

# DRAFT RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

For the Galaxy/Spectron Site, Cecil County, Maryland



Draft for Public Review and Comment

March 2008

National Oceanic and Atmospheric Administration  
Maryland Department of Natural Resources  
U.S. Fish and Wildlife Service



## EXECUTIVE SUMMARY

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### **What was injured?**

The Galaxy/Spectron, Inc., (Spectron) site is an abandoned solvent recycling facility located approximately six miles northwest of Elkton, Maryland. The site covers approximately eight acres adjacent to Little Elk Creek, a tributary to the Elk River and the upper Chesapeake Bay. Past operations at the recycling facility resulted in contamination of the site soils and groundwater with volatile organic compounds (VOCs). The primary contaminant migration pathway to trust resources was VOC discharge to Little Elk Creek. Fish surveys conducted on Little Elk Creek have identified trust resources including alewife, blueback herring, white perch and the American eel. The Creek provides aquatic and benthic habitats supporting trust resources. The Trustees determined injuries were primarily to anadromous fish such as herring and alewife.

### **Draft Plan to Restore the Resources**

This Draft Restoration Plan and Environmental Assessment (Draft RP/EA) was prepared by Federal and state natural resource trustees to address natural resources, including ecological services, injured, lost or destroyed due to releases of hazardous substances at the Site. The purpose of this restoration, as outlined in this draft RP/EA, is to make the environment and the public whole for injuries resulting from the release of hazardous substances by implementing restoration actions that return injured natural resources. The Trustees are seeking written comments from the public on the proposed restoration plan.

### **How were restoration alternatives evaluated and selected?**

The Trustees considered numerous restoration alternatives to compensate the public for injuries to natural resources. The number of sites considered includes 72 possible fish blockages and 11 stream restoration sites in both Little Elk Creek and the overall Elk River watershed. After evaluating the alternatives, the Trustees identified Scotchman Creek as the preferred restoration alternative based on the anticipated ecological benefits to anadromous fish, project cost-effectiveness and overall need for restoration within the Elk River watershed.

### **Scotchman Creek Fish Blockage Removal and Stream Restoration Project**

The preferred alternative is removal of a partial fish blockage and stream restoration at Scotchman Creek at Mill Lane in Cecil County, Maryland. This area is documented spawning ground for striped bass, white perch, alewife, and blueback herring. Historically, Scotchman Creek and the Bohemia River into which Scotchman Creek flows have produced some of the highest counts of striped bass juveniles in the Chesapeake Bay. Fish blockage removal and stream restoration at Scotchman Creek will restore 1000 linear feet of stream and open an additional 2.2 miles of habitat for anadromous fish and the American eel.

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## **1.0 INTRODUCTION**

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This Draft Restoration Plan and Environmental Assessment (Draft RP/EA) was prepared by Federal and state natural resource trustees to address natural resources, including ecological services, injured, lost or destroyed due to releases of hazardous substances in areas at or adjacent to the Galaxy/Spectron site (Site) located approximately six miles northwest of Elkton, Maryland in Cecil County. The purpose of this restoration, as outlined in this Draft RP/EA, is to make the environment and the public whole for injuries resulting from the release of hazardous substances by implementing restoration actions that return injured natural resources.

The natural resources trustees include the following four Federal and state agencies: the National Oceanic and Atmospheric Administration (NOAA) of the U. S. Department of Commerce, the United States Fish and Wildlife Service (USFWS) on behalf of the U.S. Department of the Interior (DOI), and the Maryland Departments of the Environmental (MDE) and Natural Resources (DNR) (collectively, "the Trustees").

This Draft RP/EA identifies the restoration action the Trustees plan to implement as part of a natural resource settlement for natural resource injury in areas at or adjacent to the Site. The trustees seek comments on the proposed restoration alternatives presented in this Draft RP/EA. The Trustees will consider written comments received during the public comment period before finalizing the document.

### **1.1 OVERVIEW OF SITE**

The Galaxy/Spectron, Inc., (Spectron) Site is an abandoned solvent recycling facility located approximately six miles northwest of Elkton, Maryland (Figure 1). The Site covers approximately 8 acres adjacent to Little Elk Creek, a tributary to the Elk River and the upper Chesapeake Bay. The main portion of the Site (Plant Area) consists of seven acres on the southern bank of Little Elk Creek; another portion of the Site is an approximately one-acre parcel of the Site (Office Area) located on the northern bank of Little Elk Creek (Figure 2). The Site began as a paper mill. From the late 1800s through the early 1950s, a water-powered paper mill operated on the property. In 1961, Galaxy Chemicals, Inc. began a solvent recovery operation treating wastes generated by the electronics, pharmaceutical, paint, and chemical process industries. Galaxy Chemicals claimed bankruptcy in 1975. The facility reopened as Solvent Distillers, Inc., with primarily the same ownership. Solvent Distillers, Inc., which later changed its name to Spectron, Inc., closed the facility in 1988, declared bankruptcy and abandoned the Site with approximately 1,300 drums and 62 large storage tanks containing hazardous chemicals and waste left on site. (<http://epa.gov/reg3hwmd/npl/MDD000218008.htm>)

A dam (Spectron Dam) is located on Little Elk Creek in Cecil County adjacent to the Galaxy/Spectron site where injuries occurred. The dam was likely constructed to provide

low-head hydro power to former paper mills along Little Elk Creek. The original dam (circa 1832) has been modified significantly on several occasions in attempts to stabilize, repair and improve it. The dam is presently 9 feet high at the downstream concrete apron level and 98 feet long. It should be noted that the Spectron settlement ultimately was for a cash value equivalent to the estimated cost of removing the Spectron Dam (approximately \$507,300); however, the project could not be completed due to lack of cooperation from the dam owner, unknown but potential contaminants in sediment behind the dam and the possibility of compromising the integrity of the installed Stream liner (a component of the groundwater treatment system) downstream of the project site.

## **1.2 SUMMARY OF NATURAL RESOURCE INJURIES**

Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) the trustees may assess injuries to natural resources resulting from a release of a hazardous substances covered under CERCLA or the CWA and may seek to recover those damages. The goal of an injury assessment is to determine the nature and extent of injuries to natural resources and to quantify the resulting resource and service losses, thus providing a technical basis for evaluating the need for, type of, and scale of restoration actions.

The Trustees' assessment of natural resource injuries focused on identifying the injury or losses of natural resources which were likely or known to have resulted from migration of contamination into Little Elk Creek. VOCs were the primary contaminants of concern (COCs) at the Site and for the natural resource damage assessment. These hazardous substances were found in surface water and sediments in Little Elk Creek as a result of migration from contaminated groundwater from the Site. The Trustees determined injuries were primarily to anadromous fish such as herring and alewife.

### ***1.2.1 Summary of the Remedial Investigation and Cleanup***

During industrial operations from 1961 through 1988, soil and groundwater at the Site became contaminated with hazardous substances including VOCs such as trichloroethene (TCE) and perchloroethene (PCE). On May 20, 1996, an Administrative Order on Consent was signed by Environmental Protection Agency (EPA) and the potentially responsible parties (PRPs), requiring the PRPs to continue investigations at the Site and to develop a Remedial Investigation and Feasibility Study ("RI/FS"). These reports and other documentation are provided in the EPA Administrative Record. In June 2001, EPA decided to split the site into two operable units to expedite the cleanup of contaminated soils. Operable Unit 1 addressed contaminated site soils and overburden groundwater. Operable Unit 2 addressed bedrock groundwater contamination. A Record of Decision was signed for Operable Unit 1 in 2004 which addressed contamination in the soil beneath the Site and shallow groundwater. The RI/FS is ongoing for the fractured bedrock aquifer, which is a focus of Operable Unit 2. Operable Unit 2 includes defining the nature and extent of contamination in the bedrock aquifer and evaluating alternatives for cleaning efforts.

A groundwater containment, collection, and treatment system (collectively referred to herein as "Groundwater Containment System") was installed to catch and treat contaminated seeps discharging from the Site along the stream bank and contaminated groundwater discharging to the stream. In the fall of 1998, the PRPs began constructing the Groundwater Containment System which required the excavation of the stream bed; the installation of a French drain system; and installation of a watertight synthetic liner between the Site contamination and Little Elk Creek. The watertight synthetic liner or "Stream liner" provides a barrier between the stream and the contaminated seeps and groundwater. By the spring of 1999, the work in the stream bed was complete.

The stream was restored by planting native trees and plants along the banks and aquatic restoration was performed in the stream bed itself. The French drains located under the Stream liner collect contaminated groundwater, which is then pumped to an on-site groundwater treatment plant. The water is treated before being discharged to Little Elk Creek. By the spring of 2000, construction work for the Groundwater Containment System was completed, and the plant began treating captured contaminated groundwater. The treatment plant uses biological/powder activated carbon ("PAC") treatment tanks. This treatment process allows bacteria, in two 18,000 gallon tanks, to degrade or consume the contaminants in the groundwater. In September 2000, an air stripper was incorporated as a polishing process for the treated water to remove any residual organic compounds not removed by the biological/powder activated carbon treatment. Under EPA and MDE oversight, the design and construction of these facilities was conducted and financed by the PRPs.

Surface water samples have been collected quarterly by the PRP in Little Elk Creek since 1995. The program collects samples from 29 residential wells and 15 surface water locations in the stream. The surface water collection was semi-annual with four sites and moved to quarterly sampling of twelve locations in 1996. In 1999, sampling of 15 stations in 15 stream locations began to be conducted to determine the effectiveness of the Stream liner. Once the Stream liner was in place, surface water concentrations of VOCs dropped considerably. Since March 2000, when the Stream liner became operational, VOC concentrations have been approximately one to two orders of magnitude lower than before the Stream liner (Environmental Resources Management 2001).

### **1.3 SUMMARY OF SETTLEMENT**

In March 2003, a Federal District Judge in the United States District Court for the District of Maryland finalized a settlement which required de minimis parties to pay \$5.8 million toward the clean-up of the Site. The de minimis settlement included approximately 480 parties who sent relatively small amounts of hazardous material to the Site. De minimis settlements enable smaller waste contributors to help pay cleanup costs in advance and, in exchange, release them from future financial obligations at sites. In January 2007, EPA reached a second settlement for \$21.8 million with 95 parties. The settlement includes an estimated \$19.5 million for cleanup at the Site, reimbursement of \$1.8 million in past cleanup costs and payment of \$507,300 to natural resource trustees to restore aquatic

habitat and resources, including migratory fish such as blueback herring that were harmed by the contaminant releases from the Site. The Trustees have \$455,000 available for restoration activities after reimbursement for past restoration planning costs during the settlement phase.

<http://yosemite.epa.gov/opa/admpress.nsf/56d5d55f70218074852572a000657b5d/79596996817a8a828525726e006267bc!OpenDocument>

#### **1.4 SUMMARY OF PREFERRED RESTORATION ALTERNATIVE**

In this Draft RP/EA, the Trustees' propose natural resource injuries be compensated by restoring fish passage and habitat for anadromous fish. The Trustees evaluated over 70 potential fish blockage removals in the Elk River watershed to restore anadromous fish passage and 11 possible sites for stream restoration in the Little Elk Creek watershed. Each restoration alternative was evaluated based on selection criteria developed by the Trustees. Chapter 5 of this Draft RP/EA presents the selection criteria developed by the Trustees, as well as a description and evaluation of a range of alternatives considered. Based on the Trustees' evaluation, the preferred alternative is partial fish blockage removal and stream restoration at Scotchman Creek along the former impoundment at Mill Lane in Cecil County, Maryland. This area is documented spawning ground for striped bass, white perch, yellow perch, alewife, and blueback herring. Historically, Scotchman Creek and the Bohemia River into which Scotchman Creek flows have produced some of the highest counts of striped bass juveniles in the Chesapeake Bay. Fish blockage removal and stream restoration at Scotchman Creek will restore 1000 linear feet of stream and open an additional 2.2 miles of habitat for anadromous fish and the American eel. This restoration represents in-kind restoration for natural resource injuries from Site activities.

