

**Final Plan
And
Environmental Assessment**

North Fork Powell River Watershed

Lee County, Virginia

February 2008



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WATERSHED PLAN and ENVIRONMENTAL ASSESSMENT NORTH FORK POWELL RIVER WATERSHED

Lee County, Virginia

February 2008

Abstract

This document describes alternatives considered to improve water quality through the installation of passive acid mine drainage treatment measures and erosion and sediment control practices in the watershed. Economic benefits generated, costs incurred, and environmental impacts produced vary depending on the alternative considered. The recommended plan includes the installation of 11 wetlands, 21 open limestone channels, six ponds, three portal closures, five successive alkaline producing systems (SAPS), seven diversions, elimination of two highwalls, grade and vegetate 12 sites, remove waste material on two sites, and construct a rock toe buttress, grade, shape and revegetate four sites. The primary effects of the plan are improved water quality of streams, improved habitat for fish and other aquatic species, and erosion and sediment damage reduction. This document is intended to meet the requirements of the National Environmental Policy Act and to be considered for authorization of Public Law 83-566 funding.

Authority

Prepared under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566), as amended (16 U.S.C. 1001-1008) and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 43121 et seq.).

Sponsors

Lee County Board of Supervisors
Daniel Boone Soil and Water Conservation District
Virginia Department of Mines, Minerals and Energy

Prepared By

USDA – Natural Resources Conservation Service

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WATERSHED AGREEMENT

between the

Lee County Board of Supervisors
Daniel Boone Soil and Water Conservation District
Virginia Department of Mines, Minerals and Energy
(Referred to herein as Sponsors)

Commonwealth of Virginia

and the

Natural Resources Conservation Service
U.S. Department of Agriculture
(Referred to herein as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by Sponsors for assistance in preparing a plan of works of improvement for the North Fork Powell River Watershed, Virginia, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a plan for works of improvement for the North Fork Powell River Watershed, Virginia, hereinafter referred to as the Plan, which Plan is annexed to and made a part of this agreement:

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on this Plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this Plan and including the following:

1. Cost-sharing rate for the establishment of enduring land treatment practices is 65 percent of the average cost of installing the enduring practices in the selected plan for the evaluation unit. The estimated total financial assistance cost for enduring practices is \$963,000
2. The NRCS will assist the Sponsors in providing technical assistance to landowners or operators to plan, design and install structural measures shown in the plan. Percentages of technical assistance costs to be borne by the Sponsors and NRCS are as follows:

Works of Improvement	Sponsors	NRCS	Estimated Technical Assistance Costs
Land Treatment Practices	0% \$0	100% \$260,000	100% \$260,000

3. The Daniel Boone Soil and Water Conservation District or the Virginia Department of Mines, Minerals and Energy will obtain applications from owners of not less than 10 percent of the land in the problem area, indicating that they are willing to participate in the proposed watershed protection program. These applications will be obtained before the first project agreement is executed.

4. The Virginia Department of Mines, Minerals and Energy will obtain agreements with landowners or operators to operate and maintain the land treatment practices for the protection and improvement of the watershed.

5. The Sponsors and NRCS will each bear the costs of project administration that each incurs, estimated to be \$20,000 and \$37,000, respectively.

6. The Sponsors will acquire, or will ensure that land users or operators have acquired, with other than Public Law 83-566 funds, such real property as will be needed in connection with the works or improvement. (Estimated cost is \$0 since access to property is expected to be donated by landowners.)

7. The Sponsors hereby agree to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as further provided by Uniform Relocation Assistance and Real Property Acquisition for Federally Assisted Programs, 49 CFR Part 24, and 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements of the Act, they agree that, before any Federal financial assistance is furnished, they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the Sponsors and NRCS as follows:

	Sponsors %	NRCS %	Estimated Relocation Payment Costs \$
Relocation Payments	35	65	\$0 ¹

8. The Sponsors will be responsible for the costs of water, mineral, and other resource rights and will acquire or provide assurance that landowners or resource users have acquired such rights pursuant to state law as may be needed for the installation and operation of the works of improvement.

9. The term of this agreement is for the expected life of the project (35 years) and does not commit the Sponsors or NRCS to assistance of any kind beyond the end of the program life unless agreed to by all parties.

10. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto, will be the average costs incurred in the installation of works of improvement or an improved variation.

11. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

12. A separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail

¹ Investigation of the watershed project area indicates no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared in accordance with the percentages shown.

the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

13. This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, NRCS shall promptly notify the Sponsors in writing of the determination and the reasons for deauthorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the Sponsors having specific responsibilities for the measure involved.

14. No member of, or delegate to, Congress, or resident commissioner, shall be admitted to any share or part of this Plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to the agreement if made with a corporation for its general benefit.

15. The program conducted will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 C.F.R. 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participating in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

16. Certification Regarding Drug-Free Workplace Requirements (7 CFR 3021, Subpart F).

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled Substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The sponsors certify that they will or will continue to provide a drug-free workplace by:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(2) Establishing an ongoing drug-free awareness program to inform employees about--
(a) The danger of drug abuse in the workplace;

(b) The grantee's policy of maintaining a drug-free workplace;

(c) Any available drug counseling, rehabilitation, and employee assistance programs;
and

(d) The penalties that may be imposed upon employees for drug abuse violation occurring in the workplace

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will--

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employees who is so convicted--

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1),(2),(3),(4),(5),and (6)

B. The sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project of other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

17. Certification Regarding Lobbying (7 CFR 3018).

(1) The sponsors certify to the best of their knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The sponsors shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

(2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

18. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primarily Covered Transactions (7 CFR 3017).

(1) The sponsors certify to the best of their knowledge and belief, that they and their principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

Board of Supervisors, Lee County

P.O. Box 367
Jonesville, Virginia 24263
Address _____ Zip Code _____

By: /S/ Mark A. Carter
MARK A. CARTER

Title: Chairman

Date: February 19, 2008

The signing of this plan was authorized by a resolution of the Lee County Board of Supervisors governing body of the adopted at a meeting held on February 19, 2008.

/S/ D. Dane Poe
Clerk

P.O. Box 367, Jonesville, VA 24263
Address _____ Zip Code _____

Date: February 19, 2008

Daniel Boone Soil and Water Conservation District

Rt. 2 Box 2010
Jonesville, Virginia 24263
Address _____ Zip Code _____

By: /S/ Jerry L. Ingle
JERRY L. INGLE

Title: Chairman

Date: February 21, 2008

The signing of this plan was authorized by a resolution of the Daniel Boone Soil and Water Conservation District governing body of the adopted at a meeting held on February 21, 2008.

/S/ John M. Britton, Sr.
Secretary

Rt. 2 Box 2010, Jonesville, VA 24263
Address _____ Zip Code _____

Date: February 21, 2008

Virginia Department of Mines, Minerals and Energy

P.O. Drawer 900
Big Stone Gap, Virginia 24219
Address _____ Zip Code _____

By: /S/ Bradley C. Lambert
BRADLEY C. LAMBERT

Title: Director, Division of Mined
Land Reclamation

Date: February 15, 2008

**Natural Resources Conservation Service
United States Department of Agriculture**

Approved by:

/S/ John A. Bricker
JOHN A. BRICKER
State Conservationist

Date: February 26, 2008

SUMMARY OF WATERSHED PLAN

Project: North Fork Powell River Watershed

State: Virginia

Counties: Lee County

Sponsors: Daniel Boone Soil and Water Conservation District
Lee County Board of Supervisors
Virginia Department of Mines, Minerals and Energy

Congressional District: 9

Background: The North Fork of the Powell River Watershed Plan is recommending installation of land treatment practices at 39 sites. These practices are intended to reduce the delivery of environmental contaminants emanating from abandoned mine lands which currently diminish water quality. All of the recommended practices are contained within the NRCS National Handbook of Conservation Practices. Therefore, this project meets the requirements delineated in the NRCS National Watershed Manual, Section 503.46, paragraph b), to be designated as a “Watershed Protection Plan”. By installing approved land treatment practices, Watershed Protection Plans only need to identify and recommend the least costly and environmentally most acceptable project investment consistent with the local sponsor’s needs and project purposes. This alternative also will accelerate achievement of the level of resource improvement that the local sponsors are seeking by providing high enough levels of technical assistance and financial resources for rapidly moving forward with project implementation.

Description of Recommended Plan: The recommended plan includes the installation of passive acid mine drainage treatment measures and erosion and sediment control practices on 39 sites.

- Acid mine drainage treatment measures: Successive Alkalinity Producing Systems, Open Limestone Channels, Ponds, Aerobic & Anaerobic Wetlands.
- Erosion and sediment control practices applied to critically eroding mined land: Critical Area Planting, Diversions & Water Bars, Rock-lined Waterways or Outlets, Tree & Shrub Establishment, Spoil Spreading, Upland Wildlife Habitat Management.

The primary effects of the plan are improved water quality of streams, improved habitat for fish and other aquatic species, and erosion and sediment damage reduction.

Resource Information:

Watershed Size: 57,620 acres

Land Cover: Agricultural land = 5,089 acres
Forestland = 44,485 acres
Mines or Barren land = 6,275 acres
Developed or Transportation land = 1,457 acres
Water and Wetlands = 314 acres

Land Ownership where project works of improvement will be installed: 100% private

Prime and Important Farmland: None within the watershed

Number of Minority Farmers: N/A – Project deals with mining issues

Number of Limited Resource Farmers: N/A – Project deals with mining issues

Project Beneficiary Profile: The primary direct beneficiaries of this project are the downstream inhabitants of Lee County and other local residents who will enjoy expanded opportunities to fish on the North Fork of the Powell River and its tributaries. The local population is 98.4% white as compared to 73.6% for the state of Virginia; median age in Lee County is 39.7 years vs. 35.7 for the state as a whole; 15.5% of the population of Lee County is 65 years of age or older compared to 11.2% for the state; 39.4% of the adult population over 25 in Lee County did not have a high school education or equivalency diploma in 2000, more than double the state figure of 18.5%; median annual household income in Lee County was \$22,972 which was less than one-half of the state-wide number of \$46,677.

Indirect Beneficiaries: Indirect project beneficiaries include anyone who places existence value on the threatened and endangered species whose habitat will improve as a result of the installed project works of improvement.

Wetlands: 4.76 acres (existing); 7.8 acres created

Floodplains: N/A – Project deals with mining issues

Highly Erodible Cropland Acres: N/A – Project deals with mining issues

Threatened and Endangered Species: 15 species freshwater mussels; three forage fish species, one rough fish species, and one game fish species; two bird species.

Cultural and Historic Resources: Forty sites present in the watershed. Nine are archaeological sites and thirty-one are architectural sites. No adverse effect to any sites.

Fishery Resources:

- 7.6 current fishable stream miles on tributaries and 3.5 miles of put-and-take trout fishery on North Fork Powell River;
- 22.95 additional fishable stream miles gained by the project;
- current warm water fishery in North Fork Powell River consists of a mix of approximately 40 species of game, rough, and forage fish.

Problem Identification:

Surface water quality is adversely affected by acid mine drainage and critical erosion from past mining activities.

Candidate Plans Considered:

Alternative 1 - No Action Plan

Alternative No. 2 – Positive Net Benefits Plan: Treatment of six sites in the Jones and Mud Creek subwatershed and one site in the Craborchard Creek subwatershed.

Alternative No. 3 - Treatment of 39 identified Acid Mine Drainage Sites and Critically Eroding Sites in the watershed. This is the Recommended Plan.

Project Purpose: Watershed Protection

The project will reduce damages caused by acid mine drainage and excessive erosion and sedimentation. This will meet the sponsors' objectives to improve water quality. It will also improve habitat for aquatic organisms, warm water fisheries, and threatened and endangered species.

Principal Project Measures:

Specific measures include the following:

- 11 wetlands constructed
- 21 open limestone channels installed
- 6 ponds constructed
- 3 portal closures
- 5 successive alkaline producing systems (SAPS) constructed
- 7 diversions constructed
- 2 highwalls stabilized
- 12 sites graded and vegetated
- 2 sites with waste material removed
- 4 sites will have a rock toe buttress constructed and graded, shaped and revegetated

Project Costs:

	<u>PL-566 Funds</u>	<u>Other Funds</u>	<u>Total Dollars</u>
Land Treatment	\$ 962,000	\$ 521,000	\$1,483,000
Project Administration	\$ 20,000	\$ 37,000	\$ 57,000
Technical Assistance	\$ 260,000	\$ 0	\$ 260,000
Totals	<u>\$1,242,000</u>	<u>\$ 558,000</u>	<u>\$ 1,800,000</u>

Annualized Costs: \$111,100

Annualized Benefits: \$55,500

Net Annualized Benefits: - \$55,600

Overall Benefit to Cost Ratio: 0.50 to 1.0

Project Benefits:

- 22.95 miles of fishery gained
- Positive but unmeasured effects to groundwater
- Improved habitat for threatened and endangered species
- Improved wildlife habitat on 56.25 acres
- Reduction of 252 tons/year of sediment delivered to streams
- 18.4 miles of stream water quality improved
- 315 gallons per minute of acid mine drainage treated
- 7.8 acres of wetlands created.

Average Annual Economically Quantifiable Benefits:

On-site productivity benefits: \$0
Off-site water quality benefits: \$55,500

Projected Induced Adverse Impacts: None expected

Other Impacts:

Natural resources changed or lost include:

- Conversion of 56.25 acres of critically eroding lands to grasses, trees and shrubs for wildlife.
- Improved productivity and viability of terrestrial and aquatic ecosystems currently diminished by coal extraction.
- No irretrievable loss of existing biological and physical resources.

Social impacts: The economic and social well-being of all participants in the project area will improve by the implementation of the proposed measures.

Major Conclusions:

There is no direct statistical correlation between the acid mine drainage from abandoned mine lands and the socioeconomic characteristics of the local population. However, there is scientific evidence indicating that degraded natural resources have a negative effect on human health and safety. The proposed alternatives can reduce pollution entering the local streams and result in improvements to human health and safety.

Areas of Controversy:

There are no major areas of controversy with respect to this proposed project.

Issues to be Resolved:

There are no outstanding issues to be resolved with this proposed project.

INTRODUCTION

PURPOSE AND NEED

Many of the tributary streams in the North Fork Powell River Watershed have poor water quality. This is due, in part, to the presence of abandoned coal mines that are emitting Acid Mine Drainage (AMD) and/or are experiencing critical levels of soil erosion. The purpose of the project is to improve water quality throughout the watershed by reducing acid loading from AMD and reducing sediment loading from critical erosion (CE) sites associated with abandoned mines.

