 1 restoration areas are located there. Once these sites are restored, if they are considered important in maintaining water quality or providing a natural vegetation network, these areas should be protected.

Map 9 (Isle of Wight, Assawoman, Newport, Sinepuxent) and Map 10 (Chincoteague Bays) show priority 2 protection sites.

Table 1. Soil characteristics and ranking for the hydric soils within Maryland Coastal Bays watershed. Characteristics are based on the 2000 Worcester County Soil Survey (USDA, 2000).

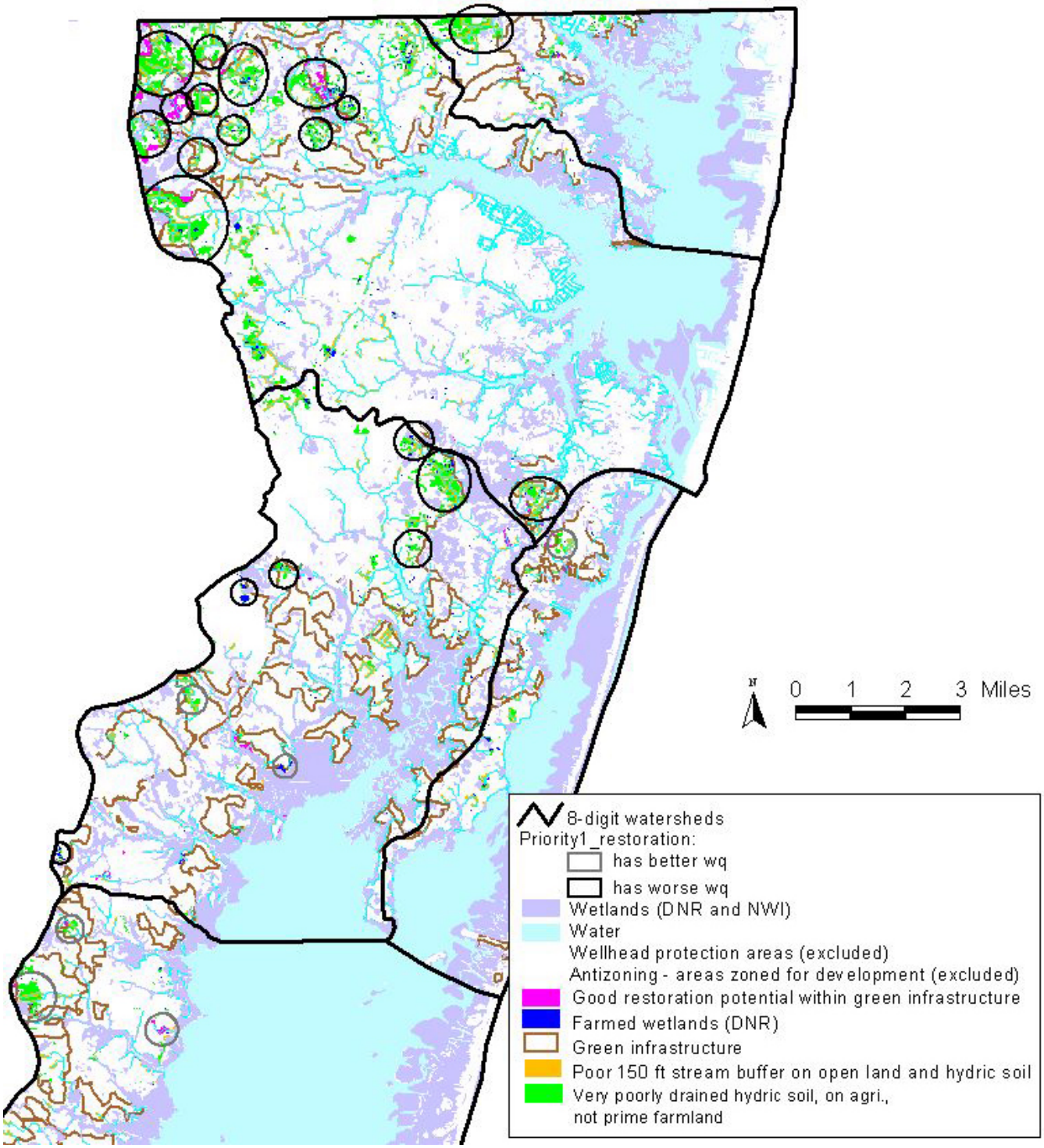
Map Symbol	Soil Name	Family or higher taxonomic class	Drainage	Epipedon	OM	Texture	Landform	Acid when drained	Rank
As	Askecksy	Siliceous, mesic Typic Psammaquents	pd	ochric	2	1	FL/DEP	N	4
Bh	Berryland	Sandy, siliceous, mesic Typic Haplaquods	vpd	Umbric (spodic horizon)	4	1	FL/DEP	N	2
Br	Broadkill	Fine-silty, mixed, nonacid, mesic Typic Sulfaquents	vpd	ochric	4	3	TM	Y	1
BX	Boxiron (40%); Broadkill (40%)	Boxiron: Fine-silty, mixed, nonacid, Histic Typic Sulfaquents; Broadkill: Fine-silty, mixed, nonacid, mesic Typic Sulfaquents	vpd	histic	5	organic	TM	Y	1
Ch	Chicone	Coarse-silty, mixed, acid, mesic Thapto-Histic Fluvaquents	vpd	buried histic	4	2	FP	N	2
Ek	Elkton	Fine-silty, mixed, mesic Typic Endoaquults	pd	ochric	2	3	FL/DEP	N	3
Em	Elkton	Fine-silty, mixed, mesic Typic Endoaquults	pd	ochric	2	3	FL/DEP	N	3
Fa	Fallsington	Fine-loamy, mixed, mesic Typic Endoaquults	pd	ochric	2	3	FL/DEP	N	3
Hu	Hurlock	Coarse-loamy, siliceous, mesic Typic Endoaquults	pd	ochric	2	2	FL/DEP	N	4
In	Indiantown	Coarse-loamy, siliceous, acid, mesic Cumulic Humaquepts	vpd	umbric	3	2	FP	N	2
Ke	Kentuck	Fine-silty, mixed, mesic Typic Umbraquults	vpd	umbric	4	3	FL/DEP	N	2