## **2.0 PURPOSE AND NEED FOR RESTORATION**

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This Draft RP/EA was prepared by the Trustees to evaluate a range of alternatives for restoring natural resource injuries resulting from activities at the Site. The Trustees are making this Draft RP/EA available to the public to solicit their comments on the proposed restoration actions. This Draft RP/EA also serves as a draft Environmental Assessment (EA) as defined under the National Environmental Policy Act (NEPA) (42 U.S.C. *et seq.*).

### **2.1 AUTHORITIES AND LEGAL REQUIREMENTS**

This Draft RP/EA was prepared jointly by the Trustees pursuant to their respective authority and responsibilities as natural resource Trustees under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. § 9601, *et seq.*), the Federal Water Pollution Control Act (33 U.S.C. § 1251, *et seq.*) (also known as the Clean Water Act [CWA]), and other applicable federal or state laws, including Subpart G of the National Oil and Hazardous Substances Contingency Plan (NCP) (40 C.F.R. §§ 300.600 through 300.615) and DOI's CERCLA natural resource damage assessment regulations (43 C.F.R. Part 11) which provide guidance for this restoration planning process under CERCLA. As a designated Trustee, each agency is authorized to act on behalf of the public to protect and restore natural resources that have been injured at the Site.

#### ***2.1.1 Public Participation***

This Draft RP/EA provides the public with information on the natural resource injuries and injuries assessed in connection with the Site, the Trustees' restoration objectives, the restoration alternatives considered, and the preferred restoration alternative. In accordance with Federal and state laws, including NEPA and the NRDA regulations, the restoration plan proposed in this Draft RP/EA is being made available for review and comment by the public for a period of 30 days. The deadline for submitting written comments on the Draft RP/EA is specified in one or more public notices issued by the Trustees to announce its availability for public review and comment. Comments are to be submitted in writing to:

Ms. Mary P. Andrews  
NOAA Restoration Center, 410 Severn Avenue, Suite 107A, Annapolis, MD 21403  
Phone: 410-267-5644 Fax: 410-267-5666

The Trustees will consider all written comments received prior to approving and adopting a Final RP/EA. Written comments received and the Trustees' responses to those comments, whether in the form of plan revisions or written explanations, will be summarized in the Final RP/EA.



### **2.1.2 Administrative Record**

The Trustees have placed the information considered and actions taken by the Trustees during this restoration planning process in an Administrative Record (AR) supporting this Draft RP/EA. The AR may be reviewed by interested members of the public at <http://www.darrp.noaa.gov/northeast/spectron/index.html> or:

NOAA Restoration Center, 410 Severn Avenue, Suite 107A, Annapolis, MD 21403  
Phone: 410-267-5644 Fax: 410-267-5666

and

Cecil County Public Library, 301 Newark Avenue, Elkton, Maryland 21921  
Phone: 410-996-5600

Access to and copying of these documents in the AR are subject to all applicable laws and policies including, but not limited to, laws and policies relating to copying fees and the reproduction or use of any material that is copyrighted.

## **2.2 NEPA COMPLIANCE**

Actions undertaken by the Trustees to restore natural resources or services under CERCLA and other federal laws are subject to NEPA (42 U.S.C. § 4321 *et seq.*), and the regulations guiding its implementation (40 C.F.R. 1500 *et seq.*). In compliance with NEPA, this Draft RP/EA summarizes the current environmental setting, describes the purpose and need for restoration actions, and identifies alternative actions and their potential environmental consequences (also see Appendix A).

This information was used to make a threshold determination as to whether preparation of an environmental impact statement (EIS) is required prior to selection of the final restoration actions. Based on the draft EA integrated into this plan, the Trustees have determined that the proposed restoration actions do not meet the threshold requiring an EIS.

### **3.0 AFFECTED ENVIRONMENT**

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This chapter presents a brief description of the physical, biological, and cultural environment for the overall Elk River watershed and Little Elk Creek, as required by NEPA (42 U.S.C. Section 4321, et seq.). Natural resource injuries occurred over one linear stream mile (approximately 3 acres total) along Little Elk Creek. Restoration activities will occur in the larger Elk River watershed, specifically Scotchman Creek, a tributary to the Bohemia River and Elk River.

#### **3.1 PHYSICAL ENVIRONMENT**

The Elk River basin drains into the northeastern portion of the Chesapeake Bay from Cecil and Kent counties, Maryland. Portions of the basin drain from Pennsylvania and Delaware. The Elk River basin includes the watersheds of the Elk, Sassafras, Northeast, and Bohemia Rivers. The drainage basin is approximately 440 square miles. Upper reaches are mainly freshwater non-tidal streams while lower reaches of the streams can be tidally influenced with low salinity ranges. One major concern in the basin is eroded, unstable stream banks that reduce habitat quality and contribute to water quality problems in downstream areas. As lands in the basin become more urbanized, stream bank instability has occurred causing an increase in downstream transport of nutrients and suspended sediment into the Chesapeake Bay (<http://www.dnr.state.md.us/streams/pubs/elk.pdf>).

Little Elk Creek, a tributary to the Elk River, is the closest surface water body to the Site. The creek divides the Site into two parcels, a seven acre site on the southern bank and a one acre site on the northern bank. Little Elk Creek is a shallow freshwater creek with a tidally influenced lower one-quarter mile. Upper reaches are mainly freshwater, while the salinity in the lower reaches varies with precipitation. The creek is approximately 50-65 centimeters deep and 15-90 meters wide. Silty sand dominates the sediments near Little Elk Creek's confluence with the Elk River, while gravel and cobble substrate are found in the upper portion of the Creek.

(<http://mapping.orr.noaa.gov/website/portal/LittleElkCreek/habitat.html>). A small intermittent stream runs along Ed Moore Road before crossing through a portion of the Plant Area before discharging to Little Elk Creek above the Spectron Dam (<http://epa.gov/reg3hwmd/super/sites/MDD000218008/prap/2003-06.htm#solvent>).

The Little Elk Creek flows into the Elk River, which in turn flows into Chesapeake Bay. NOAA conducted a field inspection of Little Elk Creek and several of its tributaries in May 2005 and the habitat issues identified as being of greatest importance were lack of riparian buffers and potential fish blockages, including the dam at the Site.

Little Elk Creek was contaminated by Site activities as described in Section 1.2. Leachate seeps previously discharging into Little Elk Creek contained elevated levels of VOCs. The seeps are now being captured and treated in a groundwater containment system. Similar contaminants have historically been detected in the creek downstream

from the Site. The Groundwater Containment System, installed as part of the current cleanup effort, caused a significant reduction in these levels. On-site monitoring wells also are contaminated with chlorinated solvents. Potential risks exist if contaminated groundwater is used as a drinking water source. The risks associated with coming into direct contact with contamination seeping from the river bank at the chemical plant location have been eliminated by the installation of a Groundwater Containment System. (<http://epa.gov/reg3hwmd/npl/MDD000218008.htm>)

### **3.2 BIOLOGICAL ENVIRONMENT**

The Elk River basin has an estimated fish abundance of 2.2 million including 42 total fish species, 11 reptile and amphibian species and 2 species of freshwater mussels (<http://www.dnr.state.md.us/streams/pubs/elk.pdf>). Anadromous fish present in the Elk River watershed include American shad, blueback herring, white perch, striped bass and the American eel. The basin is also home to a number of resident fish species, birds and mammals.

Trust resources observed in Little Elk Creek include alewife, blueback herring, white perch and American eel. The three former species spawn and forage as juveniles and adults in the stream. Little Elk Creek also provides habitat to support numerous other species including reptiles, amphibians, birds, and mammals.

The Site is bordered on the east by Little Elk Creek. The stream provides aquatic and benthic habitats supporting trust resources, including anadromous fish, the catadromous American eel, and resident forage fish supporting piscivorous birds and mammals. Passage of anadromous species (alewife, blueback herring and white perch) is currently restricted by the dam at the Site, but historically these species had upstream access.

### **3.3 CULTURAL ENVIRONMENT**

The Elk River basin offers a variety of recreational activities for residents and visitors, including Fair Hill Natural Resource Management Area, Elk Neck State Forest and Elk Forest Wildlife Management Area. Popular activities include hunting, biking, fishing, horseback riding, swimming, bird watching and picnicking.

The State of Maryland designated the Little Elk Creek as a potential drinking water source and a stream targeted for protection and maintenance of aquatic life. Little Elk Creek provides numerous recreational opportunities including fishing, swimming, wading, and wildlife observation.

## **4.0 INJURY DETERMINATION**

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This section includes a description of the Trustees' assessment strategy, including the approach used to evaluate injuries to natural resources affected by hazardous substance releases from the Site. The section also includes a description of the approach used to evaluate benefits to natural resources from proposed restoration actions.

### **4.1 INJURY EVALUATION**

The Trustees' assessment of natural resource injuries focused on identifying the injury or losses of natural resources which were likely or known to have resulted from migration of contamination into Little Elk Creek. VOCs were the primary contaminants of concern (COCs) at the Site and for the natural resource damage assessment. These hazardous substances were found in surface water and sediments in Little Elk Creek as a result of migration from contaminated groundwater from the Site prior to installation of the stream liner in 2000.

The goal of this assessment was to determine the nature and extent of injuries to natural resources and to quantify the resulting resource and service losses, thus providing a technical basis for evaluating the need for, type of, and scale of restoration actions. The assessment used relatively conservative assumptions (i.e. erring on the side of overestimating potential injury) in order to reduce the cost and time associated with the performance of the settlement injury assessment, ultimately supporting an earlier restoration of injured resources.

The natural resource category that was potentially affected was aquatic life in Little Elk Creek. These receptors include benthic organisms, fish, amphibians, birds, and mammals. Habitat Equivalency Analysis (HEA) is a tool used by natural resource trustees in the natural resource damage assessment process. The HEA calculated losses prior to remediation based on injury from contamination. Injury following remediation was assumed to be zero as the migration pathway was essentially eliminated and VOCs are not persistent in the aquatic environment. Prior to remediation, a percent service loss was applied to a one mile stretch of Little Elk Creek below the Site. This is the area for which an advisory against swimming and other recreational uses was issued based upon the data obtained in the remedial investigation. The percentage loss was based on measurements of groundwater contamination that exceeded criteria for protection of aquatic life with consideration of dilution in surface water. Groundwater entering the creek was the primary source of contamination contributing to ecological injury and is a more reliable media to evaluate injury based upon a more robust data set at the Site and the environmental characteristics of VOCs in surface water.

The calculation of lost ecological services is based on groundwater measurements collected as part of the Remedial Investigation and Risk Assessment (RI/RA), Report for Site Soils and Overburden Ground Water, Galaxy/Spectron Site, Elkton, MD. The document was produced in March 2001 by Environmental Resources Management.

Results from groundwater samples reported in Table 5-4 of the RI/RA, “Groundwater Results,” appear in the spreadsheet “Spectron Exceedances of Water Quality Criteria.” The contaminants measured in the RI/RA include VOCs, SVOCs, pesticides, and metals. The spreadsheet compares the groundwater sampling results to State of Maryland chronic criteria, where available (<http://www.dsd.state.md.us/comar/26/26.08.02.03-2.htm>). For VOCs and SVOCs there were no State of Maryland criteria, so the trustees relied on MacDonald *et al.* 1999, which contains a compilation of water quality criteria from around the world. From Appendix 2-4 of MacDonald *et al.* 1999 “A Summary of the Available Water Quality Criteria and Guidelines for the Protection of Freshwater Aquatic Life,” the lowest U.S. criteria were selected for use in the scaling calculations.

The total number of analyses for a particular compound was determined, then the number of times it exceeded the water quality criteria was determined. Samples included in the RI/RA used in the spreadsheet do not include duplicates and other results determined to be invalid in the RI/RA. The total number of analyses was then determined (282), as was the total number of exceedances (188). The rate at which samples were found to exceed water quality criteria was approximately 72%. This number was incorporated into the HEA.