This Watershed Plan and Environmental Assessment (Plan/EA) is a summary of the planning efforts for the North Fork Powell River Watershed. The project sponsors, the Lee County Board of Supervisors, the Daniel Boone Soil and Water Conservation District (SWCD), and the Virginia Department of Mines, Minerals, and Energy (DMME), have determined that the level and extent of AMD and CE sites are greater than can be solved by ongoing District and State programs. Their goals are to reduce environmental damages caused by past mining activities, improve water quality in the North Fork Powell River and its tributaries, and restore aquatic health to the streams. If this is achieved, the habitat will be restored for aquatic organisms, warm water fisheries, and threatened and endangered species of fish and freshwater mussels.

In July 2004, the sponsors formally applied for federal assistance under provisions of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566), as amended. The Virginia Soil and Water Conservation Board approved the application on July 15, 2004 and forwarded the request to the Natural Resources Conservation Service (NRCS). The sponsors, with the support of the local people, asked for assistance in assessing the magnitude of the problems, in identifying viable alternatives to reduce the problems, and realizing identified opportunities in the watershed.

PROJECT SETTING

PHYSICAL FEATURES

Size and Location

The North Fork Powell River Watershed is 57,620 acres in size. The watershed is located in the northeastern portion of Lee County, Virginia. The basin is bordered to the north by Kentucky, the Lee/Wise County line to the east and Stone Mountain to the south. It flows southwesterly from its headwaters near Keokee to its confluence with the Powell River near Pennington Gap. Communities in the watershed include Pennington Gap, St. Charles, Robbins Chapel and Keokee. The watershed map is included as Appendix D of this report.

Climate

This watershed has a moderate temperate continental moist climate with hot and humid summers and cool winters. The growing season is typically from early May to mid-October, and averages about 180 days between the first and last killing frosts. Average annual rainfall in the basin is

about 52 inches with recorded precipitation as low as 38 inches in dry years and over 58 inches in the wettest years. Rainfall is fairly evenly distributed throughout the year with slightly less precipitation in late summer and early fall. Average annual snowfall is about 15 inches. Mean annual temperature is 54.9° F with an average summer temperature of 78.5° F and an average winter temperature of 34° F.

Topography

The watershed lies within the Appalachian Plateau physiographic province. A highly dissected topography with V-shaped valleys and sharp, crested ridges characterize the headwaters area. The upper reaches of the basin are distinguished by high gradient first, second, and third order streams cut into sandstone/siltstone/coal lithologies. Topographic relief in the basin ranges from 3,732 feet at the crest of Little Black Mountain to 1,380 feet along the North Fork of the Powell River. This topographic setting has produced a drainage pattern of numerous first order streams on the mountain flanks to third or fourth order streams at their outlets to the North Fork of the Powell River.

Geology

Structurally, the rocks of the coal-mined area are part of the Appalachian Plateau physiographic province. Generally, the stratum dips gently to the north-northwest in the area of coal mining. Going southeast toward Stone Mountain, the dip increases sharply to a near vertical attitude at Stone Mountain. In this area, the structure of the strata is quite complex due to the pattern of folding and faulting in the pre-Pennsylvanian rocks, especially southeast of Stone Mountain.

Most of Lee County is in the Valley and Ridge province, a subdivision of the Appalachian Highlands. The Valley and Ridge province consists of parallel valleys separated by long, narrow mountain ridges. The parallel ridges in the County trend northeast to southwest and the intervening valleys are comparatively deep. Differences in the hardness of the underlying rock and geologic structure have caused this valley-and-ridge type of surface. Powell and Stone Mountains are underlain by sandstone that has resisted weathering. In contrast, the valley areas are underlain by shale and limestone, both of which are less resistant to weathering than sandstone. Residual soils are derived from weathered limestone, sandstone and shale formed during the Paleozoic Era.

Soils

The soils of the North Fork of the Powell River watershed are classified as Udults, having a light coloration, ranging from brown to grayish-yellow and light gray in the surface layer, and from brownish red to light brown and yellowish in the subsoil. Surface soil textures include residual fine sandy loams on hilly uplands weathered from sandstone, residual rocky silt loams on hilly uplands weathered from limestone, residual silt loams in mountainous uplands weathered from shale and siltstone, colluvial loams and cobbly and channery loams derived from sandstone and shale, and alluvial silt loams and loams derived from limestone, sandstone and shale.

The watershed is interspersed with mining pits and quarries. These sites have disturbed soils which are classified as unstable fill and consist of acidic mine spoils (AMD). Critical erosion from these unstable areas and water permeating these soils are sources of sediment and acid mine drainage.

The map units identified in this watershed are Bethesda, Fairpoint and Sewell soils, 0 to 80 percent slopes, very rocky, and Itmann extremely channery sandy loam, 0 to 80 percent slopes.

LAND USE

The North Fork of the Powell River watershed encompasses 57,620 acres or 90 square miles. Ten (10) percent or 5,739 acres are under the control of the Jefferson National Forest, while the remaining 51,881 acres or 90% are privately owned. The data on landuse in Table A was compiled from RESAC data obtained by the Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DSWC). RESAC is the Mid-Atlantic Regional Earth Science Applications Center at the University of Maryland. The data was a composite of LANDSAT imagery collected from the circa 1990 and 2000 eras. This was classified using several other sources as reference points for accuracy and verification. For more information on this data, go to <http://www.geog.umd.edu/resac/lc2.html>. Figure 1 shows the land use map for the watershed.

This data was extracted using the 2006 hydrologic unit boundary for the North Fork Powell compiled by DSWC. Some of the categories were grouped into similar land cover types. Acreages were calculated from a polygon feature class, using the UTM-Zone 17 and NAD83 DATUM map projection.

Table A – Land Use Information

Cover Type	Acres	% Cover
Cropland	321	0.6
Pasture / Hay Land	4,431	7.7
Grass Land	337	0.6
Deciduous Forests	35,114	60.9
Evergreen Forests	4,399	7.6
Mixed Forests	4,972	8.6
Developed	876	1.5
Transportation	581	1.0
Strip Mines and Quarries	1,984	3.4
Barren	4,291	7.5
Open Water	221	0.4
Wetlands	93	0.2
Total	57,620	100.00

RESAC 2000 Land Cover Data for the North Fork of the Powell Watershed

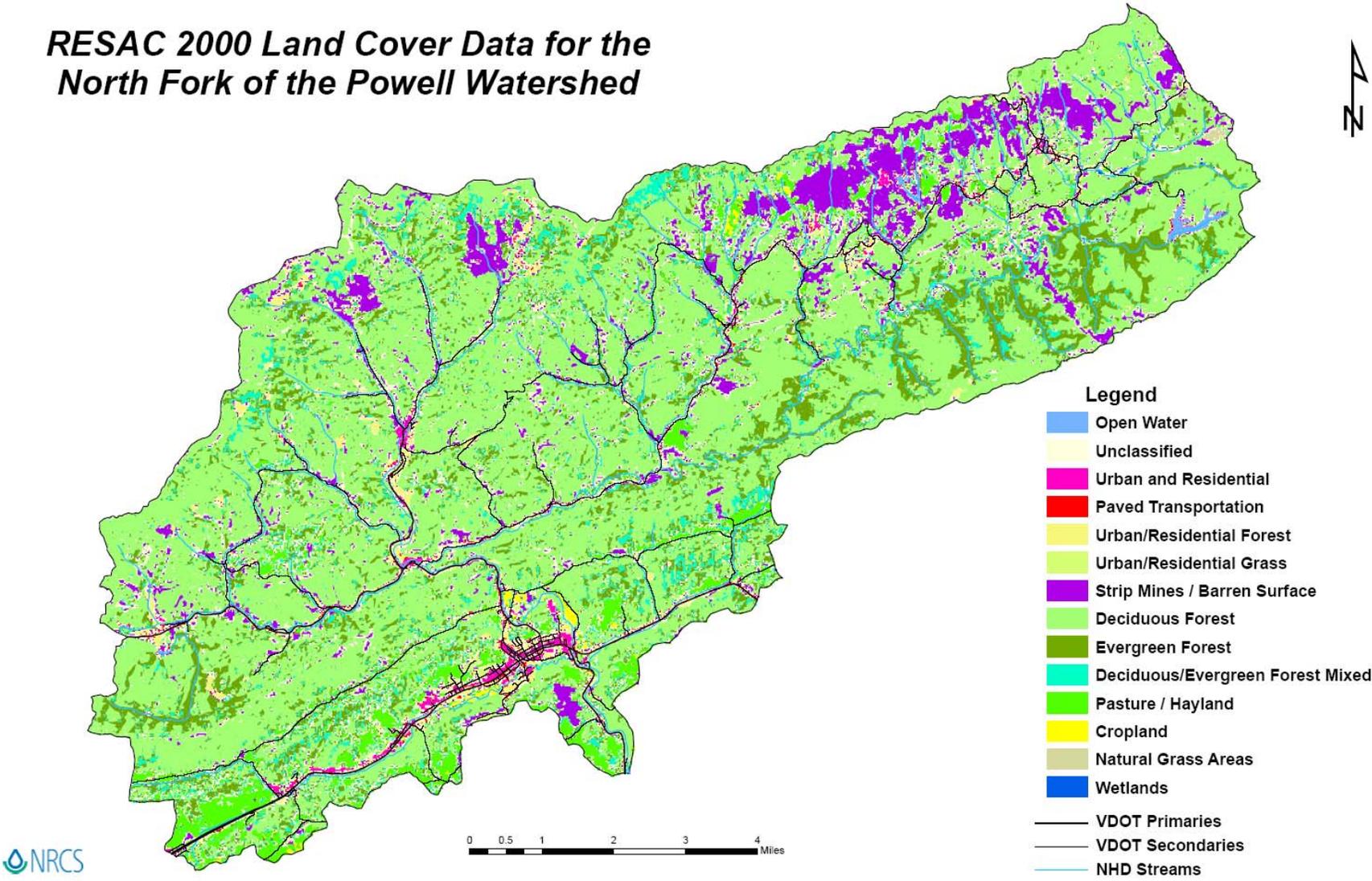


Figure 1. Land Use Map.

The northeastern area of Lee County is completely mountainous and contains the coal seams that have been vigorously sought after now for more than 100 years. The abandoned mine sites, and their associated acid drainage effluent, the critically eroding mine spoil-banks, tipples areas and high-walls, and their associated heavy-metal laden sediments, are the focus of this project, and all are located within an area of Lee County where there simply isn't much agriculture or other uses of the land. Indeed, none of the sites to be evaluated for potential treatment are located on agricultural lands. The potential project site areas are either still barren from past mining activities or they are covered with trees and other plants attempting to reclaim the abandoned mine sites through natural succession.

WATERSHED PROBLEMS AND OPPORTUNITIES

WATERSHED PROBLEMS

Mine Related Problems

The watershed suffers from the effects of seventy years of unrestricted surface mining of coal prior to the passage of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. Surface and underground mining during the pre-SMCRA period caused fairly widespread degradation of streams and aquatic ecosystems in the watershed due to AMD and critically eroding areas.

Throughout the watershed, there are numerous mine openings that discharge acid ground water to surface streams. When coal seams are exposed to air and water, a chemical reaction between them causes the ground water to become acidic. Sulfates present in the coal accelerate the acid-forming chemical reactions. The drainage and runoff from these sites contain high levels of minerals, metals and sulfates that are derived from iron sulfide, commonly known as pyrite. These materials oxidize in the presence of air and rainfall and the resulting pollutants include iron sulfates, sulfuric acid, iron hydroxides, and ferric, aluminum and manganese salts. When dissolved in water at critical concentrations, the copper, zinc, aluminum and manganese that are associated with pyrites, become toxic to the fish, invertebrates, and plant life composing the aquatic ecosystem. The iron that is also in the coal seam reacts with the acid water, causing it to develop a red to yellow discoloration. Part of the iron also precipitates and is seen as the orange colored sediment on stream bottoms. The AMD and critical erosion in the watershed negatively affect the many threatened and endangered mussel species in the watershed. Many of the mussels native to southwestern Virginia are found nowhere else on earth.

Many abandoned mine sites have eroding spoilbanks of mineral subsoil and waste piles that were pushed over steep hillsides and left unvegetated. Materials eroding from these sites contribute significant quantities of sediment into the streams. These sediments contain attached metals which are liberated into the streams under AMD conditions.

Since many of the mines and their associated handling areas and facilities in the watershed were worked before implementation of federal mine land reclamation laws, they were simply abandoned when coal extraction activities ceased. The funds received for the Abandoned Mine Land (AML) program, which is an annually funded Federal program, are primarily used to

address the high priority abandoned mine sites where there are existing threats to human safety and health. Additional funding would be required for remediation of the many abandoned mine land (AML) sites that are still significant sources of environmental contaminants. This condition was the main impetus for requesting NRCS planning assistance in this watershed. Therefore, the main focus of this effort is on the abandoned mine lands within the watershed.

Effects of AMD on the Aquatic Ecosystem

The Powell River ecosystem is historically diverse in aquatic resources. Twenty-nine species of mussels and nineteen species of rare fish are found in this drainage. Seventeen of the mussel species have been known to occur in the North Fork Powell River. Combined with the Clinch River to which the Powell River flows, the system is inhabited by 48 rare and vulnerable fish and mussel species, more than any other small watershed in the country. Twenty-one of these species are federally listed as threatened or endangered species. The decline of more than 30% of mussel species in the last century is closely correlated to the effects of AMD.

The decline in mussel species and population is considered to be related to a decline in host fish species for the glochidial stage in the mussel life cycle. The mussel life cycle begins with male mussels releasing sperm into the stream in spring or summer. The female mussel draws the sperm in through her siphon and fertilizes her eggs internally. The fertilized eggs are stored temporarily in her gills. The embryos reside in the gills for 2-3 weeks when they have developed into larvae or glochidia. Glochidia are less than 0.01 inches in diameter and have gaping, half-moon shaped valves or shells with a single adductor muscle to open and close them. Glochidia are released by the female to drift downstream and attach to the gills of a host fish species. The glochidia derive their nutrition from the blood of the host species. This stage lasts a few weeks until the juvenile stage is reached and the young mussel drops off, attaches to a substrate and develops into an adult. Development into the adult stage is adversely affected by the pH and metal toxicity in the water and sediment. In addition, excessive sediment carried by the water causes abrasion to the young mussels or suffocates them by covering the substrate.