Table 1 (continued)

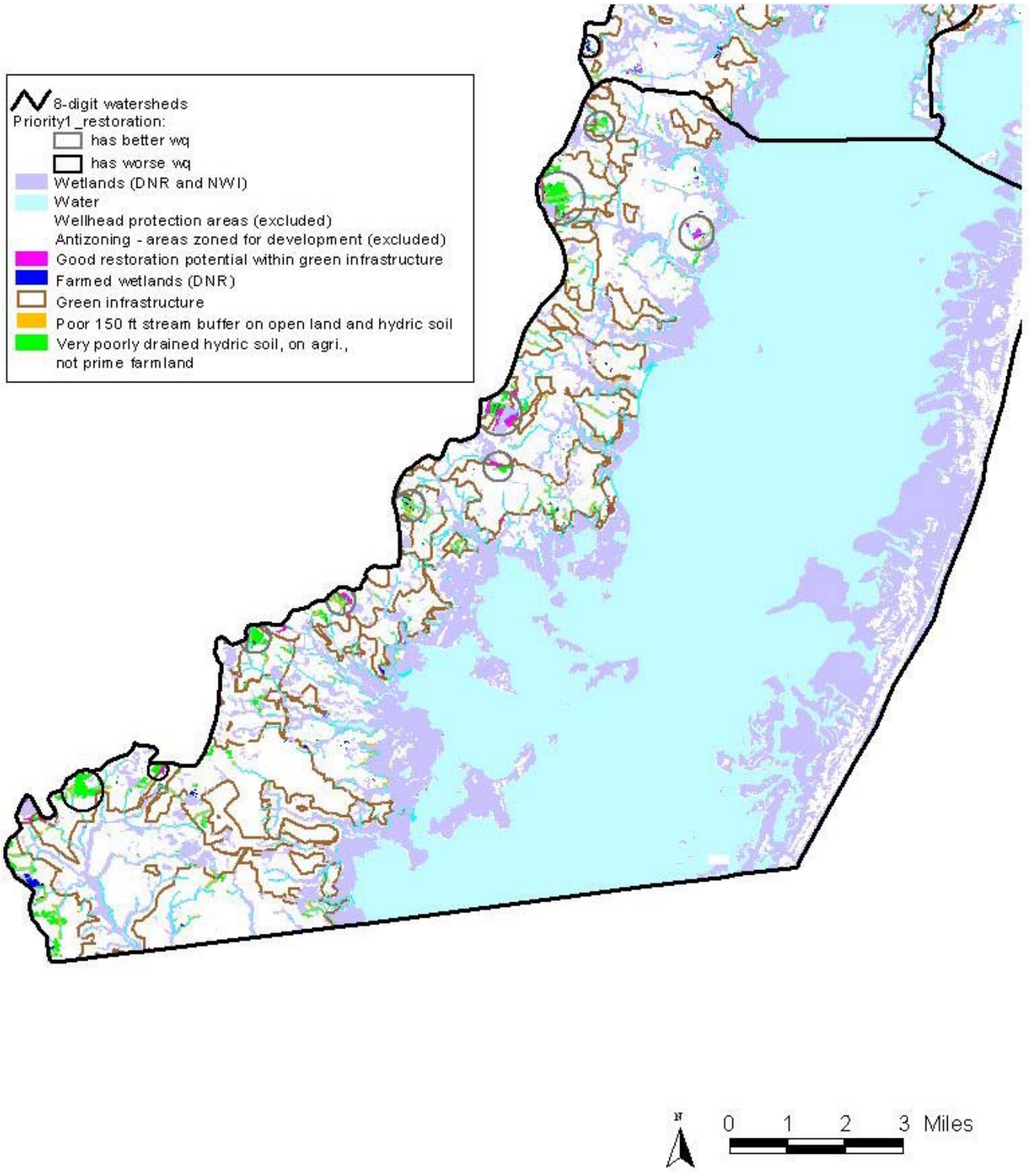
Map Symbol	Soil Name	Family or higher taxonomic class	Drainage	Epipedon	OM	Texture	Landform	Acid when drained	Rank
Ma	Manahawkin	Sandy or sandy-skeletal, siliceous, dysic, mesic Terric Medisaprists	vpd	histic	5	organic	S/FP	N	1
MC	Mannington (50%); Nanticoke (45%)	Mannington: Fine-silty, mixed, nonacid, mesic Typic Hydraquents; Nanticoke: Fine-silty, mixed, nonacid, mesic Typic Hydraquents	vpd	buried histic	3	3	MF	N	2
Mu	Mullica (55%); Berryland (30%)	Mullica: Coarse-loamy, siliceous, acid, mesic Typic Humaquepts; Berryland: Sandy, siliceous, mesic Typic Haplaquods	vpd	umbric	4	2	FL/DEP	N	2
Ot	Othello	Fine-silty, mixed, mesic Typic Endoquults	pd	ochric	2	3	FL/DEP	N	3
Pk	Puckum	Dysic, mesic Typic Medisaprists	vpd	histic	5	organic	S/FP	N	1
Pu	Purnell	Sandy, mixed, mesic Histic Sulfaquents	vpd	histic	5	organic	TM	Y	1
Su	Sunken	Fine-silty, mixed, mesic Typic Endoaqualfs	vpd	ochric	4	3	TM	Y	1
Tk	Transquaking	Euic, mesic Typic Sulfihemists	vpd	histic	5	organic	TM	Y	1
TP	Transquaking (55%); Mispillion (35%)	Transquaking: Euic, mesic Typic Sulfihemists; Mispillion: Loamy, mixed, euic, mesic Terric Sulfihemists	vpd	histic	5	organic	TM	Y	1
Zk	Zekiah	Coarse-loamy, siliceous, acid, mesic Typic Fluvaquents	pd	ochric	4	2	FP	N	3