#### **4.2 RESTORATION SCALING APPROACH**

HEA, scientific literature, and knowledge of the affected ecosystem were used to determine how much credit could be realized from an identified restoration project at the Site. The project identified was removal of the Spectron Dam to allow for fish passage, including anadromous fish species, upstream of the dam. Anadromous fish, such as herring and alewife, are species that live in saltwater as adults, but migrate into freshwater streams such as Little Elk Creek to spawn. Dams and other fish blockages in streams present significant impacts to these species and these restoration actions are a priority in tributaries of the Chesapeake Bay. Other anadromous species identified in the area include striped bass and shad though these species are not likely to use habitat upstream of the Spectron Dam.

Various inputs were considered, such as the level of ecological services currently provided at the proposed restoration location and the amount and quality of aquatic habitat upstream of the Spectron Dam. Removal of the dam was assumed to provide 10 miles of additional spawning habitat in Little Elk Creek based upon historical information provided by the Maryland Department of Natural Resources. The analysis determined how many discounted service-acre-years (DSAYs) would be credited for removal of the Spectron Dam. Benefits were calculated primarily based upon the value of services to anadromous fish which are the species most benefited by removal of the dam. Other resources, including resident fish and bird and mammalian species, would also benefit from this ecological enhancement.

Injuries begin in 1981, based on CERCLA case law establishing application of liability under the statute, and the restoration was assumed to begin in 2006. Gains from restoration are assumed to end in 2035 based on the possibility that even without

restoration the dam would be removed or breached at some point in the future. The Spectron Dam currently has several leaks and its structural integrity has weakened considerably. A 3-percent discount rate is applied to bring it to present value.

### **4.3 INJURY ASSESSMENT AND RESTORATION SCALING FINDINGS**

Ecological losses from the incident were found to be comparable to gains from the Spectron Dam removal considering the relatively conservative assumptions used in the injury assessment and inherent uncertainties in the injury assessment and restoration scaling approaches, when based on limited data. Thus the proposed restoration project, removal of the Spectron Dam, was determined to provide adequate compensation for injuries to natural resources from contaminant releases from the Site. It should be noted that the settlement ultimately was for a cash value equivalent to the estimated cost of removing the Spectron Dam (approximately \$507,300) as the project could not be completed due to lack of cooperation from the dam owner, unknown but potential contaminants in sediment behind the dam and the possibility of compromising the integrity of the installed stream liner downstream of the project site. Because the Trustees determined that removal of the Spectron Dam was not the best restoration option, these funds would be used to perform an alternate restoration project to be selected by the Trustees. This analysis is discussed in Section 5.3.

## 5.0 RESTORATION PLANNING PROCESS

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### 5.1 RESTORATION STRATEGY

The objective of the restoration planning process is to identify restoration alternatives to restore, rehabilitate, replace or acquire natural resources and their services equivalent to natural resources injured or lost as a result of the release of hazardous substances. The restoration planning process may involve two components: primary restoration and compensatory restoration. Primary restoration actions are actions designed to assist or accelerate the return of resources and services to their pre-injury or baseline levels. In contrast, compensatory restoration actions are actions taken to compensate for interim losses of natural resources and services, pending return of the resources and their services to baseline levels.

In this instance, remedial actions undertaken at the Site should protect natural resources in the vicinity of the Site from further or future harm and allow natural resources to return to pre-injury or baseline conditions within a reasonable period of time. As restoration of the stream bank and in-stream habitats was performed as part of the groundwater contamination remedial actions, it was unnecessary for the Trustees to plan for primary restoration. Accordingly, this Draft RP/EA addresses only compensatory restoration.

The Trustees searched for projects that would benefit anadromous fish and American eel that were injured by the releases. The Trustees identified and evaluated 72 possible fish blockage removals, 11 stream restoration project alternatives and the no action alternative in the Elk River watershed (Figure 3). Projects considered by the Trustees are listed in Appendices B and C.

In order to identify sites and evaluate restoration alternatives, the Trustees conducted a site selection process using the best available information from the following two sources:

- Maryland Department of Natural Resources Fish Blockage Database
- National Oceanic and Atmospheric Administration (NOAA) Little Elk Creek Watershed Database and Mapping Project

The Trustees first identified all potential fish blockages in the Little Elk Creek as an attempt to provide in-kind in-place restoration for damages. The Trustees expanded the analysis to include all fish blockages in the entire Elk River watershed after no sites meeting the evaluation criteria for feasible projects (see section 5.2) were identified in Little Elk Creek. A total of 72 sites were identified through this analysis. Stream restoration opportunities were also investigated in Little Elk Creek using the NOAA Little Elk Creek Watershed Database and Mapping Project. A total of 11 sites were investigated during this analysis (Appendix C).

## 5.2 EVALUATION CRITERIA

All potential restoration projects were evaluated by the Trustees using the following criteria:

- Extent to which alternatives met the Trustees' goals and objectives in compensating for the injured natural resources and services – restoration of anadromous fish passage was the Trustees' primary goal when selecting restoration alternatives (in-kind)
- The expected costs versus the expected benefits from restoration
- Technical feasibility of implementing the project
- Compliance with Federal, state and local laws
- Likelihood of Project Success

The Trustees used all the criteria listed above, and considered the first two criteria most important for compensatory restoration actions. The Trustees' goals and objectives for compensating for the injured natural resources and services included restoring anadromous fish passage to areas shown to support anadromous fish historically and creating and/or enhancing habitat for use by anadromous fish. Restoration alternatives focused on the removal of a blockage or dam structure resulting in additional habitat available for anadromous fish were given the highest priority. Restoration alternatives dealing with stream restoration for the purpose of providing additional anadromous fish habitat were also given a higher priority. Site selection was conducted in the Little Elk Creek watershed to identify potential restoration projects at the same geographic location of the injury (in-place) prior to expanding the analysis to include the entire Elk River watershed. The expansion of the geographic area used to identify potential projects was deemed necessary when the site selection process did not identify a suitable site in the Little Elk Creek watershed.

Based on application of the evaluation criteria, the list of potential restoration locations was narrowed from the list of 83 identified sites to five action alternatives that were determined a reasonable range of alternatives to meet the stated purpose and need. During field investigations, the Trustees determined 17 potential sites were no longer a blockage to anadromous fish. The blockages had either been removed or altered in some way allowing access to anadromous fish (Appendix B). A number of sites (34 sites total) were eliminated from further consideration based on the limited upstream habitat (0.5 miles or less) to be opened for anadromous fish by blockage removal. Projects opening more than 0.5 miles of stream habitat for anadromous fish were considered by the Trustees to compensate for lost injuries and were investigated further. An additional 12 sites were privately owned dams which blocked fish passage. A letter was sent by the Trustees requesting permission from the private owner to investigate possible dam removal. No owners were willing to investigate the possibility of dam removal. Maryland State Highway Administration (SHA) owned 5 sites in which blockages were present. Since funding is available through SHA for blockage removals, the Trustees have notified SHA and have requested they investigate possible way to remove the blockages. The Trustees eliminated these projects from consideration under the Spectron settlement. The Trustees also considered stream restoration at 11 possible sites in the Elk



River watershed. Based on the limited information available and funding constraints for restoration planning, a suitable stream restoration site was not found. Additional information on the rationale for removal of each stream restoration site is listed in Appendix C.

### **5.3 RESTORATION ALTERNATIVES**

#### ***5.3.1 Alternative 1 (Non Preferred): No Action***

Under the No Action Alternative, no restoration, rehabilitation, replacement, or acquisition actions would occur. This alternative costs the least because no action would be taken. If selected, there would be no restoration or replacement of the lost resources and their services and the public would not be made whole for past injuries from Site. The No Action Alternative cannot be selected as the preferred alternative since compensatory restoration is already required by the Consent Decree but is retained for comparative purposes.

#### ***5.3.2 Alternative 2 (Non Preferred): Spectron Dam***

The subject dam is located on Little Elk Creek in Cecil County adjacent to the Galaxy/Spectron site where injuries occurred. The dam was likely constructed to provide low-head hydro power to former paper mills along Little Elk Creek. The original dam (circa 1832) has been modified significantly on several occasions in attempts to stabilize, repair and improve it. The dam is presently 9 feet high at the downstream concrete apron level and 98 feet long. Although this site would represent in-kind/in-place compensation for injuries, the dam removal is not feasible due to landowner resistance to allowing removal of the structure. In addition, the Trustees believed the removal of the dam may potentially compromise the integrity of the Stream liner downstream of the project. The Stream liner was installed to provide a protective barrier between the contaminated shallow soils and the stream above. Lastly, the Trustees had concerns of unknown but potential contamination of the sediment behind the dam.

Since dam removal was not an option, the Trustees investigated options to provide anadromous fish passage to upstream habitat. Several options for providing fish passage were investigated; however, none of these options were technically feasible without major modifications including replacement of the existing dam structure. The existing dam has been compromised by the continued degradation, leaks, and lack of maintenance. Providing fish passage via the old millrace was investigated and deemed infeasible. The millrace could not be utilized or modified to meet any commonly accepted flow, size or design criteria that would effectively serve as a functioning fishway without major modifications to the millrace and dam. Since dam removal was given the highest priority in the site selection process to allow free uninterrupted access to spawning habitat by anadromous fish, an alternative to include dam removal and subsequent rebuilding did not meet the environmental goals and objectives of the Trustees nor was this option the most cost-effective solution to provide fish passage.

### ***5.3.3 Alternative 3 (Non Preferred): Laurel Run Dam***

A fish blockage was identified along Laurel Run at the intersection of Zeitler Road at Elkton Farm. There is a partially washed out dilapidated bridge which had been replaced with a concrete ford currently used for local vehicle traffic. The stream bed below the ford has downcut approximately 6 feet causing a clear blockage to upstream fish passage. A housing development with over 1,400 townhouses, condominiums and homes is currently being proposed at the site. This development would require new access to homes on either side of Laurel Run. The current concrete ford structure is not sufficient for anticipated traffic flow and plans for the new development include construction of a new bridge for vehicle traffic. Under the proposed plans, the blockage at Laurel Run will be removed and replaced with a newly constructed bridge at Zeitler Road eliminating the current blockage. Therefore, the blockage at Laurel Run was removed from further consideration under this Draft RP/EA.

### ***5.3.4 Alternative 4 (Non Preferred): Dogwood Run Dam***

A fish blockage was identified along Dogwood Run at the intersection of SR 545 (also known as Blue Ball Road) in Cecil County, MD. The blockage consists of a concrete apron and broken utility line. The Trustees determined the anadromous fish benefits were uncertain based on a study completed by Maryland Department of Natural Resources study completed in 1975 where no anadromous fish were found at the Dogwood Run sampling site (O'Dell et al. 1975). In order to evaluate anadromous fish benefits associated with the blockage removal, a biological stream survey would be recommended to determine anadromous fish usage below the blockage and condition of habitat areas upstream of the blockage. Time and funding allotted for completion of this Draft RP/EA did not allow for additional data collection. It is the recommendation of the Trustees to investigate this blockage further through other potential funding sources.

### ***5.3.5 Alternative 5 (Preferred): Scotchman Creek***

Scotchman Creek is a tributary to the Bohemia River, which flows into the Elk River and into the Chesapeake Bay. The stream is located on Maryland's eastern shore in the southern portion of Cecil County (Figure 4). The main branch of Scotchman Creek is approximately 5 miles long. Approximately 2.7 miles of the main stem of Scotchman Creek (below Mill Lane) is tidal.

The Mill Pond Dam consisted of an approximately 650 foot long and 15 feet tall earthen embankment placed across Scotchman Creek with a four-cell concrete box culvert spillway. The concrete box culvert served as an outlet control structure prior to the breaching of the dam. The embankment was reportedly built circa 1837. Mill Lane was constructed in 1841 to allow passage across Scotchman Creek along the earthen dam. The road was permanently closed in 1996, when structural failures deemed the dam unsafe for passage. The drainage area at Mill Lane is approximately 5.5 square miles.