Host fish that enable the propagation of mussel species are adversely affected by the same factors that determine mussel survival. The AMD, therefore, indirectly affects the survival of mussel species by affecting the host fish species, as well as by direct toxic effects to the juveniles.

Identified Sites

There are 61 AMD and/or critically eroding sites in the watershed that have been identified as having an adverse effect on the watershed. Of the 61 sites, 40 sites have AMD as the primary concern. Ten of these list AMD as the first concern with critical erosion as a secondary issue. An additional nine sites have critical erosion of either an abandoned mine site or a streambank as the primary concern. The two remaining sites have no major AMD issues but do have public safety concerns associated with the abandoned tipples.

In addition to the AMD and critical erosion issues identified in the watershed, there are a significant number of tributaries that are adversely affected by the total dissolved solids (TDS) present in the water. The main stem of the Powell River is also affected. Although treatment of AMD sites seems to have a positive effect on TDS, improvements to TDS will not be addressed as a primary concern in this plan.

The COE has completed work on five of the 12 projects that they have identified as eligible for their mine reclamation program. Forty-four sites have been identified as eligible for participation in the PL-566 program administered by NRCS. Reclamation of these sites will complement the work already done or planned by the COE. The remaining five sites will be addressed by the AML program administered by DMME or through local grant programs.

Other Water Quality Problems

The watershed has a variety of problems that are affecting water quality, human health and safety, and economics. In addition to mining, sewer and “gray water” disposal are also important issues in the area. Inadequate sewer/septic systems make a significant contribution to the water quality degradation. Water samples indicate the current state standard for primary body contact recreation of 200 cfu(colony forming units)/100 ml for fecal coliform is exceeded in many locations throughout the watershed. A range of 100 to 8,000 cfu/100 ml has been documented in the watershed.

Poor water quality has adverse impacts on the health of the residents. It also makes it necessary to spend scarce resources, both time and money, to haul potable water to the individual households. Illegal trash dumping not only has the potential to impact water quality, but it also degrades the visual resources of the watershed. It is often difficult for places with poor aesthetic appearances to attract new people and businesses to the area. The lack of a well-educated labor pool is also a deterrent to incoming enterprises. Many of these factors combine to reduce the economic opportunities in the watershed.

Most, if not all, of these social, health and economic issues are being addressed through state and local programs. With respect to mining, however, many of the existing programs make treatment of safety issues on abandoned mines a higher priority than treatment of environmental issues. In cooperation with DMME, the U.S. Army Corps Of Engineers (COE) has made a significant investment of time and money in order to identify those abandoned mine sites in the watershed that are degrading water quality by the emission of AMD or by contributing to the sediment loading of the streams.

WATERSHED OPPORTUNITIES

There are many opportunities to improve the natural and human resource conditions in the watershed. The following are examples of potential outcomes:

- Improve overall water quality
 - Increase warm water fisheries on streams
 - Improve habitat for threatened and endangered fish species
 - Improve habitat for threatened and endangered mussel species
 - Reduce sedimentation to streams
- Improve riparian zones and reduce water temperature by planting vegetative cover
- Clean water by creating wetlands
- Reduce critical erosion on abandoned mine lands
- Create wildlife habitat on abandoned mine lands
- Eliminate critically eroding brownfield/tipple sites
- Increase recreational opportunities for hunting, fishing and contact recreation
- Eliminate safety problems by closing mine portals and eliminating highwalls
- Improve aesthetics through vegetative cover and clean-up of problem areas
- Increase tourism for Coal Heritage Trail
- Improve economic opportunities through sales of goods associated with fishing, water recreation and hunting

The community has an opportunity to rehabilitate existing abandoned tipple sites so as to minimize Non-Point Source Pollution (NPSP) from them while exploring ways to convert them into sites that contribute to the local economy. These sites are adjacent to state roads and offer the potential to be redeveloped into such uses as commercial business sites, park and ride facilities, community parks, outdoor classrooms, etc.

SPONSORS' GOALS AND OBJECTIVES

The Sponsors identified the following goals and objectives in their Application for Federal Assistance:

Goal 1: Improve the water quality in the North Fork Powell River Watershed.

Objectives:

1. Develop a strategy to address all point and nonpoint sources of pollution in the watershed.
2. Eliminate acid mine drainage sources by identifying and formulating effective remediation plans, particularly those sites with the most acid mine drainage.
3. Reduce erosion by backfilling, regrading, topsoiling, and revegetating inadequately reclaimed abandoned mine lands, thereby reducing stream sedimentation and runoff.
4. Mitigate stream bank erosion to reduce deposition in the stream and protect wildlife.
5. Minimize levels of sediment and total suspended solids in streams in order to improve aquatic habitat.
6. Improve the aesthetics of the watershed through revegetation and cleaning up illegal trash dumps and abandoned coal tipple sites.

SCOPING OF CONCERNS

7. Decrease nutrient loading by offering assistance to residents by eliminating straight pipes and failing septic systems. Straight pipes carry raw sewage to surface water without treatment. Elimination of illegal dumps will further eliminate nutrient loads.

Goal 2: Promote and protect wildlife and aquatic organisms.

Objectives:

1. Protect and restore critical habitat for endangered species of fish and mollusks.
2. Seek partnerships with groups who promote habitat enhancement of upland species (i.e. Ruffed Grouse Society, National Wild Turkey Federation and Quail Unlimited).

Goal 3: Improve riparian and wetland areas

Objectives:

1. Enhance riparian habitat through stream bank restoration and vegetation.
2. Improve and create new wetland areas.
3. Install stream buffers, which will lower water temperature and filter sediment and nutrients from runoff.

Goal 4: Improve the social and economic condition of the region.

Objectives:

1. Improve image of watershed.
2. Increase the opportunities for recreation.
3. Improve the health of the residents.
4. Improve economic health of region.

SCOPING OF CONCERNS

The need for treatment of the North Fork Powell River Watershed was first recognized and promoted by the Daniel Boone Soil and Water Conservation District (SWCD). The NRCS Planning Team conducted an initial watershed reconnaissance visit in May 2004. Coordination among agencies to scope issues to be addressed during planning was initiated during this general time period. Based on the judgment of the Team, the watershed needed an accelerated land treatment program.

In July 2004, the Virginia Soil and Water Conservation Board approved the Sponsors' Application for Federal Assistance and the request was forwarded to NRCS for action. In August 2004, a partnership meeting was held in Big Stone Gap. A public meeting was held the same day at the Community Center in St. Charles. Watershed issues and concerns were listed and prioritized by watershed residents with the assistance of agency representatives.

The project was discussed at a scoping meeting held on December 14, 2006 in Big Stone Gap. The meeting was attended by State and Federal natural resource agencies, representatives from NRCS, the Daniel Boone SWCD, community action groups, and representatives of the Virginia Mining Association. Table B is a summary of the scoping concerns identified during the scoping process.

SCOPING OF CONCERNS

Table B – Scoping Results For North Fork Powell River Watershed			
Resource Concern	Degree of Concern ¹	Significance to Decision Making ²	Remarks
Air Quality *	Low	Low	
Erosion and Sedimentation	High	High	
Fisheries and Aquatic Resources*	High	High	Put-and- take trout fishery on the North Fork Powell River above Stone Cr. Trib.
Wildlife Habitat *	High	High	
Floodplains *	Medium	Medium	
Ground water *			
Quality	High	High	
Quantity	Low	Low	
Cultural Resources *	Medium	Medium	Tex Rivers Tipple Site on Reeds Creek may be part of local Coal Mining Heritage Trail
Prime and Unique Farmlands *	Low	Low	
Recreation	High	Medium	Trails along streams important to future economic development
Threatened & Endangered Sp. *	High	High	Focus is on mussel reestablishment
Water Quality *	High	High	Completed TMDL on Straight Creek (DEQ)
Wetlands *	Medium	Medium	
Wild & Scenic Rivers *	Low	Low	
Other Concerns:			
Social Considerations	High	High	Future outlook; health & welfare; regional image
Economy	High	High	Protecting jobs, fighting poverty
Education	High	High	Improving education, a key concern
Forestry	Medium	Medium	Concern with reforestation of mined areas
Sewage, Gray Water	High	Low	Health concerns & image problem
Solid Waste Disposal	High	Low	Illegal trash dumps are a major problem
Private Property	High	High	Property acquisition is challenging; dealing with coal companies, railroads, land holding co.

* Required by Law

¹ Low, Medium or High

² High – must be considered in the analysis of alternatives; Medium – may be affected by some alternative solutions; Low – consider, but not identified as important to decision making.

INVENTORY AND FORECASTING

WATER QUALITY

Surface water quality in the watershed ranges from good to severely degraded. Based on information in the 2004 Virginia Water Quality Assessment Report, there are a total of 39.3 miles of streams in the watershed with water quality impairments. Lake Keokee has 100 acres of impaired surface water. The stream segments and lake shown below have documented violations of water quality standards. The aquatic life use is not being supported in all listed streams and the recreation use is not being supported in Straight Creek and the North Fork Powell River listed segments. The stream impairments are for total fecal coliform/E. coli and/or General Standard for benthic organisms. The sources of the impairments in the streams are listed as either unknown, resource extraction, acid mine drainage, residential, or nonpoint sources from urban land. The impairments in Lake Keokee are for dissolved oxygen and pH from natural conditions. In addition, fish tissue samples taken in the watershed have shown evidence of arsenic, PCBs and mercury. Sediment samples showed significant nickel concentrations in Straight Creek.

2004 Virginia Category 5A Impaired Waters (303d list requiring a TMDL)

- North Fork Powell River = 6.03 miles
- Straight Creek = 6.66 miles
 - Tributaries to Straight Creek
 - Puckett Creek = 5.31 miles
 - Lick Branch = 0.79 miles
 - Gin Creek = 2.61 miles
 - Baileys Trace = 4.55 miles
 - Stone Creek = 10.08 miles
 - Tributary to Stone Creek
 - Ely Creek = 3.27 miles
- Lake Keokee = 100 acres

The bacteria contaminating area streams come from wildlife, grazing livestock, land application of animal manure, urban and suburban runoff, failed and malfunctioning septic systems and uncontrolled discharges of human wastes.¹ The acid mine drainage and heavy metal polluted sediments are derived principally from processes conducted during underground and surface mining of coal. The pH values of AMD range from 1.5 to about 9.0 across the watershed. The concentration and loading of iron and aluminum in the water is directly related to the observed pH values. Abandoned mine lands account for the majority of the pollutants stressing the area's aquatic ecosystems. Agricultural practices also contribute to the degradation of water quality in the watershed, but are a relatively minor contributor accounting for only 0.6% (321 acres) in cropland and 7.7% (4,431 acres) in pasture or hayland of the total land cover contained within the watershed's 57,620 total acreage.

TMDL Results

¹ Fecal Bacteria and General Standard Total Maximum Daily Load Development for the Powell River Basin, February 7, 2005 draft prepared by Map Tech, Inc. for the Virginia Department of Mines, Minerals and Energy and the Virginia Department of Environmental Quality.

The State Department of Environmental Quality completed a Total Maximum Daily Load (TMDL) study for Straight Creek in the Powell River Basin in September 2005. Ambient water quality monitoring indicates that Straight Creek failed to meet State water quality standards for fecal coliform/E. coli and the General Standard for benthic organisms. With regard to the General Standard, the potential stressors evaluated for effect on the benthic community were sediment, toxics, dissolved oxygen, nutrients, pH, metals, conductivity, temperature and organic matter. The study identified sediment and conductivity (EC)/total dissolved solids (TDS) as the most probable stressors of benthic health in the watershed.

Ground Water

The watershed suffers from significantly altered/degraded ground water resources as a result of the destructive effects of surface and underground mining for coal. These negative effects have altered both ground water quality, and in many cases, ground water quantity. As a result of mining, the ground water aquifers have been substantially altered with significant amounts of heavy metals and acidity as well as by altered courses and quantities of underground flows. The wells in the watershed contain manganese and iron levels that far exceed the Secondary Maximum Contaminant Levels (SMCL), 0.05 mg/l for manganese and 0.3 mg/l for iron, set by the Virginia Department of Health (VDH) for drinking water. Many wells also exceed the VDH pH limits (6.5 – 8.5) set for potable water. DMME has surveyed numerous communities regarding drinking water supplies and these problems are prevalent as is the presence of sulfates. Many residents complain about the foul smell of their water and the staining effects iron-laden tap water has on porcelain sinks and clothing. As a result, many residents have to expend resources to treat their well water, haul water from distant sources and/or purchase bottled water.



Figure 2. Cold Springs. Some residents travel as far as ten miles to obtain drinking water from places such as Cold Springs on Route 421.

The following quotes from the October 1998 DMME application for an AML potable water supply project for Keokee, Virginia, clearly illustrates the health implications of impacted ground water resources in the watershed:

“The issue of public health is very relevant to this project. Iron poisoning, primarily in the form of gastro-intestinal degradation, is particularly important to young children as they are more susceptible than adults. Excessive levels of manganese can also result in intestinal irritation, primarily in the form of diarrhea. Again, the ailments are magnified in infants and young children. Sulfates will also result in the same ailments as manganese. The low pH levels could result in water being corrosive and leach lead from solder existing in older home plumbing. It should be noted that many of the homes in the project area are of an age when leaded solder was widely used in the plumbing industry. The link between lead and mental illness has been well documented. As with most all of the issues related to water based health concerns, the effects are most pronounced in young children.”

Water Resources

The watershed consists of the main stem of North Fork Powell River, which flows in a generally southwestern direction, and its tributaries. There are 12 subwatersheds within the North Fork Powell River drainage, eight of which are affected by mining activities. Figure 3 shows these subwatersheds. Table C lists the stream miles by stream order for the eight impaired watersheds.

Impaired Waters

The major tributaries to the North Fork of the Powell River that have AMD or critical erosion problems are Stone Creek, Straight Creek, Jones Creek, Cox Creek, Jordan Branch, Craborchard Creek, and Wells Branch. Of these, Ely Creek is a major subwatershed to Stone Creek, Stone Creek and Puckett Creek are major subwatersheds of Straight Creek, and Reeds Creek is a major subwatershed to Jones Creek. There are also several subwatersheds to the river that have no documented AMD or critical erosion issues. These watersheds are Cane Creek, Bundy Creek and Stone Creek Main.. The main stem of the river has no identified AMD or critical erosion issues identified above the mouth of Straight Creek, except for Bobs Branch. Bobs Branch is a very small subwatershed of the North Fork Powell River with two critical erosion sites that drain directly to the river.