Drainage: pd=poorly drained, vpd=very poorly drained. Organic matter represents undrained organic matter. Higher numbers indicate higher organic matter. Drained OM is generally lower. Soil texture: 1=sandy; 2=coarse-silty/coarse loamy; 3=fine-loamy/fine-silty; organic=histic. Landform: FL/DEP=Lowland flat and depressions, TM=Estuarine tidal marshes, FP=Flood plains, S/FP=Swamps and floodplains, MF= Mud flat. Ranking: Higher numbers indicate more desirable soils for wetland restoration.

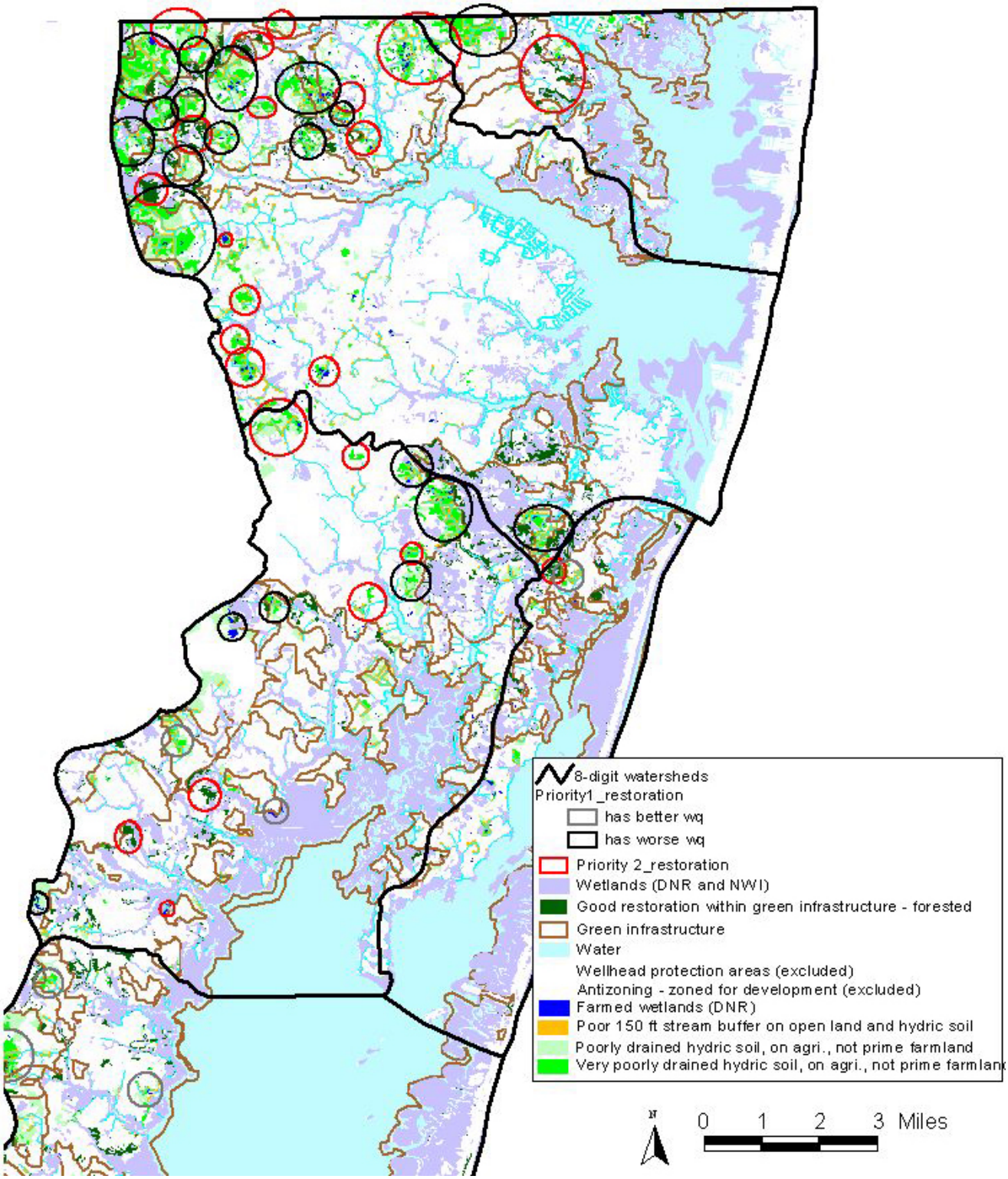
Map 1. Priority 1 wetland restoration sites for four northern Coastal Bays watersheds.