During the past 150 years, the dam has been overtopped during many flood events which

has caused damage on several occasions. Hurricane Floyd in 1999, overtopped the dam and caused a complete washout of approximately 150 feet of the earthen embankment. Prior to the failure of the embankment, the dam provided a pond storage volume of 525 acre-feet, a pond surface area of 43.7 acres and a maximum pond water depth of approximately 12 feet (Rummel et al. 2002).

Prior to Hurricane Floyd, the Mill Pond Dam was a complete blockage to fish migrating upstream along Scotchman Creek. After the breach, emergency repairs included the placement of stone riprap causing yet another blockage to migratory fish. In the years since the repair, the riprap has been distributed throughout the stream channel along with sediment derived from the former impoundment. The accumulation and displacement of these materials cause periodic fish blockages in the stream channel at base flow. A survey of anadromous fish spawning areas documented the presence of white perch (*Morone Americana*), yellow perch (*Perca flavescens*) and herring (*Alosa pseudoharengus* or *Alosa aestivalis*) below Mill Pond Dam (O'Dell et al. 1975). If the blockage were removed, this project would restore approximately 2.2 miles of stream of potential spawning and rearing habitat for anadromous fish and the American eel.

## **5.4 DESCRIPTION OF PREFERRED ALTERNATIVE**

### **5.4.1 Restoration Objectives**

The Trustees propose to restore anadromous fish usage of Scotchman Creek through partial blockage removal and stream restoration. Restoring fish passage would result in beneficial impacts via opening approximately 2.2 linear miles of stream as potential spawning and rearing habitat to anadromous fish species and the American eel. Stream restoration would prevent further sedimentation impacts downstream and ensure the long-term stability of critical fish habitat. In addition, restoration at Scotchman Creek would include enhancement of shallow water emergent marsh and vernal pool habitat, placement of large woody debris and invasive species removal in the former Mill Pond which would benefit a number of amphibians, resident and migratory birds, fish and mammalian species.

### **5.4.2 Comprehensive Restoration Plan**

The Trustees, in cooperation with other Federal, state and local environmental resource agencies and interest groups, developed a comprehensive restoration plan for the proposed Scotchman Creek site. The comprehensive plan includes (1) fish blockage removal at the site of the former earthen embankment (2) stream restoration (3) enhancement of approximately 2.5 acres of shallow water emergent marsh (4) invasive plant species removal (5) creation of vernal pool habitat and (6) placement of large woody debris (Figure 5). The comprehensive plan exceeds the available funding through the Spectron settlement and, therefore additional funding sources have been identified for wetland and vernal pool restoration, placement of large woody debris and invasive species control. The additional work to be completed outside of the Spectron funding is included in this document for the purpose as a Draft Restoration Plan, however, those

related actions that are not subject to federal funding or federal implementation are not evaluated for the purposes of NEPA.

The funds from the Spectron settlement would be used for the design and implementation of the fish blockage removal and approximately 1000 linear feet of stream restoration (Figure 5). Stone placed in the stream channel from the emergency repair of the breach would be removed. Stream restoration would be conducted on approximately 1000 linear feet of stream channel. This may include partial realignment of the stream channel through the existing breach. The concept plan also includes the placement of approximately five stone structures (j-hooks and cross vanes) to act as grade control structures to eliminate further incision of the stream channel. The restoration plan includes regrading existing stream banks and planting native vegetation for bank stabilization. The stream channel would be resized based on hydrogeomorphic principles to create a stable stream channel geometry. Stream restoration would be conducted with the primary goal of anadromous fish passage. All structures (j-hooks and cross vanes), channel sizes and water velocities would be designed to ensure proper fish passage.

Cecil County Department of Public Works would remove the remnants of Mill Lane and existing box culvert with County funds. Maryland Department of the Environment, Maryland Department of Natural Resources, Ducks Unlimited and other potential partners would fund the enhancement of shallow water emergent marsh, excavation of vernal pools, placement of large woody debris, planting of native vegetation and additional invasive species control measures at the site, as follows:

- Wetland restoration would be limited to areas dominated by the invasive plant species *Phragmites australis*. Field investigations identified healthy marsh in the upper portion of the former impoundment (Figure 6). This area would have little or no disturbance during restoration activities. The shallow water emergent marsh would be located on the northwest corner of the former impoundment. The marsh would be approximately 2.5 acres total with approximately one acre being open water with an average water depth of 4 feet. A few deeper water pools would be created to sustain fish populations during periods of drought. Approximately 1.5 acres would be shallow vegetated fringe marsh to support amphibians. The final location of the shallow water marsh would be determined based on the hydrology, topography and soils information collected at the site during the design phase of this project.
- In other areas dominated with *Phragmites australis* (northeast and northwest corners of the former impoundment), vernal pools would be excavated. Vernal pool sizes would be less than 0.25 acres in size with a maximum water depth of less than 3 feet. Gradual slopes along the pool edge would be constructed for successful emigration of amphibian larvae. Pools would be located based on the topography and soils information to be obtained during the design phase of this project. Pools must be located in areas that would have 90 or more consecutive days of water over winter and spring to allow insect and amphibian larvae to develop. Suitable pool habitat must be located adjacent to forested wetlands for

adult and juvenile life stages. Therefore, material excavated from the pools would be placed adjacent to the pools and replanted with forested wetland buffer. Any woody debris removed from the earthen embankment during removal of the remnants of the dam would be placed as large woody debris in the project area.

- Control of the invasive species *Phragmites australis* would continue before, during and after project construction. A controlled burn would occur in the Winter/Spring 2008. Additional aerial spraying of the site would also occur. Construction activities may include the removal of the root zone if all other measures have been deemed unsuccessful.

#### 5.4.3 *Probability of Success*

Fish blockage removal and stream restoration have been shown to successfully restore fish passage in numerous projects conducted throughout the Country. The Trustees believe this project has a high likelihood of success.

#### 5.4.4 *Performance Criteria and Monitoring*

Successful implementation of the restoration project would be measured using two criteria (1) by the usage of restored habitat by anadromous fish species and (2) stability of the channel. Field surveys would be completed using settlement funds and used to monitor habitat usage by anadromous fish for a period of five years post restoration. Stream channel cross sections, to be completed using settlement funds, would be monitored for five years post restoration to assess if changes in the planform or stream profile have occurred.

#### 5.4.5 *Approximate Project Costs*

Fish blockage removal and stream restoration at Scotchman Creek would restore 1000 linear feet of stream for anadromous fish and provide an additional 2.2 miles of habitat for anadromous fish and the American eel. Project costs are based on the following assumptions (1) 1000 linear feet of stream would be restored and (2) placement of 5 stone structures (j-hooks and cross vanes) for grade control. Project implementation costs are estimated at \$285,000 for the fish passage and stream restoration components. Spectron settlement funds would be used to cover planning, design, implementation and monitoring of the fish passage and stream restoration components of the project (Figure 7).

Figure 7. Summary of Fish Blockage and Stream Restoration Costs

<b>Phase</b>	<b>Cost</b>
Planning	\$60,000
Design	\$85,000
Implementation	\$285,000
Monitoring	\$25,000
<b>TOTAL</b>	<b>\$455,000</b>

The comprehensive plan includes (1) fish blockage removal at the site of the former earthen embankment (2) stream restoration (3) enhancement of approximately 2.5 acres of shallow water emergent marsh (4) invasive species removal (5) creation of vernal pool habitat and (6) placement of large woody debris (Figure 5). Since the comprehensive plan exceeds the available funding through the Spectron settlement, additional funding sources have been identified for wetland and vernal pool restoration, large woody debris placement, native plantings and invasive species control. Overall costs for restoration at Scotchman Creek are estimated at approximately \$543,000 with contribution from partners (Figure 8).

Figure 8. Overall Restoration Costs

<b>Phase</b>	<b>Cost</b>
Fish Passage and Stream Restoration	\$455,000
Wetland Enhancement	\$72,000
Vernal Pool Creation	\$6,000
Placement of Large Woody Debris	\$8,160
Invasive Species Control	\$2,550
<b>TOTAL</b>	<b>\$543,710</b>

## 5.5 DESCRIPTION OF ENVIRONMENTAL IMPACTS

### *Air Quality Impacts*

Minor increases in the amounts of carbon monoxide or other pollutants associated with the use of heavy machinery may be temporarily associated with the proposed activities on-site during the construction phase. Construction activities should have no long-term air quality impacts on the site or surrounding environment.

### *Water Quality Impacts*

A temporary increase in turbidity is expected during construction and would be timed to occur during periods of reduced or non-critical usage by fisheries resources. This would occur through the use of best management practices and time-of-year restrictions. Erosion control devices to minimize or prevent sediments from entering the water column such as turbidity curtains would be used on-site during construction activities. This project is anticipated to have no long-term negative water quality impacts. One of the primary goals of this restoration project is to reduce the amount of erosion in Scotchman Creek thereby improving water quality in downstream areas.

### ***Sediment Quality Impacts***

Existing sediment characteristics on the project site include fine silts and clays in the stream bed and wetland. There would be no adverse impact to sediment at the project site.

### ***Vegetation Impacts***

Wetland plants have colonized the former pond bed resulting in a healthy composition of native wetland plants in the upper reaches of Scotchman Creek and the former impoundment. Restoration activities would not occur in these areas.

In the downstream area of the impoundment near the former dam, the invasive plant *Phragmites australis* has invaded the project site resulting in an area less favorable to many plant and animal species. Separate from the Spectron settlement funds, the Trustees intend to remove *Phragmites australis* through the spraying of herbicides and controlled burns. In addition, excavation activities would occur in a small area (approximately 2.5 acres) for wetland enhancement. Surface elevations would be lowered to encourage colonization by native emergent marsh vegetation. In addition, this area would have vernal pools created to increase plant and animal biodiversity. Vernal pools would be excavated and sediment would be used to establish elevations to support wetland forest buffer. The overall goal is to restore wetlands with native vegetation and increase biodiversity at the site. The Trustees would plan these efforts to consider the use of herbicides specifically approved for the use on the target species in aquatic environments, and would follow appropriate best management practices to minimize compaction of the wetland and adjacent streambank soils, reduce the temporary turbidity and effects of sediment disturbance on water quality, and conduct work during appropriate seasons so as to maximize the control of *Phragmites australis* and minimize soil/water disturbing activities.

### **Description of Socio-Economic Impacts**

#### ***Aesthetics Impacts***

No aesthetic or scenic resources would be impacted by the proposed restoration project. The dam was breached during a tropical storm in 1999 and has not been rebuilt. Positive impacts on aesthetics are expected due to the restoration of the stream and wetland to its historic form.

#### ***Noise Impacts***

There would be a minor increase in noise levels at the project site during the construction phase of this project. These impacts are expected to be short-term and limited to active periods of construction between sunrise and sunset. No sediment is expected to be removed from the project and therefore hauling vehicles would likely not need to transfer material off site. However, if existing rip rap in the stream channel cannot be reused in

the proposed restoration project, it may be removed from the project. Therefore, hauling vehicles would likely need to transfer material off site. No long-term noise impacts are associated with this project.

There would be a minor increase in noise levels at the project site during the road removal phase of this project to be completed by the Cecil County Department of Public Works. These impacts are expected to be short-term and limited to active periods of construction between sunrise and sunset. Sediment is expected to be removed from the project and therefore hauling vehicles would likely need to transfer material off site. Cecil County Department of Public Works would be applying for separate permits for the road removal component of this project at which time federal, state and local government, as well as the public, will be given the opportunity to review the proposed plan. However, no long-term noise impacts are associated with this component of the project.

### ***Recreational Impacts***

Current recreational use is limited since the former impoundment has been breached and not repaired and due to the dense monotypic stands of *Phragmites australis*. Therefore, during construction there would be no lost recreational opportunities. Following construction and completion of the restoration plan, the project area would provide additional benefits for passive recreation including canoe and kayaking opportunities. The Maryland Department of Natural Resources would be providing canoe and kayak access at this site. Additional recreational opportunities include bird watching, hiking and fishing.