Eight impaired subwatersheds are briefly described below. See Appendix C for maps of the impaired waters.

Water sampling data was available in most of the eight subwatersheds impacted by mining or critical erosion. Data collected at these points included net acidity, dissolved oxygen, discharge, iron, aluminum, pH, total dissolved solids (TDS), and total suspended solids. To simplify the analysis, pH was selected as the major indicator of water chemistry. Total Dissolved Solids data were also evaluated as an indicator of benthic health but were not quantified due to the difficulty in identifying the source of the contamination. There are multiple sources, including mining, that can contribute to TDS.

For the purpose of this study, the pH values were categorized into these groups: pH-Acceptable (pH-A) with values from 7.0-9.0; pH-Recovering (pH-R) with values from 6.0 – 6.9; and pH-Impaired (pH-I) with values less than 6.0. Sites with erosion rates exceeding the soil loss tolerance value of “T” were described as CE-Impaired. Sediment delivery rates from critically eroding sites were estimated from the TMDL Study done on Straight Creek. The number of stream miles impaired by critically eroding sites was also estimated because there was little or no data on Total Suspended Solids (TSS) that could have been used to quantify impairments from these sites.

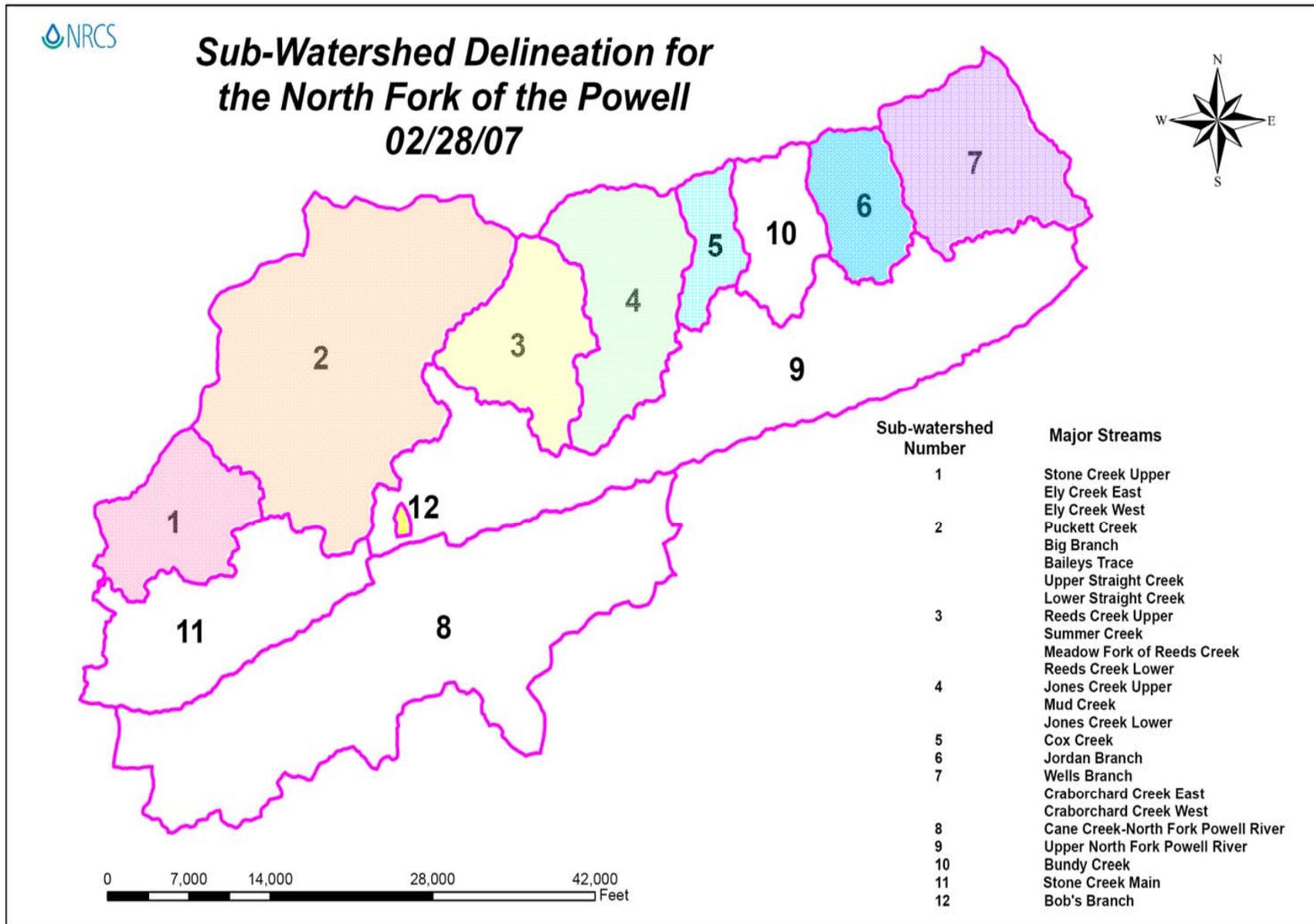


Figure 3. Subwatershed Delineation

Table C - Stream Miles by Subwatershed

Sub-watershed Number and Name	Major Streams and Tributaries	Drainage Area, acres	Stream Miles				Total
			1 st order	2 nd order	3 rd order	4 th order	
1 - Upper Stone and Ely Creek	Upper Stone Creek, Ely Creek, Goose Creek, Bean Creek	2,659	6.70	2.07	0.80	-	9.57
2 – Straight and Puckett Creeks	Straight Creek, Baileys Trace, Fawn Branch, Gin Creek, Big Branch of Straight Creek, Puckett Creek, Big Branch of Puckett Creek, Lick Branch (of Puckett Creek), Cooper Hollow (Puckett Creek)	10,533	21.81	6.52	4.40	3.54	36.27
3 – Reeds and Summers Creeks	Reeds Creek, Summers Creek, Meadow Fork	3,004	7.89	3.46	1.79	0.92	14.06
4 – Jones and Mud Creeks	Jones Creek, Mud Creek, Allen Hollow	3,781	12.55	2.68	0.91	2.90	19.04
5 – Cox Creek	Cox Creek	1,143	2.99	2.11	0.68	-	5.78
6 – Jordan Branch	Jordan Branch	1,869	7.50	1.62	0.67	-	9.79
7 – Craborchard Creek and Wells Branch	Craborchard Creek, Wells Branch	3,835	16.23	2.80	2.11	-	21.14
8 – Cane Creek	Cane Creek ¹	12,447	-	-	-	-	-
9 – Upper North Fork of Powell River	Upper North Fork of Powell River ¹	11,875	-	-	-	-	-
10 – Bundy Creek	Bundy Creek ¹	1,880	-	-	-	-	-
11 – Stone Creek Main	Stone Creek Main ¹	4,533	-	-	-	-	-
12 – Bobs Branch	Bobs Branch ²	61	-	-	-	-	-
Total		57,620	75.67	21.26	11.36	7.36	115.65

¹ Stream data is not listed for the unimpaired watersheds.

² Subwatershed 12 is a small area in the Bobs Branch watershed that drains directly into the North Fork Powell River by overland flow.

Site Descriptions (Refer to maps in Appendix C)***Subwatershed No. 1 – Upper Stone Creek and Ely Creek***

The upper portion of the Stone Creek watershed has two AMD sites. The Mason Coal site (SCUAMD1) has two point sources that outlet into a roadside ditch. The pH is slightly impaired (5.5-5.8) at the upper site but recovery is noted immediately downstream. The Gilbert Creek site (SCUAMD2) has two seeps. At the upstream seep, the pH is less than 2.7 and this causes a pH impairment of the stream for approximately 0.41 stream miles. The stream pH begins to show recovery when the roadside ditch from Mason Coal enters the stream and continues this trend to the confluence with the main stem of Stone Creek, a distance of about 0.47 stream miles. There are 2.2 miles of stream that are not affected by pH or critical erosion.

There are four main sections of Ely Creek. The Bean Creek tributary has six sites that have already been treated by the COE. The three Everglades sites (ECWAMD1) and the three Bean Creek sites (ECWAMD2) had SAPS cells and wetlands installed by the COE in 2004. Sample data downstream of the sites indicates pH recovery has been successful. Approximately 0.48 stream miles were recovered as a result of this work. Fish have been observed downstream since the completion of the projects.

The Bog sites on Goose Creek (ECWAMD3) were also completed by the COE in 2004. Three successive alkaline producing systems (SAPS) cells and a wetland were installed. The post-construction pH values were primarily in the Acceptable range with some minor fluctuations into the Recovering range. Approximately 0.16 stream miles were converted from Impaired to Acceptable/Recovering. Together, all of the COE projects in the Ely Creek watershed treat over 440 gallons per minute (gpm) of AMD.

The main stem of Ely Creek above the confluence with Goose Creek has five identified sites with AMD: Lenges (ECEAMD1), M&H Coal (ECEAMD2), Aubra Dean (ECEAMD3), Knuckles (ECEAMD4), and SW12 (ECEAMD5). Critical erosion is identified as a secondary impairment on the M&H Coal and Aubra Dean sites. There is a reference sample site (SW15) upstream that indicates that the portion of the stream that is not impacted by mining has Acceptable values for pH and TDS. A second stream sample site (SW13) that is downstream from the reference site and downstream of a strip mine but upstream of the five identified sites showed pH values from 6.4 to 7.4. At the stream sample site (SW11) immediately above the confluence with Goose Creek, the pH is in the Impaired range. Some of the pH values coming from the five sites are as low as 2.7. The pH-Impaired stream distance is about 0.40 stream miles. Another 0.34 stream miles below the pH-Impaired reach are identified as pH-Recovering. The Goose Creek restoration project had a positive impact on the water quality in Ely Creek downstream of the confluence with the main stem of Ely Creek. However, the pH values remained in the Impaired range due to the influence of the five untreated sites. Impairment from critical erosion is estimated to begin at site ECEAMD3 and extend to the end of the pH-Impaired water (0.40 miles).

The fourth reach in the Ely Creek Watershed is an unnamed tributary located downstream of Bean Creek. The Baker Mine site (ECWAMD4) has a highwall that is seeping water with pH values of less than 3.5. The site also has critical erosion problems. Approximately 0.37 stream

miles are pH-Impaired and an additional 0.12 stream miles are pH-Recovering. The entire length of the tributary is impaired by critical erosion (0.49 miles).

There are 9.57 stream miles in the subwatershed. Of these, 1.18 miles (12.4%) are pH-Impaired and 1.32 miles (13.8%) are pH-Recovering. Approximately 6.08 miles (63.5%) of the streams in this subwatershed are headwaters streams that have no known effect from mining. Another 0.64 miles (6.7%) became pH-Acceptable upon completion of the COE work. There are 0.35 miles (3.7%) of pH-Acceptable stream but its location below the impaired sites makes it vulnerable to pH drainage in high flow events. Also, 0.40 miles (4.2%) of the streams are critical erosion-Impaired. Existing fishable waters are 0.93 miles. There is a potential for a total of 1.84 miles of fishable waters in this subwatershed. Page C-1 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 2 – Straight and Puckett Creeks

The Straight Creek subwatershed has four major tributaries: Baileys Trace, Gin Creek, Big Branch, and Puckett Creek. Baileys Trace has two critically eroding sites located in the headwaters. The Bonnie Blue site (BTCE1) and the Fawn Branch Refuse Slide (BTCE2) are landslides located adjacent to tributaries of Baileys Trace. The sediment delivered to the stream is estimated to be 30.8 tons/year at Bonnie Blue and 1.7 tons/year at Fawn Branch. Sediment from critical erosion is estimated to affect 1.73 stream miles from Bonnie Blue and 0.86 miles of fishery. The Fawn Branch affects 1.87 stream miles but only 0.33 miles of fishery. There are no water sample locations in the vicinity of these sites. Therefore, there is no information about possible pH impairments associated with these sites.

The Gin Creek Slide (USCCE1) is located in the headwaters of Gin Creek. This slide becomes active during precipitation events and contributes approximately 20.5 tons/yr of sediment to the stream. There are 2.23 miles of fishable water in the 3.01 miles affected. Downstream pH impairments prevent fish access to these reaches. There are no water quality sample sites in the vicinity and no data is available on possible pH impairments associated with this site.

The main stem of Straight Creek has several sites. There are two sites above St. Charles that the COE is planning to address as funds become available. The Blowout site (USCAMD1) is located on Straight Creek. Although the water quality data does not reflect a pH Impairment, it has been determined that the foam sealant used in a previous restoration effort is very alkaline and is artificially raising the pH. SAPS and wetland cells will be used to address the pH-Impairment that is presently impacting 0.04 stream miles. Approximately 0.14 stream miles below the impaired section are pH-Recovering. The Penhook seeps (USCAMD2) are located on both sides of a small tributary to Straight Creek. One seep will be drained during the restoration of the Blowout site. However, the remaining three seeps have pH values as low as 2.0, 2.2, and 2.8. This site is pH-Impaired for approximately 0.20 stream miles on the tributary and 0.05 stream miles on Straight Creek. A pH-Recovering zone extends about 0.07 stream miles downstream of the impairment. Flow is estimated at 50 gpm from the Blowout Site and 10 gpm from the Penhook Site.

There are two sites on the hillside directly above the community of St. Charles. The St. Charles site (LSCCE1) is a 0.5 acre landslide that is eroding directly into Straight Creek. The annual sediment delivery rate is 6.84 tons/year. The site appears to be well vegetated but a major

precipitation event that causes significant mass movement of the soil into Straight Creek could cause flooding in the Town of St. Charles due to the resulting stream blockage. A house located at the top of the slide has been condemned as unsafe. Petry Spring (LSCAMD3) is seeping low pH water (~2.9) from a mine portal on the hillside. Although no water quality impacts from this site are observed in Straight Creek, it contributes to surface water contamination during high flow periods.

The Slick Lizard site (BTAMD1) is an abandoned mine site located on the railroad right-of-way at the confluence of Baileys Trace and Straight Creek. The discharge from this site has pH values as low as 2.1. The available stream data shows little direct impact from this site but the potential for water quality impairments during high runoff events is significant. It is estimated that a rainfall event large enough to cause overland flow into Straight Creek will occur one time in four years. The resulting pH-Impairment would be approximately 0.69 miles with a pH-Recovering zone of 0.62 miles. During the recovery period, estimated to be about 2 years, the upstream fishery would be limited to the resident population existing in the 6.33 miles upstream of the site.