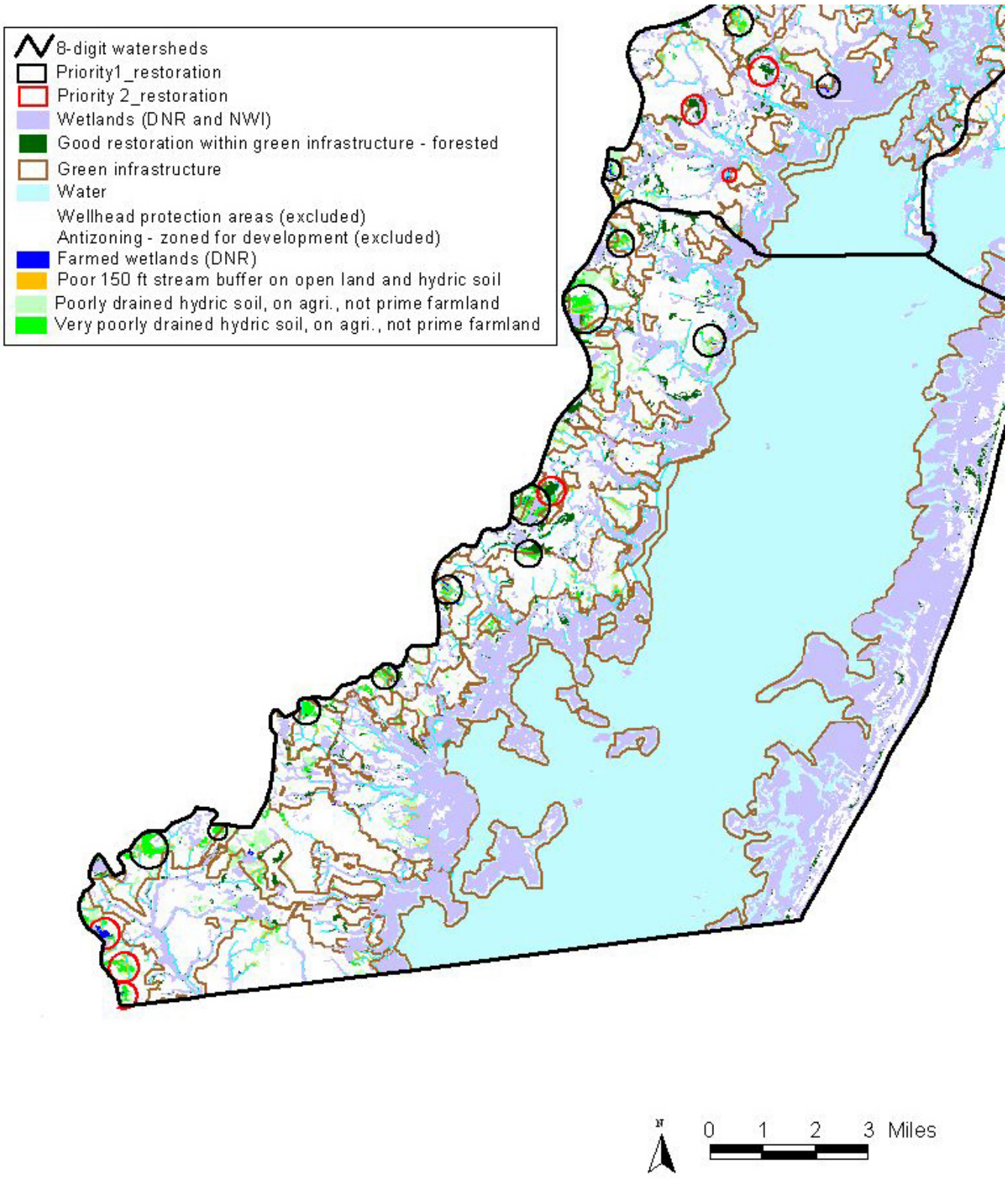
Map 2. Priority 1 wetlands restoration sites for Chincoteague Bay watershed.