### ***Transportation Impacts***

Some additional minor impacts to land based transportation in the project area is expected during the construction phase. Trucks would transport construction equipment and workers to the restoration site. Hauling sediment from the site for restoration activities under this Draft RP/EA is not anticipated. However, removal of the remnants of the road would be completed by Cecil County and would require material to be taken off-site of the project area.

### ***Fish and Wildlife Habitat Impacts***

Restoration activities associated with this project would not adversely impact or curtail any naturally occurring aquatic movement. The passage of migratory fish during spawning season is impacted by the existing partial stream blockage. The goal of this restoration project is to remove the existing blockage to allow migratory and resident fish access to the upstream habitat of Scotchman Creek. Stream restoration would also occur in the area of the breach (approximately 1000 linear feet) to restore the stream channel using natural stream channel design. This would stabilize the stream and increase use of the stream bed by benthic organisms. Stable stream banks would allow for colonization of native vegetation and use by a number of wildlife species. *Phragmites australis* would



be removed and the area would be replanted to native emergent and forested marsh (Figure 5). This would provide food and habitat for many wildlife species including migratory birds. Any adverse impacts, such as increased turbidity, from the project are temporary in nature and would be minimized via the use of best management practices. These temporary impacts are not anticipated to have a corresponding impact to fish and wildlife habitats at the site, and the net effect of the project would be an improvement in wildlife function.

The Trustees know of no direct or indirect impacts of the proposed restoration action on threatened or endangered species, or their designated critical habitats. The general locale where the restoration actions would be sited is not critical habitat for any listed species. No unique or rare habitat would be destroyed due to blockage removal, stream restoration or wetland restoration activities. The proposed restoration action does not require, nor do the Trustees anticipate, any violation of Federal, state or local laws, designed to protect the environment, incident to or as a consequence of the implementation of the proposed action. The restoration action proposed can be implemented in compliance with all applicable state and local permits and approvals, such as the CWA Section 404 permits and associated state water quality certification. All permits would be obtained prior to initiating site activities that require these permits.

### **Essential Fish Habitat**

The proposed restoration project is not occurring in an area designated as Essential Fish Habitat (EFH), as determined by the National Marine Fisheries Service (NMFS). There would be no adverse impacts to EFH.

### **Historic and Cultural Impacts**

The Trustees believe the proposed restoration action would not affect any designated National Historic Site or any nationally significant cultural, scientific, or historic resources. A phase I archaeological investigation and evaluation was completed in 2001. The archaeological resources within the proposed project area were evaluated under the National Register of Historic Places Criterion and found not to be eligible (Comer 2001). Coordination with the Maryland Historic Preservation Office would continue during the design phase of this project to ensure no adverse impact to historic or cultural resources.

### **Cumulative Impacts**

Fish blockage removal, stream restoration and wetland restoration occurs all over the northeastern and mid-Atlantic United States in order for anadromous fish species to return to historical habitat. The proposed restoration, therefore, sets no precedents for future actions of a type that would significantly affect the quality of the human environment. There are numerous efforts to restore fish passage in the State of Maryland being led by the Maryland Department of Natural Resources. The proposed project would only restore a historical fish passageway that originally existed and naturally

occurred in the area. Earlier construction of the dam disrupted anadromous fish passage beyond the dam. Wetland restoration would be limited to restoring degraded habitat near the former earthen embankment. Healthy emergent wetlands in the upper portion of the impoundment would not be significantly impacted. Further, the action proposed in this Draft RP/EA is intended to restore habitat services to offset the natural resource loss of equivalent habitat services resulting from releases of hazardous substances. The restoration of these services is designed to make the public whole (i.e., to compensate for injuries to the public's natural resources).

## 6.0 REFERENCES

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- Comer, Elizabeth. 2001. Phase I Archaeological Investigation and Evaluation of the National Register of Eligibility of the Cultural Landscape, Mill Pond Dam over Scotchman Creek, Cecil County, Maryland prepared for Cecil County Department of Public Works.
- Long, E.R., D.D. MacDonald, S.L. Smith and F.D. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in Marine estuarine sediments. *Environmental Management* 19: 81-97
- Long, E.R., L.J. Field, and D.D. MacDonald. 1998. Predicting toxicity in marine sediments with numerical sediment quality guidelines. *Environmental Toxicology and Chemistry*, 17(4): 714-727
- Lee, BG, JS Lee, SN Luoma, HJ Choi and CH Koh. 2000. Influence of Acid Volatile Sulfide and Metal Concentrations on Metal Bioavailability to Marine Invertebrates in Contaminated Sediments. *Environ. Sci. Technol.* 34: 4517-4523
- MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environmental Contamination and Toxicology* 39: 20-31.
- MacDonald, D.D., T. Berger, K. Wood, J. Brown, T. Johnsen, M.L. Haines, K. Brydges, M.J. Macdonald, S.L. Smith, and D.P. Shaw. 1999. A Compendium of Environmental Quality Benchmarks. Environment Canada, Georgia Basin Ecosystem Initiative, GBEI 99-01. 1999
- NOAA. 1999. Discounting and the treatment of uncertainty in natural resource damage assessment. Technical Paper 99-1. National Oceanic and Atmospheric Administration, Damage Assessment and Restoration Program. <http://www.darp.noaa.gov/publicat.htm>
- NOAA. 2000. Habitat Equivalency Analysis: An Overview, Damage Assessment and Restoration Program, National Oceanic and Atmospheric Administration, Department of Commerce, 23 pp. <http://www.darp.noaa.gov/pdf/heaoverv.pdf>
- O'Dell, J., J. Gabor and R. Dintamin. 1975. Completion Report, Project AFC-8 for Potomac River Drainage and Upper Bay Drainage. Report by Maryland Department of Natural Resources Fisheries Administration in cooperation with National Marine Fisheries Service. August 1974. 60 pp.
- Rummel, Klepper and Kahl. 2002. Mill Pond Dam Impoundment of Scotchman Creek. Cecil County, Maryland. Categorical Exclusion prepared for the Cecil County Department of Public Works.

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## 8.0 FIGURES

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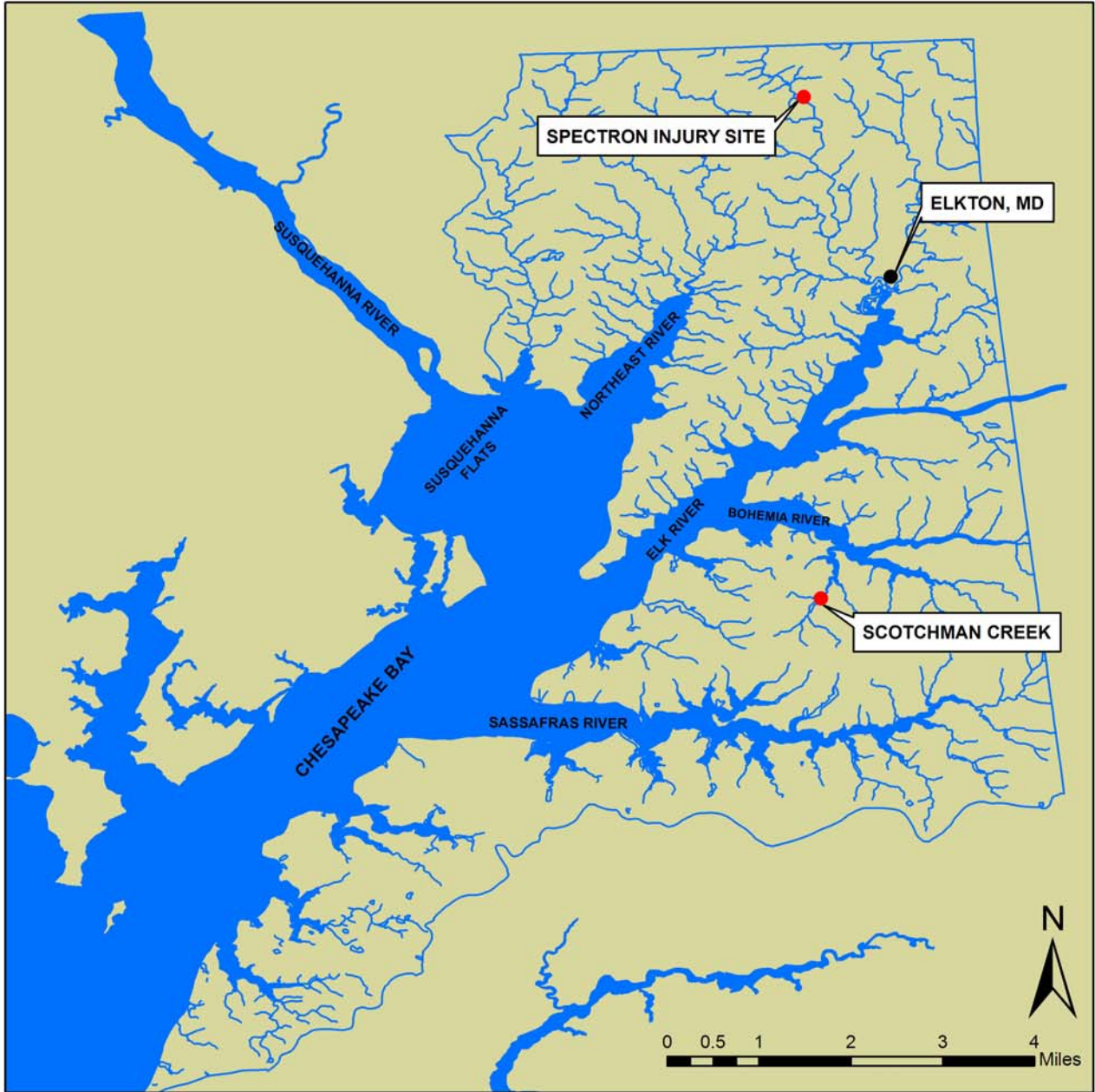
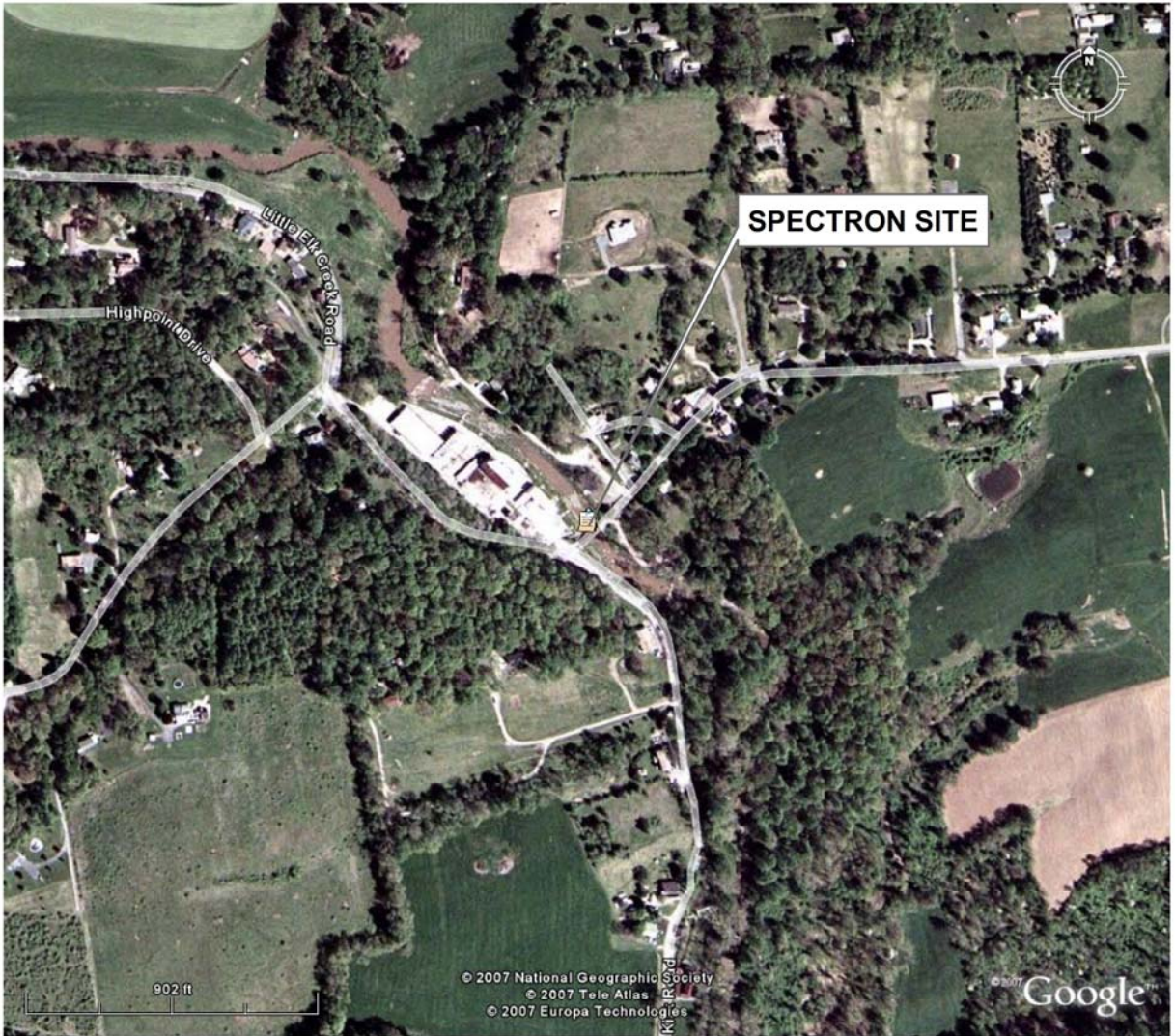