The Wagonertown Seeps (LSCAMD1) and Watertank Road Seep (LSCAMD2) are located on an unnamed tributary to Straight Creek just south of St. Charles. The pH-Impaired section begins approximately 0.20 stream miles upstream of the Wagonertown Seeps and extends downstream for an additional 0.09 stream miles. The pH-Recovering section is 0.16 stream miles long and extends to the confluence with Straight Creek. This section includes a 700 foot long limestone-lined channel that was installed in 2002. It is clear from the water sample data that the channel has a positive influence on the pH. The Watertank Road Seep is a little intermittent flow that has no defined channel. However, the pH was 4.8 in the water sample. The pH-Impaired section is estimated to be 0.23 overland miles during wet conditions. During high flows, the pH-Impaired water could damage 0.55 miles on Straight Creek. An additional 0.73 miles would be pH-Recovering.

Big Branch of Straight Creek (BBAMD1) is located just south of the Town of St. Charles. Water quality data indicates that the stream is pH-Impaired for about 0.42 stream miles and pH-Recovering for an additional 0.03 stream miles. The site encompasses 8 acres and there are 54.7 tons of sediment delivered to the stream annually. Critical Erosion impairs 1.25 miles of the stream. Existing fishable stream length is 0.42 miles.

Puckett Creek enters Straight Creek just above the confluence with the North Fork of the Powell River. The COE has recently completed two AMD reclamation sites in this watershed. The Lick Branch site (PCAMD1) has two sites that were treated as one unit. Due to the newness of construction, there are no water quality samples available. However, given the results of the Ely Creek reclamation sites, it is reasonable to assume that the effectiveness of the treatments will be similar. Approximately 0.48 stream miles are now pH-Recovered and will become pH-Acceptable in about 2 years. The Big Branch of Puckett Creek site (PCAMD4) has also been recently completed. Approximately 0.16 stream miles are pH-Recovered and 0.09 stream miles are pH-Acceptable for a total of 0.25 miles of pH-Acceptable in about two years. Approximately 139 gpm of flow were treated at these two sites.

The Richard Davis Wetland (PCAMD2) is located at the confluence of Cooper Hollow and Puckett Creek and the Lanningham mine site (PCAMD3) drains to the wetland. Together, there are 0.06 stream miles of pH-Impaired water and 0.18 miles of overland flow associated with these two sites.

The Triple R Mine site (PCCE1) is located across from the confluence of Lick Branch and Puckett Creek. The primary impairment on this site is critical erosion with a projected sediment delivery of 68.4 tons/yr to Puckett Creek. A pH value of 4.9 has been noted on the site indicating a need to consider some remediation. Overland flow from this site has the potential to cause a pH-Recovering reach of 0.24 miles of stream while Critical Erosion impairs 0.28 miles with sediment eroded from the site. At the present time, there are no fishable waters in this stream.

The Straight Creek watershed has a total stream length of 36.27 miles. Of these, 1.66 miles (4.6%) are pH-Impaired, 1.55 miles (4.3%) are pH-Recovering, and 10.34 miles (28.5%) are critical erosion-Impaired. Some of these impairments are concurrent. There are 22.25 miles of upland streams that are not pH-Impaired in any way. The remaining 10.81 miles are located where they could be impacted by AMD but are not presently impaired. This watershed has been identified as a TMDL watershed by the State of Virginia. The primary impairment identified by the State is E. coli bacteria and AMD. There are 1.20 miles of existing fishery of the potential 11.72 miles of fishable water in the watershed. Page C-4 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 3 – Reeds and Summers Creeks

Reeds Creek, and its tributaries Summers Creek and Meadow Fork, is a major tributary to Jones Creek. Meadow Fork has no identified water quality impairments. Summers Creek has one named AMD site (SCAMD1) with four sites on it. At locations PS01, PS02, and PS04, the pH ranges from 3.7 to 5.0 for the one sample taken at each site. However, the pH on these three sites on the main stem of Summers Creek is somewhat mitigated by a wetland that outlets into the creek. The pH was measured to be 6.4 downstream of the three sites. The fourth site (PS03) is on an unnamed tributary to Summers Creek that runs parallel to Route 878. There are several mine openings on the site. The pH values are in the Impaired range. Due to the natural buffering capacity of the stream, the pH is somewhat higher upstream of the confluence with the main stem of Summers Creek but has some sample values that are still in the Impaired range. The COE plans to address only PS03 in their reclamation plan.

There are nine sites on Reeds Creek and its tributaries. The Coolers site (RCUAMD1), Tomlinson (RCUAMD2), and Rivers Wetland (RCUAMD3) are located along the stream and are all pH-Impaired. These three sites have a combined pH-Impaired reach length of 0.44 stream miles and approximately 0.29 stream miles of pH-Recovering stream. The Rivers Tipple site (RCUAMD4) has two mine openings and an historic tipple on site. There is also some erosion occurring on site with a sediment delivery ratio to the stream of 3.42 tons/yr. The stream is pH-Recovering for 0.09 miles downstream of the site. Approximately 0.24 miles are impaired by the sediment from this site.

The ninth site on Reeds Creek is identified as “Orphan Land Site Above Coolers” (RCUAMD9) and consists of an old mine bench with a small pond. This site is not located directly on the

stream but has the potential to impact surface water during high flow events and ground water at other times. On the day the site was identified, the pH was less than 4.0. No other data is currently recorded.

The Maw Bee site (RCUAMD8) is located upstream of the Bee Mine site. The three samples available indicated the stream is pH-Recovering both upstream (0.17 stream miles) and downstream (0.04 stream miles) of the site.

Rivers Portal (RCUAMD5) also has a mine opening on site with some critical erosion with a sediment delivery of 3.42 tons/yr. The stream is pH-Recovering for 0.09 miles according to the one available water quality sample. However, some impairment may occur during high flow situations. This site will be addressed by DMME through the AML Program.

The McPherson site (RCUAMD6) is located in the headwaters of Reeds Creek and consists of three identified sites. There are impairments noted at the sites for about 0.42 stream miles and 0.20 overland miles. The sites are pH-Recovering for an additional 0.35 stream miles. The COE is planning to do the reclamation of this group of sites. There are some additional water quality samples sites upstream of the three identified sites that may indicate the presence of additional AMD point sources. The Bee Mine site (RCUAMD7) will also be addressed by the COE. It is located on an unnamed tributary of Reeds Creek and is pH-Impaired for a distance of 0.07 stream miles. The pH-Recovering zone is about 0.08 stream miles long.

Summers Creek and Meadow Fork have a total of 6.11 stream miles. Of these, 0.37 stream miles are pH-Impaired (6.2%) and 0.80 stream miles are pH-Recovering (13.3%). Approximately 4.84 stream miles are upstream of any known mining. This represents 80.5% of the Summers Creek and Meadow Fork drainage areas. There are 1.30 potential fishable miles on these two tributaries. Of these, 0.97 miles are accessible. Reeds Creek has 7.95 stream miles with 0.93 miles of pH-Impaired stream (11.7%) and 1.11 miles of pH-Recovering stream (14.0%). Approximately 3.97 stream miles are upstream of any known mining. This represents 49.9% of the total drainage area. There are 1.94 miles of pH-Acceptable stream miles (24.4%) but they are vulnerable to pH impairment during high flow times. The existing fishery for Reeds Creek is 1.43 miles. Page C-10 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 4 – Jones and Mud Creeks

The Kitty Kat site (JCLAMD1) is described as an AMD seep with a small (0.07 stream miles) pH-Impaired section. Access to 2.68 miles of fishery is blocked due to this impairment. The Jones Creek subwatershed contains the major tributaries of Mud Creek and Allen Hollow. The Allen Hollow site (JCUAMD1) has no data located directly at or below the site. There is one water quality sample site at the confluence with Jones Creek. At that point, the pH is Acceptable. Although there is no data for this site, it is a concern for DMME. Therefore, it is included as a potential site.

The Blackwood Land Seeps (MCAMD1) are located on the Right Fork of Mud Creek. There are two seeps with a pH less than 5.0. The pH-Impaired section extends for 0.15 miles downstream. There are 0.08 miles of pH-Recovering stream below the Impaired section.

Although critical erosion has been identified as the primary concern on Mud Creek Mine Pits #1 and #2, MCCE1 and MCCE2 respectively, the sites also have AMD. Approximately 0.13 miles of stream are pH-Impaired on pit #1 and 0.10 miles on pit #2. The streams exiting the sites join to have a shared pH-Recovering zone of 0.14 stream miles. Critical erosion from each site is estimated to cause 34.2 tons/year of sediment delivery to Mud Creek. The critical erosion-Impaired stream length for the sites is 1.44 miles. Approximately 0.77 miles of fishery are impacted.

There is a pH-Impaired section identified in the water quality data at the Robbins Chapel site (JCLAMD2) on an unnamed tributary to Jones Creek. The pH Impaired section is approximately 0.03 stream miles long. The stream is pH-Recovering above the site for 0.14 stream miles and below the pH-Impaired section for another 0.05 stream miles. The COE is planning the reclamation of this site. Flow from this site is estimated to be 60 gpm.

The Jones Creek/Mud Creek subwatershed has 19.04 stream miles. Of these, 0.41 (2.2%) stream miles are pH-Impaired and 0.48 (2.5%) are pH-Recovering. The existing fishery in this subwatershed is 1.64 miles. Critical erosion impairs 1.44 miles of the headwaters streams. Page C-13 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 5 – Cox Creek

Cox Creek is the second smallest of the eight subwatersheds with identified AMD and/or critical erosion problems. The Bailey site (CCAMD1) has a sealed mine portal and a highwall. Water seeping from these areas has a pH between 4.0 and 5.0. The pH-Impaired reach is about 0.05 stream miles long with 0.04 stream miles of pH-Recovering water downstream. Christine Coal (CCAMD2), also known as the Fanhouse (cover photo), has a flow rate of 15 gpm from the mine portal. The outflow from the site is pH-Recovering for about 0.05 stream miles.

The third site in this watershed is a critically eroding site known as Hilltop Raceway (CCCE1). This raceway has both sheet and gully erosion. Because the site is still in use for racing, it is not feasible to treat the erosion from overland flow. However, the gully erosion from the perimeter of the site delivers about 34 tons/yr to the stream and can be treated and maintained. The primary impairment from this site is Critical Erosion and the identified impairment length is 0.86 stream miles.

There are 5.77 stream miles in the Cox Creek subwatershed. Of these, 0.05 stream miles (0.9 %) are pH-Impaired, 0.09 stream miles (1.6%) are pH-Recovering, and 0.86 miles are impaired from Critical Erosion. The possible fishery is 2.79 miles but none are presently available due to the effects of critical erosion and pH-Impairment. Page C-16 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 6 – Jordan Branch

The Jordan Branch subwatershed has four AMD sites that have been identified by DMME as candidates for treatment. Of these, only two sites, Jordan Seeps (JBAMD1) and Jordan Branch AMD (JBAMD4) have sufficient data at the sites to draw conclusions about the water quality effects of the sites. Jordan Seeps have pH values greater than 7.0 which are pH-Acceptable. Jordan Branch AMD has 0.06 miles of pH-Recovering stream. Carroll Hollow (JBAMD2) and Whisman Hollow (JBAMD3) have no data points in the immediate vicinity of the sites. Data

points at the confluence of Carroll Hollow and Meadow Branch are showing some pH-Recovering segments above the main stem but it is likely that pH effects actually occur in the upstream reaches. For the purposes of this report, it is assumed that JBAMD2 has 0.25 miles of pH-Impaired stream and 0.30 miles of pH-Recovering stream. Similarly, JBAMD3 is assumed to have 0.17 miles of pH-Impaired stream and 0.43 miles of pH-Recovering stream. The impacted fishery is 0.13 miles.

Jordan Branch subwatershed has 9.79 stream miles. Of these, there are 0.42 miles (4.3%) of pH-Impaired stream and 0.79 miles (8.1%) of pH-Recovering section identified. There are 1.48 miles of potential fishery. Based upon the available data, all of these waters are accessible to fish. Page C-19 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 7 – Craborchard Creek and Wells Branch

The North Fork of the Powell River begins at the confluence of Craborchard Creek and Wells Branch. Wells Branch has one site (WBAMD1). The COE consultant has indicated that the pH data for the point source may have some invalid information in it. The stream water quality data indicate that there are pH-Recovering stream segments above and below the site for a distance of 1.75 stream miles and 1.11 stream miles, respectively. There are no potential fisheries because the entire stream is first order.

Craborchard Headwaters (COEAMD1) has three sites with AMD discharges. The pH range for these sites is 7.5 to 5.7, with the majority of the data greater than 6.0. There is significant beaver influence in this area which has a mitigating influence on the pH. There are 0.17 stream miles of pH-Impaired water and 0.41 stream miles of pH-Recovering water.

The Beaver Pond and Crest sites together make up the site identified as COEAMD2. There are beaver influences on the stream which reduce the effects of the low pH water before it extends to the main stem of Craborchard Creek. There is a pH-Impaired section of 0.23 stream miles and a pH-Recovering section of 0.37 stream miles associated with this site. Sites COEAMD1 and COEAMD2 also have 1.09 miles of shared pH-Recovering stream below the confluence of their respective tributaries.

The Wilson Bench site (COWAMD1) located on Moore Branch has a significant pH-Impairment for 0.53 stream miles. The pH-Recovering section downstream is 0.17 stream miles in length. Approximately 0.22 miles of fishable water is present but it is not available due to the impairments of COWAMD2. The estimated flow rate from this site is 45 gpm.

The Craborchard Seeps (COWAMD2) are located on the main stem of Craborchard Creek downstream of Moore Branch. This site has 0.12 stream miles of pH-Impaired water and 0.33 stream miles of pH-Recovering water. The railroad line parallels the stream at this site.

The Craborchard Creek/Wells Branch subwatershed has a total of 21.14 stream miles. Of these, 1.05 (5.0%) are pH-Impaired and 5.20 (24.6%) are pH-Recovering. There are 0.33 miles of existing fishery of the potential 3.51 miles in the watershed. Page C-22 in Appendix C shows the existing water quality impairments in this watershed.