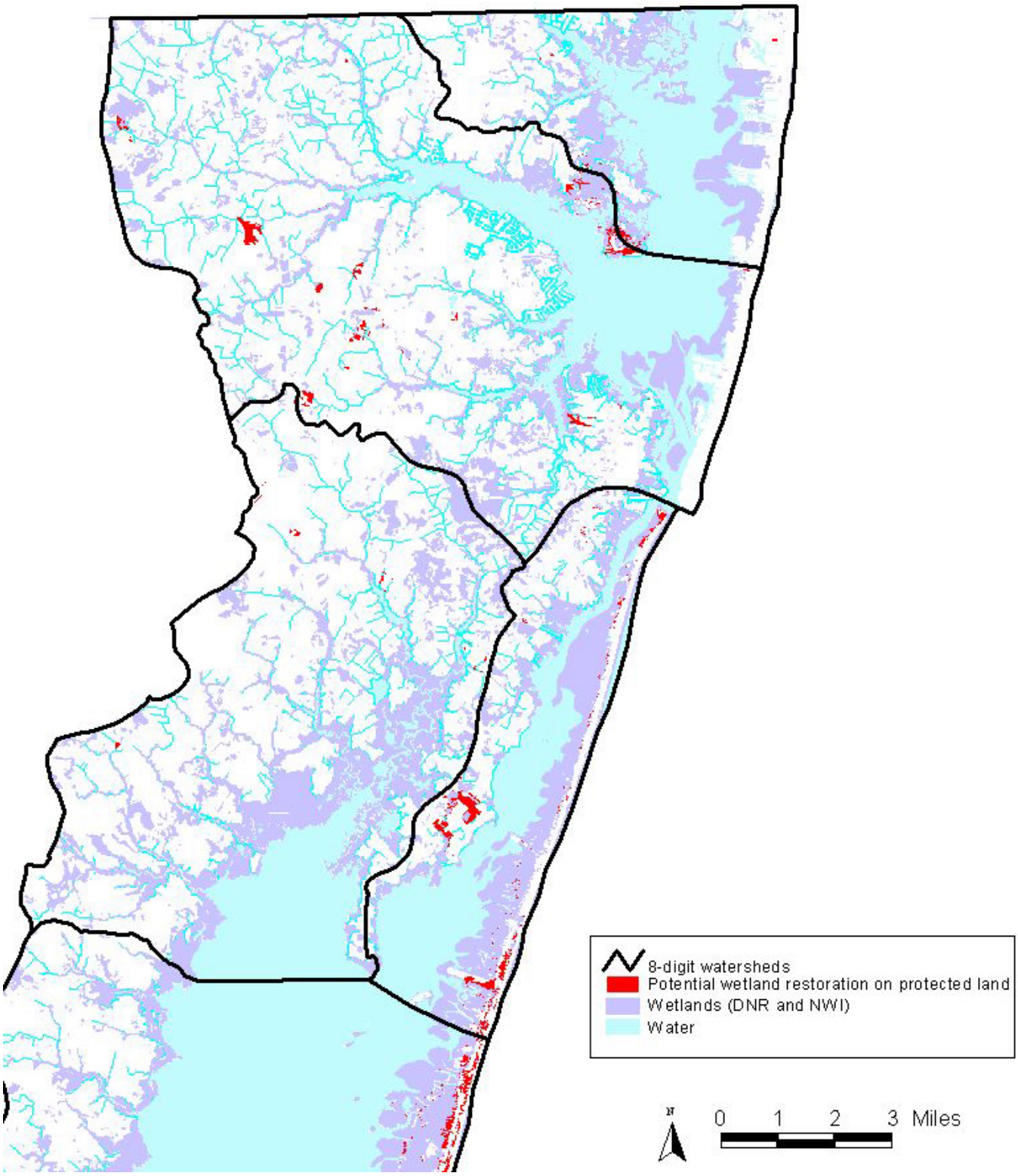
Map 3. Priority 1 and 2 wetland restoration sites for four northern Coastal Bays watersheds.