FIGURE 1. PROJECT LOCATOR MAP



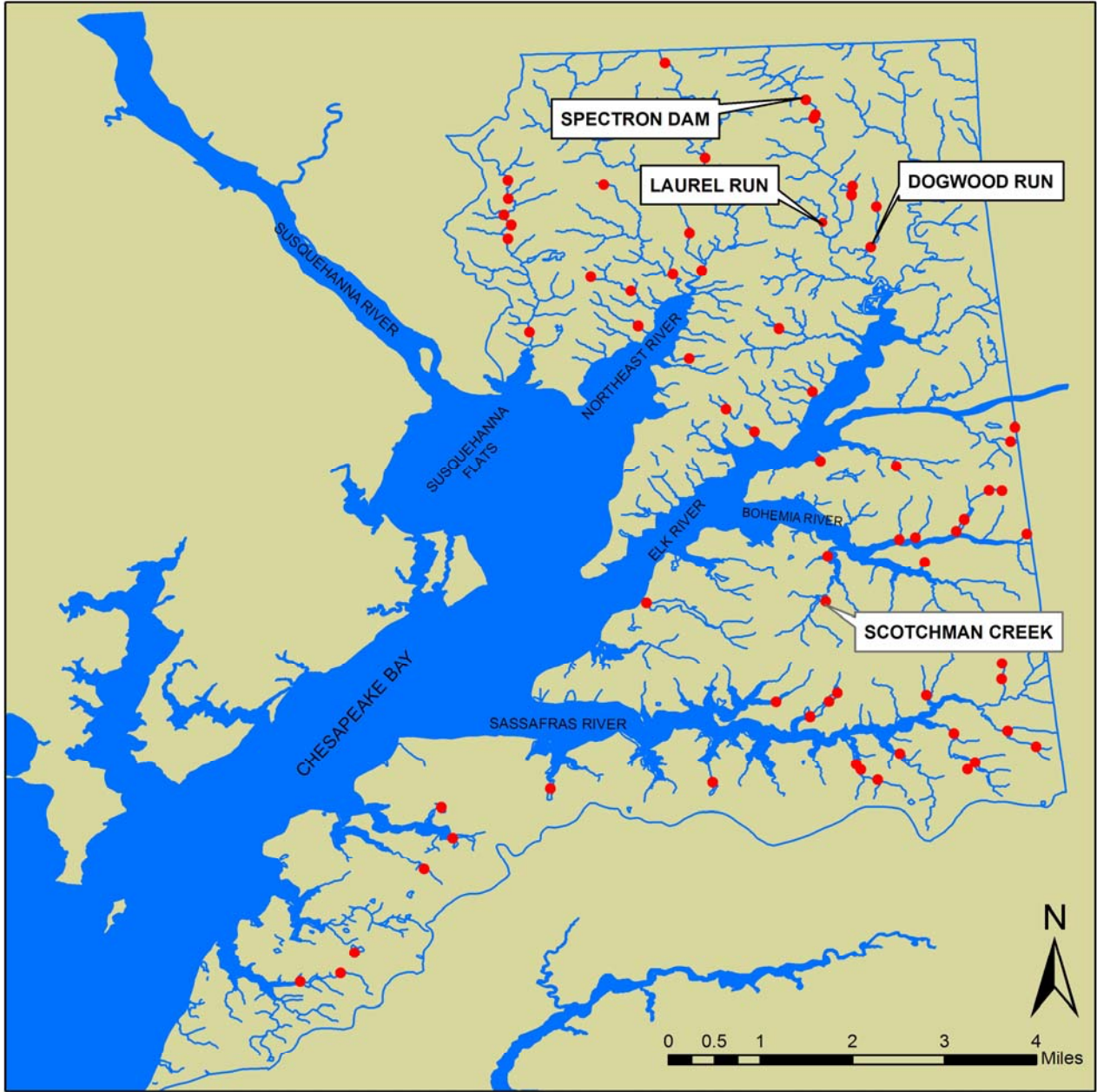




**FIGURE 2. GALAXY/SPECTRON SITE  
CECIL COUNTY, MARYLAND**







**FIGURE 3. FISH BLOCKAGE SITES INVESTIGATED AS POTENTIAL RESTORATION ALTERNATIVES IN ELK RIVER WATERSHED**



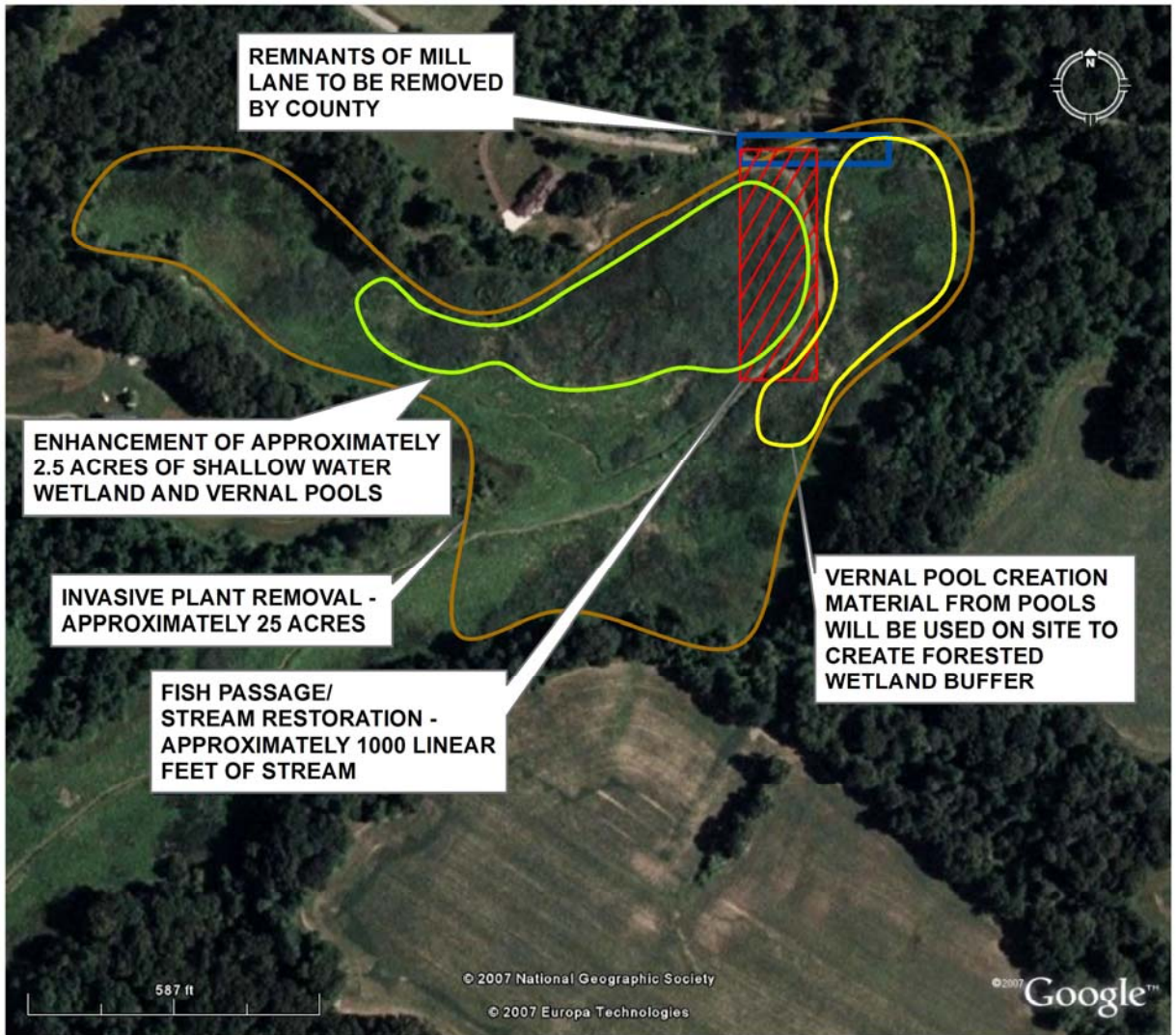




**FIGURE 4. SCOTCHMAN CREEK RESTORATION SITE - AFTER BREACH AT MILL LANE**

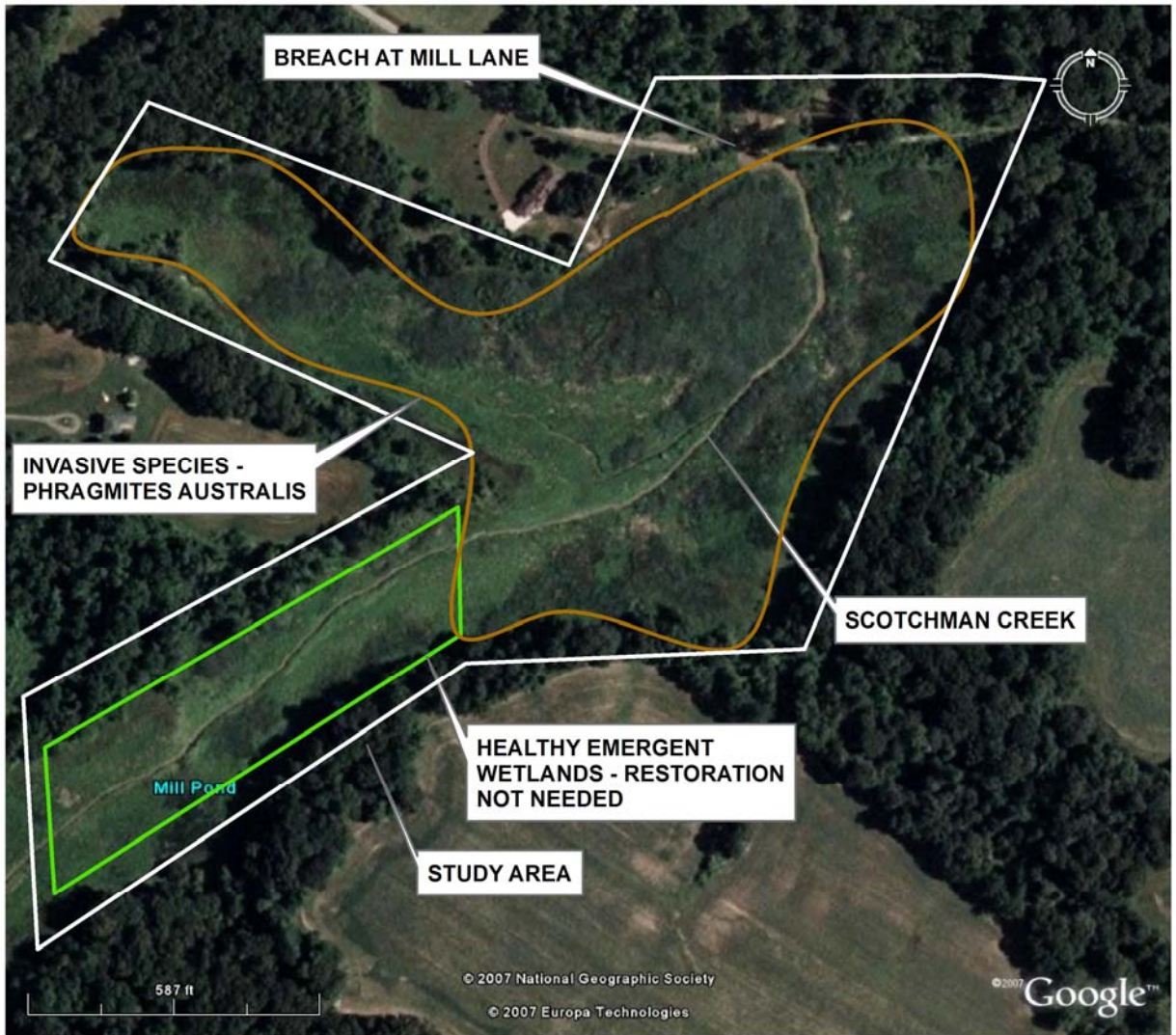






**FIGURE 5. SCOTCHMAN CREEK RESTORATION PLAN - CONCEPTUAL LEVEL**





**FIGURE 6. SCOTCHMAN CREEK RESTORATION SITE- STUDY AREA**



## 9.0 APPENDICES

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## **APPENDIX A COMPLIANCE WITH KEY STATUTES, REGULATIONS AND POLICIES**

### **Anadromous Fish Conservation Act**

The Anadromous Fish Conservation Act (16 U.S.C. § 757a, *et seq.*) provides authority to conserve, develop, and enhance anadromous fishery resources.

**Compliance:** The preferred alternative will directly conserve, develop, and enhance anadromous fishery resources.

### **Clean Air Act**

The Clean Air Act (42 U.S.C. § 7401, *et seq.*) directs EPA to set limits on air emissions to ensure basic protection of health and the environment. The fundamental goal is the nationwide attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Primary NAAQS are designed to protect human health. Secondary NAAQS are designed to protect the public welfare (for example, to prevent damage to soils, crops, vegetation, water, visibility and property).

**Compliance:** Public notice of the availability of this draft RP/EA to the Environmental Protection Agency is required for compliance pursuant to Sections 176C and 309 of the Act. All construction activity will be done with conventional equipment in compliance with all local ordinances.

### **Clean Water Act**

The Clean Water Act (33 U.S.C. § 1251, *et seq.*) is the principal law governing pollution control and water quality of the Nation's waterways. Section 404 of the law authorizes a permit program for the beneficial uses of dredged or fill material in navigable waters.

The U.S. Army Corps of Engineers (USACE) administers the program.

**Compliance:** Coordination with the Army Corps of Engineers will be completed pursuant to Section 404 of this Act. All joint federal/state permits will be obtained prior to the start of construction activities. All construction activity will be done in compliance with Section 404 of the law.

### **Coastal Zone Management Act**

The goal of the federal Coastal Zone Management Act (CZMA) (16 U.S.C. § 1451, *et seq.*, 15 C.F.R. Part 923) is to preserve, protect, develop and, where possible, restore and enhance the Nation's coastal resources. The federal government provides grants to states with federally approved coastal management programs. The State of Maryland has a federally approved program. Section 1456 of the CZMA requires any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone to be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the State the opportunity to concur that the project is consistent with the State's coastal policies. The regulations outline the consistency procedures.

**Compliance:** The Trustees believe the project selected for implementation is consistent with Maryland CZMA programs. The permit applicant will apply for consistency concurrence.

### **Endangered Species Act**

The federal Endangered Species Act (16 U.S.C. § 1531, *et seq.*, 50 C.F.R. Parts 17, 222, 224) directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authority to further these purposes. Under the Act, NOAA National Marine Fisheries Service (NMFS) and USFWS publish lists of endangered and threatened species. Section 7 of the Act requires that federal agencies consult with these two agencies to minimize the effects of federal actions on endangered and threatened species.

**Compliance:** A Section 7 consultation was completed by Cecil County at the site in December 2001 where no evidence of any rare, threatened or endangered species were encountered at the site. The Trustees will conduct the necessary Section 7 consultations with NMFS and USFWS during the design phase of this project prior to implementation.

### **Estuaries Protection Act**

The Estuary Protection Act (16 U.S.C. § 1221-1226) highlights the values of estuaries and the need to conserve natural resources. It authorizes the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, to determine whether such areas should be acquired by the federal government for protection, to assess impacts of commercial and industrial developments on estuaries, to enter into cost-sharing agreements with states and subdivisions for permanent management of estuarine areas in their possession, and to encourage state and local governments to consider the importance of estuaries in their planning activities related to federal natural resource grants.

**Compliance:** The restoration activities will enhance anadromous fish populations and thus benefit estuarine resources.

### **Fish and Wildlife Conservation Act**

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. § 2901 and 50 C.F.R. § 83) provides for the consideration of impacts on wetlands, protected habitats and fisheries.

**Compliance:** The Trustees believe the restoration project will enhance fish passage and survivorship, thereby benefiting natural resources. Coordination with FWS, NMFS and MD fish and wildlife agencies signifies compliance with this Act.

### **Fish and Wildlife Coordination Act**

The Fish and Wildlife Coordination Act (16 U.S.C. § 661, *et seq.*) states that wildlife conservation shall receive equal consideration with other features of water-resource development. The Act requires federal permitting and licensing agencies to consult with NOAA/NMFS, USFWS, and state wildlife agencies before permitting any activity that in any way modifies any body of water to minimize the adverse impacts of such actions on fish and wildlife resources and habitat.

**Compliance:** NOAA and USFWS are joint federal natural resource trustees who have worked cooperatively on evaluating various restoration projects and in selecting the preferred alternative.

### **Magnuson-Stevens Fishery Conservation and Management Act**

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801, *et*

*seq.*) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104297), established a program to promote the protection of essential fish habitat (EFH) in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After EFH has been described and identified in fishery management plans by the regional fishery management councils, federal agencies are obligated to consult with the Secretary of the U.S. Department of Commerce with respect to any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH. **Compliance:** The preferred alternative is not designated essential fish habitat. Although, the Trustees will evaluate and coordinate restoration designs with the NMFS Northeast Region prior to project implementation to comply with other joint federal/state permits.