Subwatershed No. 12 – Bobs Branch

The subwatershed named as Bobs Branch is actually a small drainage area (61 acres) used to identify the location of two sites, Route 606 tipple (NFPCE1) and J&H Coal Tipple (NFPCE2). See Page C-25 in Appendix C. These critically eroding sites are two acres each and drain directly into the North Fork Powell River. The sediment delivery from these sites is about 27.4 tons per year. Contaminant associated with tipple activities also drain from the site. There is no data on water quality on these two sites, but typical contaminants include heavy metals, chemicals used on site, and AMD.

MINED LAND

Approximately 14.6% of the watershed is associated in some way with coal mining. There are 5,712 acres of active mine sites that are regulated under the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and other laws. These laws address the responsibilities of the mining companies with regard to both the ongoing efforts to protect the environment from the effects of current mine activities and the reclamation actions required to successfully reclaim a mine. There are an additional 2,700 acres of abandoned mine land. The Strip Mines and Quarries Landuse (1,984 acres) and Barren Land (4,291 acres) are a subset of the total acres affected by mining since some of the active mines have not deforested all of their permitted acreage or have reclaimed some land and some of the abandoned mines have revegetated naturally. This land is therefore described in a different land use category.

There are five identified abandoned surface mine sites in the watershed that are contributing to water quality degradation. The typical sites are old contour mines with some ridge top removal. The main problem on these sites is landslides of the unvegetated soil. Due to their location, soil erosion can occur on both sides of the drainage divide. The sites range from about 0.25 to ten acres in size. There may also be pH problems at these sites.

Underground mines have also been abandoned. Fifty-two sites have been identified in the watershed. The abandoned deep mine sites can also contribute to the sediment loading of the streams. However, the majority of the problems associated with these sites have to do with the quality of the water that is coming out of the mine portal or nearby seep.

Abandoned Tipple Sites

Abandoned tipple sites were preparation and loading areas used by coal mining operations primarily to assemble recently mined coal in order to crush, screen and load it into railroad cars. Prior to SMCRA, tipple areas were unregulated without any provision for containment of surface drainage and hazardous pollutants, such as chemicals used and discarded on-site, and natural pollutants, e.g., heavy metals and sulfur associated with coal. The land at the tipple sites was badly damaged by the heavy equipment and use of the facilities and was denuded and barren with typically more than half of the land area disturbed. These characteristics cause tipple sites to be described as heavily impacted and denatured areas analogous to "brownfield" sites which are abandoned manufacturing facilities in urban settings. Like brownfields, tipple areas also often have contaminated soil on site.

Within the watershed, there are five abandoned tipple sites. These areas range in size from 0.5 to three acres and in total occupy approximately 9.5 acres. DMME is working with grant proposals to address the resource concerns of two of the abandoned tipple sites. The third site is located in the Reeds Creek subwatershed. This historic tipple site (RCUAMD4) also has water quality problems associated with the portal of the abandoned underground mine on site. NRCS will address the water quality issues but the protection and restoration of the tipple area will be addressed by local groups. The last two tipple sites are located in the Bobs Branch subwatershed. Critical erosion is the primary concern on these sites since they drain directly into the North Fork Powell River.

The Osborne Tipple site, located in the Straight Creek subwatershed, will be redeveloped into an outdoor classroom where students will learn about public health and environmental issues related to the former mining sites. Construction of the outdoor classroom will be funded in part through a grant from the National Fish and Wildlife Foundation.

Figure 4. Aerial view of a tipple site



Source: USEPA Mid-Atlantic Land Revitalization newsletter, Winter 2006 covering mine scarred lands and available at: <http://www.epa.gov/region3/revitalization/newsletter/winter05-06/appalachia.htm>

CRITICALLY ERODING LAND

There are 18 sites identified as critically eroding lands within the watershed that are contributing excessive sedimentation to the streams. These sites cover approximately 51.25 acres. The majority of these sites are old abandoned mine sites but some are not related to mining. For example, the St. Charles landslide is located north of St. Charles on a hill that drains directly into Straight Creek. In addition, Hilltop Raceway was an illegal mine site in the 1980s. Since that time, there was an effort to develop the site as a raceway. It is experiencing sheet erosion associated with the raceway and gully erosion from runoff down the hill. In total, these sites are

delivering an estimated 350 tons of sediment annually into the receiving streams. There are no local ordinances or other actions in place to reduce the critical erosion from these sites.

Streambank Erosion

Two streambank erosion sites have been identified for potential treatment within the project area. The Wagonertown site (LSCAMD1) has AMD drainage problems associated with the streambank erosion and will be evaluated by NRCS. The Jones Creek streambank erosion site will be addressed by community resources.

PRIME FARMLAND

There are no prime farmlands in this watershed.

WETLANDS

A single soil, Holly loam, 0 to 2 percent slopes, in the updated Lee County Soil Survey, is the only hydric soil series in the watershed. This soil exists in only two locations in the watershed, on the upper reaches of Stone Creek near the southwest boundary, and near the lower end of the North Fork of the Powell River. Holly loam inclusions, however, are found in ten additional map units scattered across the drainage following a pattern of location on the upper stream reaches and within previously mined areas. The inclusions on the upper stream reaches are usually due to beaver activity in certain drainages such as Craborchard Creek where localized inundation results, and to the narrow riparian fringe areas.

Regulatory concern for the effects of AMD treatment systems on wetlands and appropriate permitting has been expressed by the COE, the U.S. Fish & Wildlife Service, the Virginia Department of Environmental Quality, and the Virginia Department of Mines, Minerals and Energy. These concerns were expressed in site reviews of Craborchard Creek, Wilson Bench, and Ely and Puckett Creeks.

Wetland delineations were performed at four project sites on Ely and Puckett Creeks. These sites are the Everglades site on Bean Creek, a tributary to Ely Creek; at the Bog Site on Goose Creek, a tributary to Ely Creek; on the Lick Branch site on Lick Branch, a tributary to Puckett Creek; and at the Big Branch site on the Big Branch, a tributary to Puckett Creek.

Jurisdictional wetlands at the Everglades site were limited to the main creek channel, adjacent forested riparian floodplain, a created cattail collection pond, and a herbaceous open drainage seep. Jurisdictional wetlands at the Bog site were limited to the riparian fringe along the main channel of Goose Creek, and on an adjacent impounded cattail dominated bog. Jurisdictional wetlands at Lick Branch were limited to the Lick Branch channel and a manmade cattail pond. Jurisdictional wetlands at the Big Branch site were limited to the Big Branch channel and the two seeps associated with the site.

Acid mine drainage (AMD) has reduced the ecological value of most of these wetlands for use by fish and aquatic organisms, as well as terrestrial wildlife.

NATURAL AND SCENIC AREAS AND VISUAL RESOURCES

The watershed is a relatively scenic subdivision of the Valley and Ridge Province of southwest Virginia. Its valley and drainage area reside in the foothills of the ridge between Lee County, Virginia and Harlan County, Kentucky to the north, and Stone Mountain to the south. Stone Mountain and the State Line Ridge are continuous with the scenic Cumberland Mountain Ridge that forms the Virginia – Kentucky state line to its terminus at Cumberland Gap. These ridges provide a scenic mountain vista when viewed from Alternate State Route 58 in the vicinity of the watershed and further northeasterly on that route, as well as southwesterly on State Route 58. In addition to these scenic vistas, the northeast one-quarter of the drainage lies within the Jefferson National Forest which provides a variety of recreational uses and scenic views.

The Virginia Department of Conservation and Recreation (DCR), Natural Heritage Division, lists three conservation sites in the drainage as General Location Natural Heritage Resource Sites. They include a site on lower Straight Creek, near the confluence with the North Fork of the Powell River, for Federally Listed Species Present; one on Reeds Creek for Natural Heritage Resources Present, and a site at the headwaters of the North Fork of the Powell River for State Listed Species Present. Cox Creek is listed as a Stream Conservation Unit for State Listed Species.

Regionally, the Daniel Boone National Historic Trail/Wilderness Road traverses the area along Route 58, running parallel to the Cumberland Gap National Historic Park, passing by the Wilderness Road State Park, and ending at Cumberland Gap, all within 50 miles of the watershed.

AIR QUALITY

The Virginia Department of Environmental Quality, Division of Air Quality, does not maintain any air quality monitoring stations in Lee County. The Virginia Department of Mines, Minerals and Energy does require mining companies to control fugitive dust emissions in permits issued for active mines.

WILDLIFE RESOURCES

The watershed is considered to be a part of the Northern Cumberland Mountains Ecoregion according to Virginia's Comprehensive Wildlife Conservation Strategy, 2005 (VDGIF). This ecoregion is geomorphologically and topographically diverse, resulting in considerable variation in precipitation and other climatic factors, which in turn have resulted in a wide variety of natural communities. The potential natural vegetation of the limestone or dolomitic valley slopes in this area is considered to be an Oak-Hickory Association/Western Mesophytic Forest. The forests of the sandstone ridges of the Ridge and Valley, and Cumberland Mountains are oak forests with heath-dominated shrub layers with relatively low species richness. Drier slopes on lower elevation limestone or dolomite hills and valley side slopes have forest communities consisting of Chinkapin Oak (*Quercus muhlenbergii*) and other oaks, sugar and black maples

(*Acer nigrum*), hickories (*Carya* spp.), Eastern Redbud (*Cercis canadensis* var. *canadensis*), and a patchy, diverse assemblage of calcium-loving herbs.

Dry, south- or west-facing shale slopes in the lower precipitation Ridge and Valley region support several types of xerophytic vegetation. Eastern Red Cedar (*Juniperus virginiana* var. *virginiana*) dominates on calcareous barrens with an understory of prairie grasses. Perhaps the more widespread vegetation type is that of the pyrophytic woodlands of Pitch Pine (*Pinus rigida*), Table Mountain Pine (*Pinus pungens*), Chestnut Oak, Bear Oak (*Quercus ilicifolia*), and various ericaceous shrubs. These fire-adapted woodlands are characteristic of xeric, exposed topography on most sedimentary ridges.

In Virginia's Comprehensive Wildlife Conservation Strategy, 2005, the Virginia Department of Game and Inland Fisheries classified 1,433 vertebrate and invertebrate animal species in Virginia into four tiers of Species of Greatest Conservation Need (SGCN). Tier I species are those with a critical conservation need having an extremely high risk of extinction, Tier II species are those with a very high conservation need and a high risk of extinction; Tier III species have a high conservation need and face possible extinction; Tier IV species have a moderate conservation need and have demonstrated a declining trend in population.

This plan identifies 101 Species of Greatest Conservation Need (SGCN) in the Northern Cumberland Mountains Ecoregion. They are distributed among the four tiers as follows: seven species are listed in Tier I; 17 species are listed in Tier II; 12 species are listed in Tier III, and 65 species are listed in Tier IV.

Of the seven Tier I species, four are bird species, one is a mammal, one is a terrestrial invertebrate, and one is an isopod. Two of the Tier I species are listed threatened and endangered species, the Indiana Myotis (bat), *Myotis sodalis*, and the Loggerhead Shrike, *Lanius ludovicianus*.

The watershed has 17 Tier II species: two fishes, two amphibians, two birds, two terrestrial insects, five terrestrial invertebrates, one Mollusk, two Crustaceans, and one aquatic insect.

Of the 12 Tier III species, there are two fishes, one reptile, one bird, one mammal, one terrestrial insect, two terrestrial invertebrates, one Mollusk, one Crustacean, and two aquatic insects.

There are 65 Tier IV species: 17 fishes, two amphibians, four reptiles, 34 birds, one mammal, one terrestrial insect, two terrestrial invertebrates, three Crustaceans, and one aquatic insect.

FISHERIES AND AQUATIC RESOURCES

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a put-and-take trout fishery on a 3.5 mile length of the North Fork of the Powell River above the community of Pocket. The Tennessee Valley Authority (TVA) has compiled historic (1968) and more recent (1994-2003) fish sample data from the North Fork of the Powell River. Forty (40) fish species were found in the 1994-2003 samples as compared with seventeen (17) species in the 1968 samples, probably an indication of the successful implementation of SMCRA (See Table D).

About 12.5% of the recent samples are game fish species such as Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Rock Bass (*Ambloplites repestris*), Bluegill Sunfish (*Lepomis macrochirus*), and Longear Sunfish (*Lepomis megalotis*); records also indicate the presence of Brown Trout (*Salmo trutta*) and Rainbow Trout (*Salmo gairdneri*). The presence of these two species is the result of a put-and-take trout fishery according to the Virginia Department of Game and Inland Fisheries (VDGIF). VDGIF personnel also indicate that the Powell River drainage was not historic habitat for native Brook Trout (*Salvelinus fontinalis*). Saugers (*Stizostedion canadense*), a relative of the Walleye (*Stizostedion vitreum*), have also been found in recent samples. Twenty percent (20%) of the sampled species were rough fish, i.e. suckers, redhorses and catfish. Sixty seven and one-half percent (67.5%) of the sampled species were forage fish, i.e. minnows, shiners and darters. There are two fish species, the Banded Darter (*Etheostoma zonale*) and the Sauger (*Stizostedion canadense*) in the watershed which are listed under Tier IV species.

Benthic Macroinvertebrates

Benthic data for this watershed have been gathered and analyzed by the environmental consulting firm, David Miller and Associates, Inc. (DMA, Inc.) for several years. As part of a cooperative agreement with the COE, NRCS assisted DMA, Inc. with collection of 2006 sample data at 14 sites and DMA, Inc. provided additional data from previous years. The manual “A Stream Condition Index (SCI) for Virginia Non-coastal Streams” (Virginia Department of Environmental Quality, and USEPA, Sept., 2003), was used to calculate an SCI score for each site using the macroinvertebrate data gathered. The SCI is a dimensionless number from 1 – 100 that can be compared relative to other site SCIs in relation to their proximity to AMD seeps, with 100 being the best possible score, and best possible stream condition.

The benthic sample sites were grouped into drainage clusters and compared relative to each other as shown in Table E. Benthic sampling stations are shown in Appendix C on Pages C-1, C-4, C-13, C-16 and C-22. The Ely Creek drainage has four benthic sample sites, SW-3, SW-6, SW-11 and SW-15, with SCI scores of 28.7, 12.88, 10.68 and 55.8, respectively. Site SW-15 is highest up on the drainage, is considered a background site with no discernable upslope AMD effects, and has the highest SCI score. There is no instream pH impairment at this site. Site SW-11, above Pine Grove Church, is affected by five untreated seeps, and is therefore pH-Impaired. This site scored an SCI of 10.68, the lowest in the range of four scores.