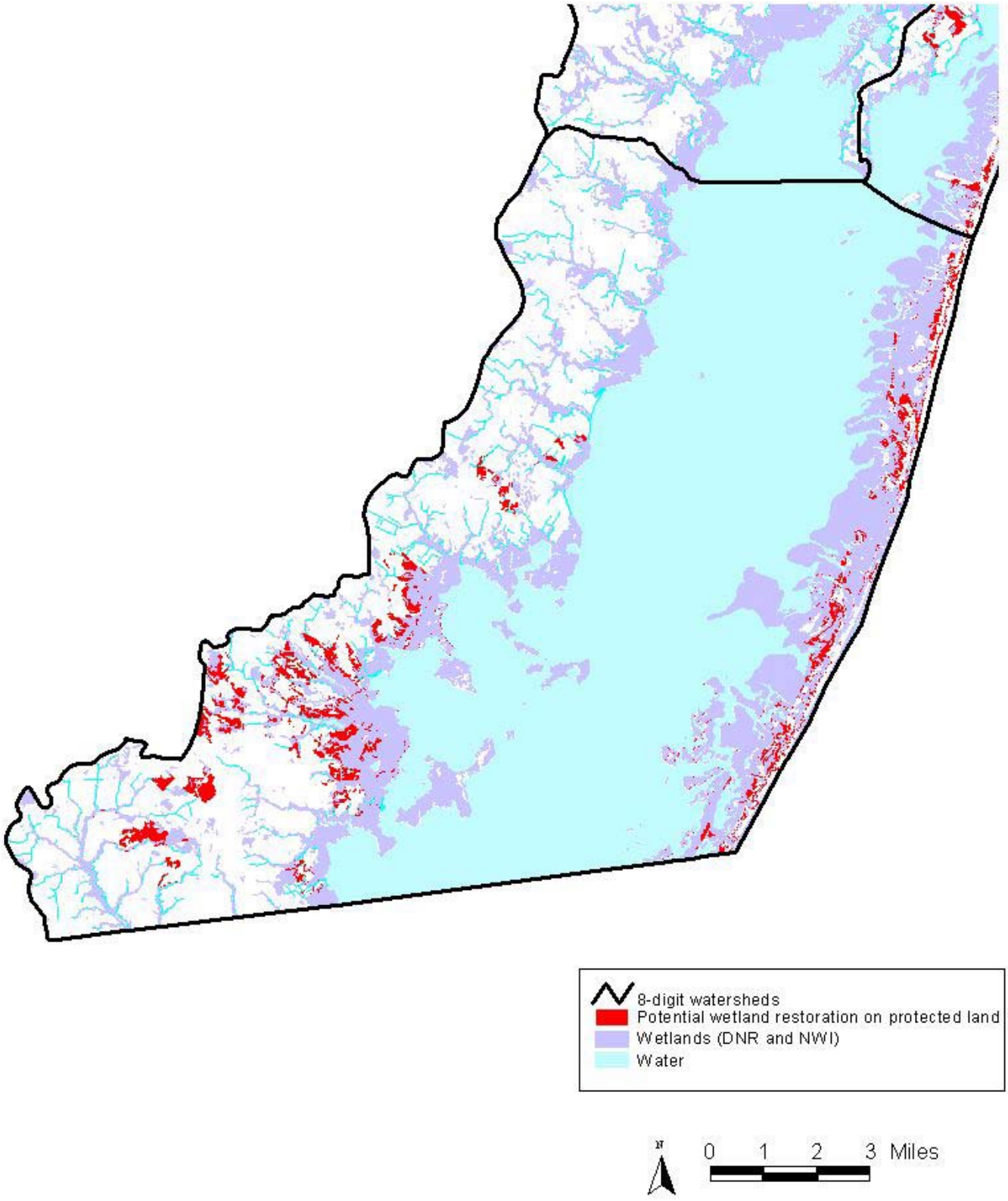
Map 4. Priority 1 and 2 wetland restoration sites for Chincoteague Bay watershed.



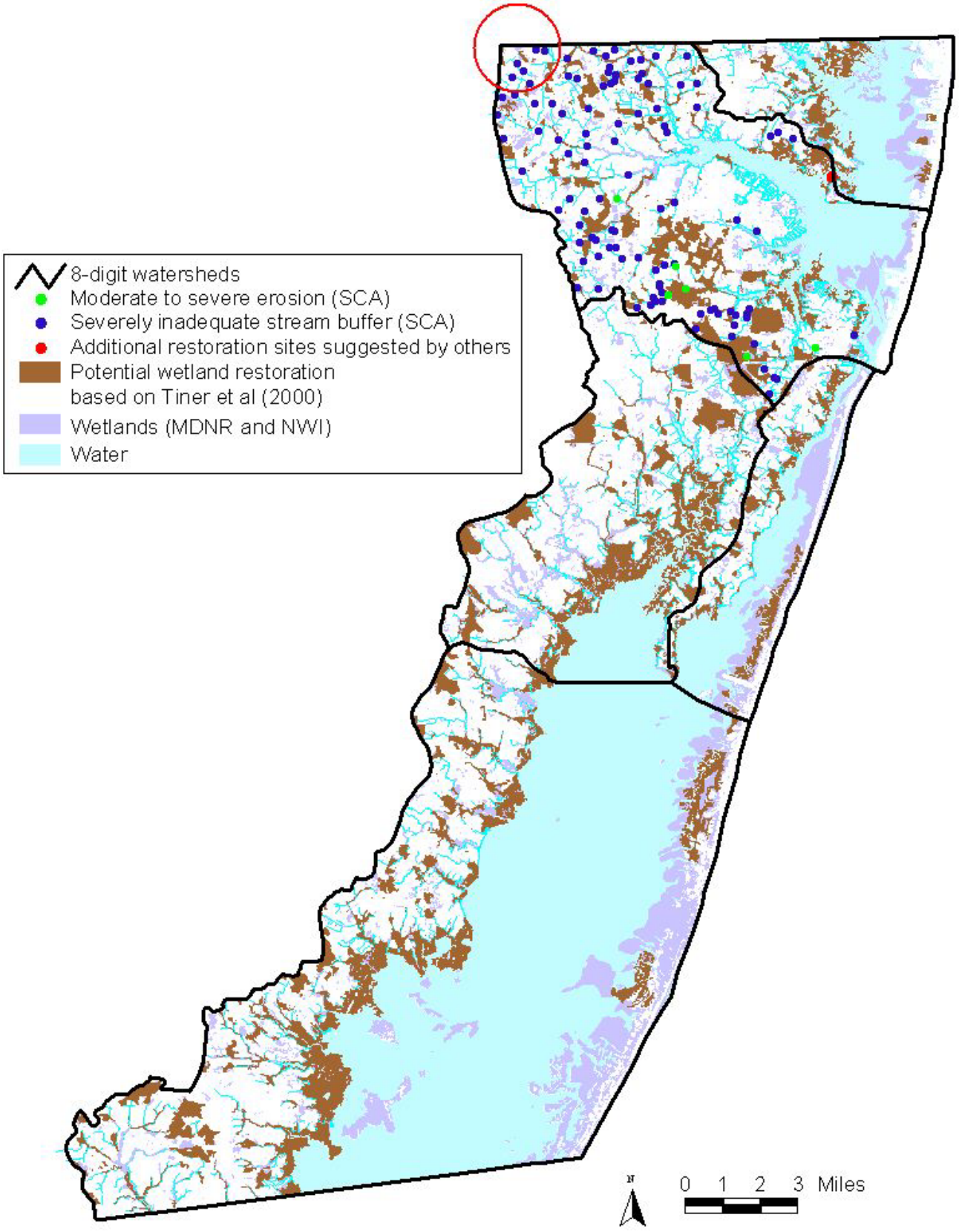
Map 5. Potential wetland restoration sites for protected land within the four northern Coastal Bays watersheds.