### **Marine Mammal Protection Act**

The Marine Mammal Protection Act (16 U.S.C. § 1361, *et seq.*) establishes a moratorium on the taking and importation of marine mammals and marine mammal products, with exceptions for scientific research, allowable incidental taking, subsistence activities by Alaskan natives, and hardship. The Act provides authority to manage and protect marine mammals, including maintenance of the ecosystem.

**Compliance:** No interaction with marine mammals in the area of the proposed restoration is expected. The proposed restoration project will have no adverse effects on marine mammals.

### **Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (16 U.S.C. § 715, *et seq.*) provides for the protection of migratory birds. The Act does not specifically protect the habitat of these birds but may be used to consider time of year restrictions for remedial activities on sites where it is likely migratory birds may be nesting and/or to stipulate maintenance schedules that would avoid the nesting seasons of migratory birds.

**Compliance:** Consultation with the USFWS constitutes compliance with this Act. If restoration construction activities are deemed to adversely impact migratory birds, time of year restrictions will be issued for these activities.

### **National Environmental Policy Act**

Congress enacted the National Environmental Policy Act (NEPA; 42 U.S.C. § 4321 *et seq.*) in 1969 to establish a national policy for the protection of the environment. NEPA applies to federal agency actions that affect the human environment. Federal agencies are obligated to comply with NEPA regulations adopted by the Council on Environmental Quality (CEQ). NEPA requires that an Environmental Assessment be prepared in order to determine whether the proposed restoration actions will have a significant effect on the quality of the human environment. If an impact is considered significant, then an Environmental Impact Statement (EIS) is prepared. If the impact is considered not significant, then a Finding of No Significant Impact (FONSI) is issued.

**Compliance:** The Trustees have integrated this Restoration Plan with the NEPA and CEQ processes to comply, in part, with those requirements. This integrated process allows the Trustees to meet the public involvement requirements of NEPA and CEQ concurrently. Full compliance is expected at the time a Finding of No Significant

Impact is issued.

### **Preservation of Historic and Archeological Data Act**

The purpose of the Preservation of Historic and Archeological Data Act of 1974, as amended, 16 U.S.C. § 469, *et seq.*) is to provide for the preservation of historic American sites, buildings, objects and antiquities of national significance, and for other purposes by specifically providing for the preservation of historical of archeological data which might otherwise be lost or destroyed.

**Compliance:** The restoration site has been surveyed to determine its value as an archaeological resource during a Phase I Archeological Investigation. The site has been determined to be ineligible for the National Register. The Maryland State Historic Preservation Office will review this report during the public commenting period and determine if additional studies need to be completed. Consultation has begun with the Maryland Historical Preservation Office (HPO) on the preferred restoration alternative. The Trustees anticipate no adverse effects to historic resources.

### **Rivers and Harbors Act**

The federal Rivers and Harbors Act (RHA; 33 U.S.C. § 401, *et seq.*) regulates development and use of the Nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the USACE with authority to regulate discharges of fill and other materials into such waters.

**Compliance:** Restoration actions that require Section 404 Clean Water Act permits are likely also to require permits under Section 10 of the RHA. A single joint federal/state permit usually serves for both. Therefore, the Trustees can ensure compliance with the RHA through the same mechanism. The restoration activities will be addressed under the joint federal/state permit.

### **Watershed Protection and Flood Prevention Act**

The Watershed Protection and Flood Prevention Act as amended (16 U.S.C. § 1001, *et seq.*) authorizes the Secretary of Agriculture to provide technical and financial assistance to entities of state and local governments and tribes (project sponsors) for planning and installing watershed projects. The USDA agency responsible for program management is the Natural Resources Conservation Service (NRCS).

**Compliance:** Floodplain impacts have been considered prior to selection of final project plans. The Trustees do not anticipate floodplain impacts with the preferred alternative.

### **Information Quality Guidelines issued pursuant to Public Law 106-554**

Information disseminated by federal agencies to the public after October 1, 2002, is subject to information quality guidelines developed by each agency pursuant to Section 515 of Public Law 106-554 that are intended to ensure and maximize the quality of such information (i.e., the objectivity, utility and integrity of such information).

**Compliance:** This restoration plan is an information product covered by information quality guidelines established by NOAA and DOI for this purpose. The quality of the information contained herein is consistent with the applicable guidelines.



**Executive Order 11514 Protection and Enhancement of Environmental Quality, as amended by Executive Order 11911 Relating to Protection and Enhancement of Environmental Quality**

Executive Orders 11514 and 11911 require that federal agencies monitor, evaluate and control their activities to protect and enhance the quality of the Nation's environment to sustain and enrich human life; inform the public about these activities; share data gathered on existing or potential environmental problems or control methods; and cooperate with other governmental agencies.

**Compliance:** Releasing the draft restoration plan and environmental assessment for public comment fully addresses the intent of the Executive Order.

**Executive Order 11990 Protection of Wetlands**

Executive Order 11990 (40 C.F.R. § 6392 (a) and Appendix A) requires federal agencies to avoid the adverse impacts associated with the destruction or loss of wetlands, to avoid new construction in wetlands if alternatives exist, and to develop mitigative measures if adverse impacts are unavoidable.

**Compliance:** The preferred alternative avoids impacts to high quality wetlands upstream of the project site by eliminating any construction activities in this area. The invasive plant *Phragmites* will be removed from the project site and earth moving activities will be limited to areas dominated by the invasive plant. Wetland enhancement activities will occur including the removal of the invasive plant, regarding a 2 acre emergent marsh and creation of a forested buffer wetland. These restoration activities will result in the restoration of high quality wetlands once dominated by the invasive plant *Phragmites*. The preferred restoration actions are in compliance with, and fully address, the intent of the Executive Order.

**Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and Executive Order 12948 Amendment to Executive Order No. 12898**

Executive Orders 12898 and 12948 require each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations.

**Compliance:** The Trustees have concluded that no low income or ethnic minority communities would be adversely affected by the proposed restoration activities.

**Executive Order 12962 Recreational Fisheries**

Executive Order 12962 requires that federal agencies, to the extent permitted by law and where practicable, and in cooperation with states and tribes, improve the quantity, function, sustainable productivity, and distribution of the Nation's aquatic resources for increased recreational fishing opportunities.

**Compliance:** The compensatory restoration activities undertaken will improve anadromous fish populations, and thus improve the recreational fishery.

**Executive Order Number 13112 Invasive Species**

The purpose of Executive Order 13112 is to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

**Compliance:** The preferred restoration project includes the removal of the invasive wetland plant *Phragmites*. Construction activities will not cause or promote the introduction or spread of invasive species. Annual surveys for invasive species (specifically *Phragmites*) and actions to control them should they be present in the created marsh have been budgeted into costs for this project.

Appendix B. Fish Blockage Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
EL024	West Branch	Elk River	1	Fish blockage no longer present.
EL014	Mill Creek	Elk River	1	Fish blockage no longer present.
EL004 (Location 39/40)	Dogwood Run	Elk River	1, 2	Fish blockage no longer present. Culvert replaced with bridge in 1996. Chicken house present on stream bank, sewage smell and dumping in area does not make suitable for anadromous fish.
EL003	Dogwood Run	Elk River	1	Fish blockage database notes blockage has been removed.
EL029 Location 36/37)	Dogwood Run	Elk River	1, 2	No existing fish blockage. Site located near headwaters of stream. Field assessment determined little anadromous fish habitat upstream.
EL005 (Location 36/37)	Dogwood Run	Elk River	1	Site only partial fish blockage. Site located near headwaters of stream. Field assessment determined little anadromous fish habitat upstream.
EL010	Little Elk Creek	Elk River	1	Fish blockage no longer present.
EL009	Dogwood Run	Elk River	1	Fish blockage no longer present.
EL028 (Location 34)	Gravelly Run	Elk River	1, 2	Fish blockage located under Interstate 95. Long culvert (under 6 lane highway) may not be favorable for anadromous fish passage and little anadromous fish habitat upstream of Interstate 95. Site located at stream headwaters. Note: Location 34 on Gravelly Run. Watershed analysis also has Location 34 on Little Elk Creek.
EL006 (Location 34)	Gravelly Run	Elk River	1, 2	Fish blockage located under Interstate 95. Long culvert (under 6 lane highway) may not be favorable to anadromous fish and little anadromous fish habitat upstream of Interstate 95. Site located at stream headwaters. Note: Location 34 on Gravelly Run. Watershed analysis also has Location 34 on Little Elk Creek.
City of Elkton Fishway Repairs	Big Elk Creek	Elk River		Repairs on fishway have been completed.
EL007	Gravelly Run	Elk River	1	Field assessment determined little upstream anadromous fish habitat. MDNR fish blockage database notes at least 2 downstream blockages.

Appendix B. Fish Blockage Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
Laurel Run (Location 20)	Laurel Run	Elk River	2	Fish blockage likely to be addressed by site developer for proposed housing development. If blockage is not addressed, Trustees recommend applying for funds under the NOAA community-based restoration program at a later date. Additional details on this site are provided in Section 5.2 of restoration plan.
Carriage Lane (Location 38)	Dogwood Run	Elk River	2	Site has partial blockage and field investigation determined upstream access to fish still possible. Little upstream habitat for anadromous fish.
Dogwood Run (EL026/Location 12)	Dogwood Run	Elk River	1, 2	Fish blockage likely to be addressed by site developer for proposed housing development. If blockage is not addressed, Trustees recommend applying for funds under the NOAA community-based restoration program at a later date. Additional details on this site are provided in Section 5.2 of restoration plan.
CE007	Furnace Bay	Furnace Bay	1	Natural fall at Route 7. No anadromous fish passage past this point.
CE008	Furnace Bay	Furnace Bay	1	Fish blockage no longer present.
CE010	Furnace Bay	Furnace Bay	1	Fish blockage no longer present.
CE011	Furnace Bay	Furnace Bay	1	Fish blockage no longer present.
CE012	Furnace Bay	Furnace Bay	1	Fish blockage no longer present.
NE002	Northeast Creek	Northeast River	1	Fish blockage no longer present.
NE003	Northeast Creek	Northeast River	1	Natural fall at NE007. No anadromous fish passage historically.
NE005	Northeast Creek	Northeast River	1	Natural falls. Complete barrier to anadromous fish.
NE006	Northeast Creek	Northeast River	1	DNR database lists blockage only to resident fish.
NE008	Stoney Run	Northeast River	1	Debris jam on Stoney Run. Blockage near headwaters and little upstream habitat for anadromous fish.
NE009	Unnamed Tributary	Northeast River	1	Limited upstream habitat for anadromous fish.
NE011	Unnamed	Northeast River	1	Limited upstream habitat for anadromous fish.
NE014	Unnamed Tributary	Northeast River	1	Blockage responsibility of SHA. MDNR to follow up with SHA.

Appendix B. Fish Blockage Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
NE015	Unnamed Tributary	Northeast River	1	Blockage responsibility of SHA. MDNR to follow up with SHA.
NE016	Unnamed Tributary	Northeast River	1	Blockage responsibility of SHA. MDNR to follow up with SHA. Limited upstream habitat for anadromous fish.
EL018	Mill Creek	Elk River	1	Small beaver dam. Limited upstream habitat for anadromous fish.
EL019	Unnamed Tributary	Elk River	1	Small beaver dam. Limited upstream habitat for anadromous fish.
EL015	Muddy Creek	Elk River	1	Large earthen dam breached in 1986. No current blockage.
EL016	Muddy Creek	Elk River	1	Limited upstream habitat for anadromous fish.
EL017	Stemmers Run	Elk River	1	Built by USACE and maintained by DNR Fisheries as public recreational lake. Not a candidate for removal.
EL021	Unnamed Tributary	Elk River	1	Fish blockage no longer present.
EL022	Unnamed Tributary	Elk River	1	Low flow and limited upstream habitat for anadromous fish.
BO001	Great Bohemia Creek	Bohemia River	1	Dam/Road recently rebuilt by Cecil County and not candidate for dam removal. Trustees not opposed to passage structure but option not highly supported by trustees. DNR investigated fish passage option and no fish ladder possible.
BO002	Little Bohemia Creek	Bohemia River	1	Limited upstream habitat for anadromous fish.
(Scotchman's Creek) BO003	Scotchman's Creek	Bohemia River	1	Preferred Alternative
BO004	Unnamed Tributary	Bohemia River	1	Fish blockage no longer present.
BO005	Unnamed Tributary	Bohemia River		Private gated property with pond upstream of BO004 and BO006. Limited upstream habitat.
BO006	Unnamed Tributary	Bohemia River	1	Private ownership of dam. Owners not willing to remove dam.
BO007	Unnamed Tributary	Bohemia River	1	Farm pond used for irrigation. Not an option for removal or fish passage.

Appendix B. Fish Blockage Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
BO008	Unnamed Tributary	Bohemia River	1	Private ownership of dam. Owners not willing to remove dam.
BO009	Unnamed Tributary	Bohemia River	1	Private ownership of dam. Owners not willing to remove dam.
BO010	Unnamed	Bohemia River	1	No upstream habitat for anadromous fish.
BO011	Unnamed Tributary	Bohemia River	1	Private ownership of dam. Owners not willing to remove dam.
SA001	Coppin Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA002	Coppin Creek	Sassafras River	1	Limited amount of poor quality upstream habitat available.
SA003	Dowdell Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA004	Freeman Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA005	Hall Creek	Sassafras River	1	Limited upstream habitat for anadromous fish. Two additional blockages upstream.
SA006	Hall Creek	Sassafras River	1	Large farm pond. Not a candidate for dam removal.
SA007	Hall Creek	Sassafras River	1	Small eutrophic farm pond. Not a candidate for dam removal.
SA008	Herring Branch	Sassafras River	1	Private ownership of dam. Owners not willing to remove dam.
SA009	Herring Branch	Sassafras River	1	Private ownership of dam. Owners not willing to remove dam.
SA010	Jacobs Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA011	Jacobs Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA012	Lloyd Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA013	Mill Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA014	Mill Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA015	Mill Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA017	Swantown Creek	Sassafras River	1	Private ownership of dam. Owners not willing to remove dam.
SA019	Duffy Creek	Sassafras River	1	Limited upstream habitat for anadromous fish.
SA020	Unnamed Tributary	Sassafras River	1	Limited upstream habitat for anadromous fish.
CE001	Churn Creek	Stillpond-Fairlee River	1	No fish blockage present.

Appendix B. Fish Blockage Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
CE003	Jacks Cove	Stillpond-Fairlee River	1	Limited upstream habitat for anadromous fish.
CE006	Mill Creek	Stillpond-Fairlee River	1	Headwater farm pond. Limited habitat upstream for anadromous fish.
CE013	Stillpond Creek	Stillpond-Fairlee River	1	Limited habitat for anadromous fish.
CE018	Unnamed Tributary	Stillpond-Fairlee River	1	Privately owned dam with owner not willing to conduct dam removal.
CE019	Fairlee Creek	Stillpond-Fairlee River	1	Large downstream blockage at CE018.

1 MDNR Fish Blockage Database

2 NOAA Coastal Protection & Restoration Division Little Elk Creek Watershed Database & Mapping Project

Appendix C. Stream Restoration Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
Locations 23/24	Gravelly Run	Elk River	2	Localized erosion along bank near bridge. Cobble deposited at upstream face of bridge. No significant erosion or evidence of stream downcutting. Excellent riparian zone. Intact riparian zone.
Location 21/22	Little Elk Creek	Elk River	2	Riffles and pool sequences present in photos. No downcutting evident or grade control structures needed. No stream restoration needed at this time.
Location 13-19	Dogwood Run	Elk River	2	Intact riparian zone and large amount of woody debris present. Channel has both high and low flow channels. Stream channel seems stable with no downcutting evident. ATV use found at site.
Location 1-11	Little Elk Creek	Elk River	2	Healthy riparian zone. Pool and riffle sequence present in stream with meanders. No evidence of downcutting. Stormwater inflow at site not causing significant erosion of stream.
Location 26	Little Elk Creek	Elk River	2	Healthy riparian zone. Pool and riffle sequence present in stream. No evidence of downcutting. Bridge structure stable with no erosion at foundation.
Location 28/30	Little Elk Creek	Elk River	2	Slight bank erosion. No downcutting of stream or grade control structures needed. Possible riparian planting at bridge needed. Stream restoration not needed.
Location 34	Little Elk Creek	Elk River	2	County conducting survey for bridge replacement during site visit. Do not recommend any restoration at site prior to replacement of bridge. Note: This location is along Little Elk Creek. Watershed analysis also has Location 34 on Gravelly Run.
Location 41/42	Little Elk Creek	Elk River	2	Riparian area healthy above and below bridge. Lack of riparian planting at bridge may be for access and part of maintenance program. Insignificant bank erosion and no downcutting evident in photos.
Location 32/33	Mill Creek	Elk River	2	Extensive riparian zone and no flow restrictions. No erosion at site or evidence of downcutting.
Location 43/44	Mill Creek	Elk River	2	Near headwaters of stream. Limited anadromous fish benefits. Small first order stream.



Appendix C. Stream Restoration Sites Investigated for Spectron Restoration Plan

Site	Stream	Watershed	Source of Data	Reason Site was Not Selected as Preferred Alternative
Locations 45/46	Mill Creek	Elk River	2	Near headwaters of stream. Limited anadromous fish benefits. Small first order stream.