Site SW-6 on Bean Creek is downstream of a cluster of COE treated seeps, but scored a relatively low 12.88. The SCI score for this site appears to be incongruous with the water chemistry data which place it in the category of pH-Recovering. It should be noted here that some benthic samples were relatively devoid of organisms due to the freezing weather conditions during which the sampling was conducted. Only four organisms were recovered at SW-6, none of which were in the Ephemeroptera-Plecoptera-Trichoptera (EPT) group of organisms that decrease with stress. Site SW-3 is on the mainstem of Ely Creek below the confluence of treated and untreated sites. The SCI score for this site is 28.70 and the stream is listed as pH-Recovering. Site PS08-DS, a tributary to Ely Creek, was sampled but only one alderfly larva was recovered.

Puckett Creek drainage includes four benthic sites, PC-5D, PC-6, PC-4 and PC-1. Site PC-5D is a background site with no known upslope AMD discharges. This site scored 52.75 and has no

instream pH impairment. Site PC-6 is located at the mouth of the Big Branch of Puckett Creek below the Davis Wetland seep site. This site was listed as pH-Impaired for 2003 data, but has recovered to pH acceptable during 2005 – 2006. The site SCI score is 100, which may be due to the sample organisms being skewed towards Plecoptera or Stoneflies, which are known to decrease with stress. The PC-4 sample site is located at the confluence of Lick Branch with Puckett Creek and is downstream of the Triple R critical erosion and seep sites. This site scored 64.57 and is listed as pH-Recovering. Site PC-1 is at the mouth of Puckett Creek, has an SCI score of 60, and is listed as pH-Acceptable.

The Wagonertown benthic sample site is located upstream of the Wagonertown seeps on an unnamed tributary to Straight Creek. Although it has an SCI score of 84.73, it is listed as pH Impaired.

Site MC-1 is located at the mouth of Mud Creek, below Robbins Chapel School, and is tributary to Jones Creek. Although there are strip mines at the headwaters of this drainage, and the Blackwood Seeps are close to the Right fork of Mud Creek, the site scored 67.47, and is listed as pH Acceptable.

Site CC-3 is located between Christine Coal (Fanhouse) and the Bailey AMD sites on Cox Creek. Despite this, it has an SCI score of 73.14 and is listed as pH-Acceptable. Site CC-2 is located on the mainstem of Cox Creek below the Bailey AMD site, has a Stream Conditions Index (SCI) score of 56.66 and is listed as pH-Acceptable.

Site CO-2 is located on Craborchard Creek at the Norfolk Southern Railroad tracks below the junction of roads 623 and 624. There is one seep on Craborchard Creek just above this sample site, and a cluster of Wilson seeps at the head of the drainage. The site SCI score is 30.68 and the stream is listed as pH-Recovering.

**Table D - Fish Species Composition in the North Fork Powell River
1968 and 1994-2003 Sampling by the Tennessee Valley Authority**

	<u>Presence In:</u>	
	<u>1968</u>	<u>1994-2003</u>
<u>Game Fish:</u>		
Rock Bass (<i>Ambloplites rupestris</i>)	x	x
Bluegill Sunfish (<i>Lepomis macrochirus</i>)	x	x
Longear Sunfish (<i>Lepomis megalotis</i>)	x	x
Smallmouth Bass (<i>Micropterus dolomieu</i>)		x
Largemouth Bass (<i>Micropterus salmoides</i>)		x
Spotted Bass (<i>Micropterus punctulatus</i>)		x
Sauger (<i>Stizostedion canadense</i>)		x
Rainbow Trout (<i>Salmo gairdneri</i>)		x
Green Sunfish (<i>Lepomis cyanellus</i>)		x
Warmouth (<i>Lepomis gulosus</i>)		x
<u>Rough Fish:</u>		
Northern Hog Sucker (<i>Hypentelium nigricans</i>)	x	x
Black Redhorse (<i>Moxostoma duquesnei</i>)		x
Golden Redhorse (<i>Moxostoma erythrurum</i>)	x	x
Yellow Bullhead Catfish (<i>Ameiurus natalis</i>)		x
Silver Redhorse (<i>Moxostoma anisurum</i>)		x
White Sucker (<i>Catostomus commersoni</i>)		x
<u>Forage Fish:</u>		
Roseyface Shiner (<i>Notropis rubellus</i>)		x
Striped Shiner (<i>Luxilus chrysocephalus</i>)	x	x
Bigeye Chub (<i>Notropis amblops</i>)		x
Bluntnose Minnow (<i>Pimephales notatus</i>)		x
Warpaint Shiner (<i>Luxilus coccogenis</i>)	x	x
Mimic Shiner (<i>Notropis volucellus</i>)		x
Whitetail Shiner (<i>Cyprinella galactura</i>)	x	x
Tennessee Shiner (<i>Notropis leuciodus</i>)	x	x
Telescope Shiner (<i>Notropis telescopus</i>)	x	x
Creek Chub (<i>Semotilus atromaculatus</i>)	x	
Spotfin Shiner (<i>Cyprinella spiloptera</i>)		x
Largescale Stoneroller (<i>Campostoma oligolepis</i>)	x	x
Popeye Shiner (<i>Notropis ariommus</i>)		x
Sawfin Shiner (<i>Notropis sp.</i>)		x
Tennessee Snubnose Darter (<i>Etheostoma simoterum</i>)		x
River Chub (<i>Nocomis micropogon</i>)	x	x
Banded Sculpin (<i>Cottus carolinae</i>)		x
Stargazing Minnow (<i>Phenacobius uranops</i>)		x
Blacknose Dace (<i>Rhinichthys atratulus</i>)	x	x
Silver Shiner (<i>Notropis photogenis</i>)		x
Greenside Darter (<i>Etheostoma blennioides</i>)		x
Blueside Darter (<i>Etheostoma jessiae</i>)	x	x
Redline Darter (<i>Etheostoma rufilineatum</i>)	x	x
Gilt Darter (<i>Percina evides</i>)		x
Banded Darter (<i>Etheostoma zonale</i>)		x

Table E - Stream Condition Index (SCI) from Benthic Macroinvertebrate Sampling

<u>Sample Site#</u>	<u>Location</u>	<u>SCI</u> <u>Oct., 2005</u>	<u>Scores</u> <u>Oct., 2006</u>	<u>Stream Segment Impairment</u>
SW-3	Mainstem Ely Creek below Pine Grove Church	18.26	28.7	pH Recovering, TDS Impaired
SW-6	Bean Creek, tributary to Ely Creek, below 6 seeps	26.28	12.88	pH Recovering, TDS Impaired
SW-11	Mainstem Ely Creek above Pine Grove Church below several seeps		10.68	pH & TDS Impaired
SW-15	Upper Ely Creek, background sample	51.04	55.8	No impairment
PS08-DS	Tributary to Ely Creek		NA	Only 1 alderfly larva collected
PC-5D	Big Branch Puckett Creek, background site		52.75	No impairment pH Impaired (2003); pH Acceptable (2005, 2006)
PC-6	Big Branch Puckett Creek, below Davis Wetland		100	
PC-4	Downstream of Lick Branch, Puckett Creek	47.28	64.57	pH Acceptable, TDS Impaired
PC-1	Mouth of Puckett Creek	24.09	60	pH Acceptable, TDS Impaired
Wagonertown	Upstream of Wagonertown Seeps; an unnamed trib		84.73	pH Impaired
MC-1	Mouth of Mud Creek, trib to Jones Creek, below Robbins Chapel School		67.47	pH Acceptable
CC-3	Between Christine Coal and Bailey AMD sites on Cox Creek		73.14	pH Acceptable, TDS Impaired
CC-2	Main stem of Cox Creek below Bailey AMD sites		56.66	pH Acceptable, TDS Impaired
CO-2	Craborchard Creek at RR tracks below junction of roads 623 & 624		30.68	pH Acceptable, TDS Impaired

DMA, Inc. previously sampled a total of twenty-three (23) sites (including one DEQ site) during October, 2005. Only five of those sites, SW-3, SW-6, SW-15, PC-1 and PC-4 were also sampled in October, 2006. The best agreement between the two years was found at SW-15, a background site where the scores only differed by 4.76 points. Sites SW-3 and SW-6 2006 scores appear to be roughly the inverse of the 2005 scores when comparing the two sites. The scores vary by 1.5 – 2.0 times the corresponding year, and are reasonably comparable. The scores for PC-4 at 47.28 and 64.57 are within reasonable agreement, differing by 17.29 points. The greatest divergence in scores is seen at PC-1 with a range of 35.91 points between the two years. The 2006 data showed a highly diverse taxa, a strong Ephemeroptera (EPT) score of 54.54, and a high percentage of Mayflies at 79.79%. Raw data and calculations for the 2005 data were not available for comparison and analysis with 2006 data. However, four of the five sites had improved 2006 scores over the 2005 scores.

THREATENED AND ENDANGERED SPECIES

The North Fork Powell River is a part of the Tennessee River Basin. The Tennessee Basin has historically been home to approximately one third, or 102, of the species of freshwater mussels in the United States. The Virginia portion of this river basin includes the Powell, Clinch and the North, Middle and South Forks of the Holston Rivers. These Virginia rivers are home to 45 freshwater mussel species, several of which occur only in the upper Tennessee River drainage.

The Virginia Fish & Wildlife Information Service lists nine mussel species as Federal Endangered, State Endangered (FESE), one mussel species as Federal Species of Concern, State Endangered Species (FSSE), two species as State Endangered (SE), two species as Federal Candidate Species and State Threatened (FCST), one species as Federal Candidate Species (FC), and one species as Federal and State Species of Concern (FSSS) in the North Fork of the Powell River drainage. In total, the North Fork of the Powell River drainage is “likely to contain” 15 listed Federal and State Threatened and Endangered freshwater mussel species, one Federal Candidate Species, and one Federal and State Species of Concern. These species are listed in Table F.

Additionally, one forage fish, the Slender Chub, Erimystax cahni, and one rough fish, the Yellowfin Madtom, Noturus flavipinnis, are listed as Federal and State Threatened Species (FTST). The Paddlefish, Polyodon spathula, is listed as a Federal Species of Concern and State Threatened Species (FSST). The Emerald Shiner, Notropis atherinoides, and the Western Sand Darter, Ammocrypta clara, are listed as State Threatened Species (ST). The Popeye Shiner, Notropis ariommus, is listed as a Federal and State Species of Concern (FSSS). The Wounded Darter, Etheostoma vulneratum, is listed as a Federal Species of Concern (FS). The Mirror Shiner, Notropis spectrunculus, and the River Redhorse, Moxostoma carinatum, are listed as State Species of Concern (SS). The Tennessee Dace, Phoxinus tennesseensis, is a Federal Species of Concern, State Endangered (FSSE) species. One game fish species, the Sauger, Stizostedion canadense, a relative of the Walleye, is listed as a State Species of Concern (SS).

The Spiny Riversnail, Io fluviialis, is a Federal Species of Concern, State Threatened (FSST) species and the Brown Supercoil, Pravittrea septadens, is a State Threatened (ST) species. The Peregrine Falcon, Falco peregrinus, a State Threatened (ST) species; the Loggerhead Shrike, Lanius ludovicianus, a State Threatened (ST) species; the Migrant Loggerhead Shrike, Lanius ludovicianus migrans, a Federal Species of Concern, State Threatened (FSST); and the Bewick’s Wren,

INVENTORY AND FORECASTING – CULTURAL RESOURCES

Thryomanes bewickii, a Federal Species of Concern, State Endangered (FSSE) species, may also be present in the watershed. The Gray Bat, Myotis grisescens, a Federal Endangered, State Endangered (FESE) species, and the Indiana Bat, Myotis sodalist, a Federal Endangered, State Endangered (FESE) species, may also be present in the watershed.

There are no confirmed occurrences of the listed mussel species, but they are considered “likely to occur” within a two mile radius of the confluence of Straight Creek with the North Fork of the Powell River. Only two of the listed fish species, the Popeye Shiner and the Mirror Shiner, have confirmed occurrences within a two mile radius of the confluence of Straight Creek with the North Fork of the Powell River.

Table F -Threatened & Endangered Freshwater Mussel Species Likely to Occur at the Confluence of Straight Creek with the North Fork of the Powell River

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>
Birdwing Pearlymussel	Lemiox rimosus	FESE
Dromedary Pearlymussel	Dromas dromas	FESE
Cumberlandian Combshell	Epioblasma brevidens	FESE
Fine-rayed Pigtoe	Fusconia cuneolus	FESE
Shiny Pigtoe	Fusconia edgariana	FESE
Crackling Pearlymussel	Hemistena lata	FESE
Rough Rabbitsfoot	Quadrula cylindrica strigillata	FESE
Cumberland Monkeyface	Quadrula intermedia	FESE
Appalachian Monkeyface	Quadrula sparsa	FESE
Elephantear	Elliptio crassidens	SE
Snuffbox	Epioblasma triquetra	FSSE
Deertoe	Truncilla truncate	SE
Slabside Pearlymussel	Lexingtonia dolabelloides	FCST
Black Sandshell	Ligumia recta	ST
Sheepnose Mussel	Plethobasus cyphyus	FCST
Fluted Kidneyshell	Ptychobranthus subtentum	FC
Tennessee Pigtoe	Fusconaia barnesiana	FSSS

* FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; FS = Federal Species of Concern (no legal status); SE = State Endangered; ST = State Threatened; SS = State Special Concern (no legal status).

A representative of the U.S. Fish and Wildlife Service attended the Scoping Meeting and was supportive of the proposed project. However, no written comments were received.

CULTURAL RESOURCES

The methodology used for inventorying cultural resources in the watershed included visits to each of the 39 AMD and/or CE sites by the Cultural Resources Specialist, conducting pedestrian surveys of each site, with shovel test pits used where appropriate. No new cultural resources were noted at any of these sites.

A search of the VDHR Data Sharing System (DSS) was conducted for listed cultural resources in the watershed. Overall, forty listed cultural resources were located. The majority of these sites and

properties are located directly south of Pennington Gap, just north of the confluence of the North Fork of the Powell River with the Powell River. A much smaller group of one archaeological site and two historical properties occur just west of Keokee in the northeast end of the watershed. None of the listed sites are in close proximity to the identified AMD and critically eroding sites.