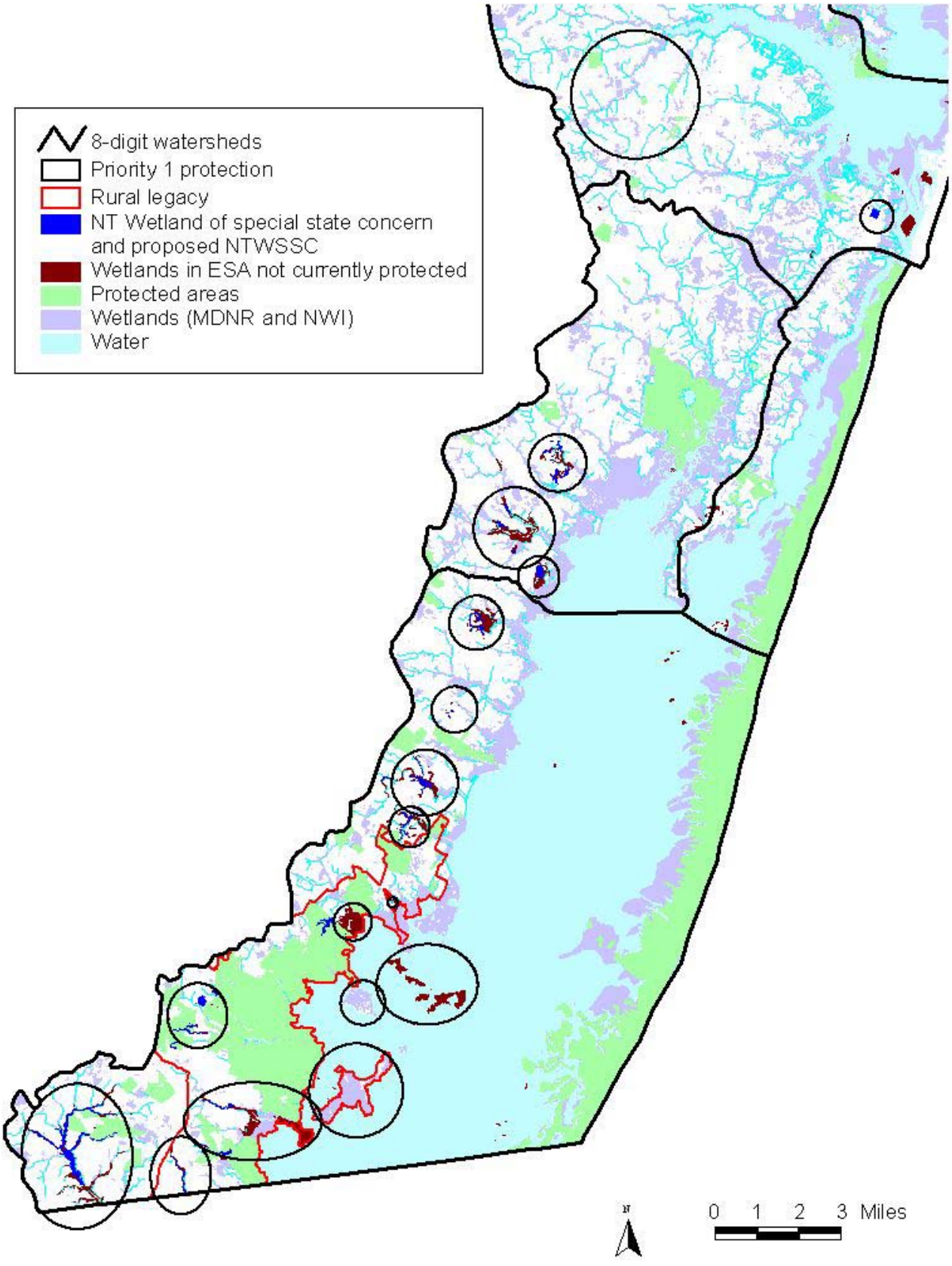
Map 6. Potential wetland restoration sites for protected land within Chincoteague Bay watershed.



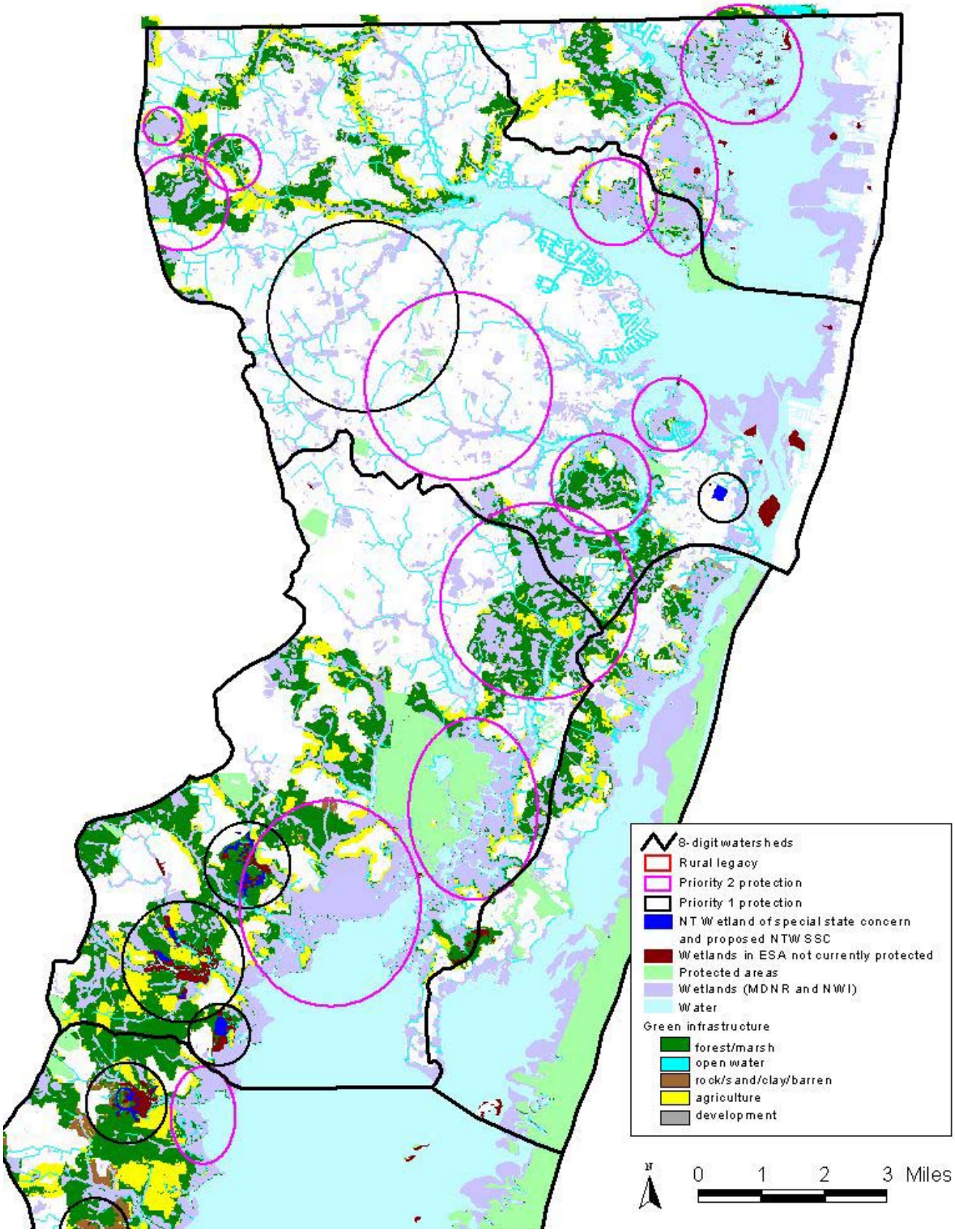
Map 7. Additional wetland restoration sites within the Coastal Bays watershed.



Map 8. Priority 1 wetland preservation sites within the Coastal Bays watershed.



Map 9. Priority 1 and 2 wetland preservation sites within the four northern Coastal Bays watersheds.



Map 10. Priority 1 and 2 wetland preservation sites within Chincoteague Bay watershed.