Of the forty listed resources, nine are archaeological sites. Of the nine archaeological sites, five are Native American, ranging in period from Archaic to Woodland. The other four archaeological sites include one natural phenomenon, a rock face; two historic period sites, one with artifacts and a second with dwellings, and one cemetery. Of the remaining thirty-one listed historical properties, seventeen have been recommended Not Eligible for listing, and fourteen have not been evaluated.

Three abandoned coal tipples are located on sites RCUAMD4 (Tex Rivers Tipple), NFPCE1 (Rt. 606 Tipple) and NFPCE2 (J&H Coal Tipple). These sites contain critically eroding areas that contribute sediment to receiving streams. According to local authorities, the Tex Rivers Tipple is historically significant and may be included as part of a future Coal Mining Heritage Trail proposal. Because of this significance, the Virginia Department of Historic Resources is recommending reconnaissance-level documentation and Data Sharing System (DSS) data entry for the Tex Rivers Tipple.

Virginia has one World Heritage site. There are ten sites in Virginia listed in the National Registry of Natural Landmarks. None occur in Lee County. There are no sites in Lee County listed on the National Registry of Historic Landmarks. The National Register of Historic Places lists five sites in Lee County. No listed sites occur in or near the project areas.

Although Virginia has no Federally recognized tribes, several Federally recognized tribes including the Eastern Band of Cherokees in North Carolina, the Catawba Indian Nation in South Carolina, and the Tuscarora Indian Nation in New York all claim ancestral lands in Virginia. Consequently, NRCS consults with these tribes on projects affecting lands where traditional cultural places, artifacts and native graves may be encountered. The project area lies within the ancestral lands of the Eastern Band of Cherokees. However, this tribe was not consulted on this project because the Phase I cultural resources survey did not locate historic or prehistoric artifacts nor are any traditional cultural sites known to exist near the evaluated AMD and critically eroding sites. The Virginia Council on Indians, a State agency, is also consulted on projects that may affect any of the eight State recognized tribes.

TRANSPORTATION

Acid mine drainage affects more than the stream water quality. In areas of low pH water, the Virginia Department of Highways has to use epoxy-coated concrete, high-density polyethylene, or polymer-coated steel pipes rather than the less expensive corrugated metal pipes for road crossings in order to achieve the required 50 years of useful life. Costs are estimated to be 15-20% higher for these materials. The installation cost for these culverts is also higher due to the heavier material weights and the need to protect the coating from damage. According to Virginia Department of Highways staff, the existing pipes in the watershed could gain an additional ten years of useful life if the pH in the watershed is raised. New culverts installed after improvements to the pH could be installed with the corrugated metal pipes used elsewhere.

SOCIO-ECONOMIC AND RELATED CONSIDERATIONS

Introduction

The North Fork of the Powell River drains areas wholly contained within Lee County in southwestern Virginia. A majority of the population within the watershed resides within the towns of Pennington Gap, Keokee and St. Charles. Lee County was established in 1792. Historically coal, timber and tobacco were very important to the local economy. Coal mining is still important, but not as it was in the past because technological advances have decreased the need for laborers. Timber production has decreased from historic levels and tobacco farming is in a severe decline.

Population and Race

According to the 2000 Census, Lee County had a total population of 23,589. The Census of 1990 calculated the resident population at 24,496 which equates to a loss of 907 or 3.7%. The Virginia Employment Commission projects that the population will continue to decline; to less than 22,500 by 2010 and to 22,001 by 2020. The decline in population is generally attributed to limited local education and economic opportunities.

Of the total population counted in 2000 (23,589), 98.4% (23,221) are white, 0.4% (103) are Black or African American, 0.2% (53) are native Americans, and 0.2% are Asian (42). Together these four groups make up 99.2% of the county's entire population. Hispanics of any race are the largest minority group with 0.5%, or 120. "Other races" constitute only 0.1% of the Lee County population with 19.

Of the various towns within the watershed, Pennington Gap is the most prominent with Keokee and St. Charles being much smaller. Pennington Gap had a total population in 2000 of 1,781 with whites comprising almost 95.3%. Blacks made up 3.4% (61) of the population. Hispanics of any racial background made up 0.7% of total population (12 individuals). Native Americans also had a very small presence within Pennington Gap at only 0.4% of the population (7 persons).

Keokee had a total population in 2000 of 316 with whites comprising 97.8% (309 individuals). No blacks lived there and only 3 Hispanics of any racial background were present (0.9% of total population). No Native Americans were present either. St. Charles had only 159 residents in 2000.

As a whole, the county and the towns contained therein are considerably less diverse racially than the state of Virginia and the entire USA. Within Virginia, 72.3% of the population is white, 19.6% is black, 4.7% is Hispanic and 3.7% is Asian. In the entire country, 75.1% of the population is white, 12.5% is Hispanic, 12.3% is black, and 3.6% is Asian.

Age

The 2000 Census of the U.S. population indicates that the median age (middle point with ½ above and ½ below) of the population of Lee County was 39.7 (42.5 for Pennington Gap and 39.6 for Keokee). The median age for the state of Virginia was somewhat lower at 35.7 years while it was 35.3 for the entire nation. Residents in Lee County that were 65 years old or older totaled 15.5% of the population (3,641). These compare to 11.2% for the State and 12.4% of the nation are over 65. In 2002, 77.2% of Lee County were over the age of 18. The same statistic for the state as a whole

in 2000 was 75.4%. The state numbers are close to the national average reported for 2000 at 74.3%.¹

Education

Nearly thirty-two percent (31.8%) of the resident population 25 years of age or older in Lee County had a high school education or equivalent while the state-wide and national percentages for this statistic in 2000 were 26% and 29.6% respectively. In Lee County, 5.5% of the population 25 years of age or older had a Bachelor's degree. The same statistic for the state and nation in 2000 were 17.9% and 16% respectively. Four percent of this population in Lee County had a graduate or professional degree. Thus 9.5% of Lee County residents have a Bachelor's degree or higher as compared to 29.5% for the state and 24.4% for the nation as a whole. An additional 15.3% in Lee County have completed at least some college level work with 4% in Lee County having obtained an associate degree. All of these numbers, except for the percent having achieved a high school degree, are very low compared to the state-wide and national averages.

From the 2000 Census, 39.4% of the adult population over the age of 25 in Lee County did not have a high school education or an equivalency diploma. Nearly twenty-two percent (21.8%) had less than 9 years of education. The high school education figure contrasts very sharply with the state level figure of 18.5% and the almost equal national average of 18.45% for adults over 25. The state percentage having less than a 9th grade education was 7.2% while the national figure in 2000 was 7%. Thus, the Lee County data for adults with less than a high school education is more than double the state and national averages. The Lee County percent of adults 25 or older with less than 9 years of education is more than three times the state and national averages.

Employment/Unemployment, Class of Worker and Commuter Status

According to the 2000 Census, the number of Lee County residents considered to be in the civilian labor force pool (defined as 16 years of age or older), or the population that potentially could be employed was estimated to be 9,068 of 18,905 for a total of 48%. Of this total pool of potential laborers, 8,337 were employed in 2000 or 44.1%, while 771 (3.8%) were unemployed. These figures are lower than the unemployment rate in 2000 for the state of Virginia as a whole which was 4.2% and 5.3% for the nation. The low unemployment statistics for these two counties can be misleading though because one must keep in mind that 52% of the population 16 years of age or older in the county are considered to not be in the labor force. This compares to 33.2% for the state and 33.8% for the nation who are not in the labor force, i.e., not working and not seeking employment.

¹ An aging population relative to the state and national averages is a good indicator that the local economy is depressed and young people are exiting the area in pursuit of better economic opportunities.

Although it may be inferred that Lee County apparently suffers from somewhat depressed economy, it has a relatively diverse economy. According to the 2000 Census, employment in Lee County is fairly evenly spread between five of the six main sub-sectors of our economy the Census uses to track employment. Indeed, almost 99% of the workforce in Lee County is employed in five of the six sub-sectors, all with 15%-20% of the jobs, excepting the area of management and related professional occupations that employed a little over ¼ of all local jobs.¹ Table G provides the statistics for the local economy as compared to the state and nation.

The same workforce statistics for the towns of Pennington Gap and Keokee are roughly comparable to the data for the county. The employment statistics for Pennington Gap are very comparable to the county level data. The main differences are found in the lower employment numbers in the construction, extraction and maintenance sub-sectors of Keokee. Being a small town with a relatively more concentrated population, Keokee understandably employs more people in the management and related professional occupations as well as the sales and office occupations area. Also according to the 2000 Census, private employment constitutes 71.8% of all employment in Lee County. Government workers constitute 19.1% of the workforce in Lee County. A few more workers are employed in the private sector and less in the public arena in Keokee.

Table G - Workforce Employed by Major Occupational Areas

Occupational Area	Lee County	Virginia	USA
Management and related professional occupations:	26.3%	38.2%	33.3%
Sales and office occupations:	20.1%	25.5%	26.6%
Production, transportation and related:	19.4%	12.5%	14.7%
Construction, Extraction and Maintenance:	16.9%	9.6%	9.5%
Service Sector:	16%	13.7%	15.1%
Farming, Fishing and Forestry:	1.2%	0.5%	0.8%
Totals:	99.9%	100%	100%

¹ Perhaps most notable from this data, is the relatively low level of employment in agriculture and forestry given the rural nature of this part of Virginia. However, the mountainous terrain and relatively limited amount of arable land for agriculture, plus the significant distances from major economic centers and marketing channels explains why agriculture is not a major local economic activity. Why forestry isn't more important probably is in part due to these same factors as well higher logging and transportation costs than the Piedmont and Coastal Plains.

Income

The 2000 Census indicates that there were 9,744 households in Lee County in 1999. The town of Pennington Gap had 854 households in 1999 and Keokee had 124. Median annual household income for Lee County in the same year was \$22,972. Compared to the \$46,677 for the state of Virginia, it is obvious that Lee County is one of the in Virginia. The national figure for median household income per year for 1999 was \$41,994. The median household income in 1999 for Lee County was 49% of the state median. Compared to the national average, Lee County's was 54.7% of the national average. As a comparison with one of the wealthiest areas of the state, Fairfax County's household income in 1999 was 174% of the state median and 193% of the national median household income. Lee County's average is only 28.3% of the average household income for Fairfax County. Income and living conditions from the northeast section of the state to the southwest corner are obviously vastly different.

The median income for a family in Lee County in 1999 was \$28,525. Median family income for Virginia as a whole was \$54,169 in 1999. This means that the Lee County figure is only 52.7% of the state average and 57% of the \$50,046 reported for the entire United States.

The per capita income for Lee County in 1999 was \$13,625. Virginia reported per capita income of \$23,975 in 1999, while the same figure for the entire United States was \$21,587. That makes the Lee County figure 57% of the State average and 63% of the national figure.

From a gender-specific perspective, males earn far more than females in the workplace at all levels. Full-time, year-round male workers in Lee County in 1999 had a median income of \$27,579 versus \$19,370 for the full-time, year-round working females. Full-time, year-round male workers for the state as a whole had a median income in 1999 of \$37,764, while the same category of females in Virginia earned \$28,035/year. The Virginia figures are very close to the national statistics of \$37,057 and \$27,194 for male and female full-time, year-round workers respectively.

Poverty

About 23.9% of the population of Lee County (5,588 individuals) and 20.2% of families (1,398) were below the poverty line in 1999 (\$17,030 for a family of 4 according to the U.S. Census Bureau)¹. 30.1% of those under the age of 18 (1,563 individuals) and 23.3% of those 65 and older (838) were living below the poverty line in Lee County. State-wide, 9.6% of the population lived below the poverty level in 1999. Seven percent of Virginia's families had incomes below the poverty level in 1999. At the national level, 11.8% of the population and 9.3% of our families lived below the poverty level in 1999. Thus, the general population poverty rate for Lee County is 2.5 times the state rate and 2 times the national rate for the general population.

A more complete picture of the Lee County workforce, employment, income and poverty conditions emerges looking at the 2000 Census statistics for households with: 1) Social Security Income; 2) Supplemental Security Income; and 3) Public Assistance Income. Social Security Income includes retirement income for individuals, as well as income for persons with disabilities regardless of their age. Social Security Income is funded through Social Security taxes. "Supplemental Security Income (SSI) is a federal income supplement program funded by general tax revenues (not Social

¹ The poverty line is the level of income below which one cannot afford to purchase all the resources one requires to live. People who have an income below the poverty line, by definition, have no discretionary, i.e., disposable income.

Security taxes): It is designed to help aged, blind, and disabled people, who have little or no income; and it provides cash to meet basic needs for food, clothing, and shelter.”¹ Public assistance income includes general assistance and Temporary Assistance to Needy Families (TANF) which is funded through the U.S. Department of Health and Human Services.² Public assistance was formerly known as welfare, but was officially termed Aid to Families with Dependent Children (AFDC). Temporary Assistance to Needy Families is targeted to adults with dependents. The following table displays the 2000 Census data for all three income categories for Lee County, Virginia and the entire USA:

Program	% of Lee County Households receiving public income assistance	% of Virginia Households receiving public income assistance	% of Households in the USA receiving public income assistance	Lee County Beneficiaries compared to Virginia Beneficiaries (rate/rate)	Lee County Beneficiaries compared to USA Beneficiaries (rate/rate)
Social Security Income	42.2%	23.4%	25.7%	180%	164%
Supplemental Security Income	12.6%	3.5%	4.4%	360%	286%
Public Assistance Income (TANF)	8.7%	2.5%	3.4%	348%	256%

Housing

There are 11,086 housing units within Lee County. Of these, 67.3% of the housing units were built before 1980. Thus, two-thirds of the Lee County housing is over 25 years old. This compares to 60.3% of the homes in the state as a whole and 67.7% of the total number of housing units in the nation having been built 25 years or more ago. Of the total inventory of housing units in Lee County, 2,615 or 23.6% were mobile homes. This figure, as a percentage, is 369% of the state-wide average for trailers. At the state level, mobile homes constitute only 6.4% of all housing units. At the national level in 2000, trailers made up 7.5% of all housing. Thus, the Lee County percentage is 315% of the national figure. The percent of mobile homes used as a primary residence is a good indicator of incomes and the general standard of living in any area. With almost a quarter of all housing being mobile homes, Lee County obviously has a depressed local economy.

The median price of a home in 1999 was \$56,900 in Lee County. This compares to \$125,400 for the state as a whole and \$120,467 for the entire nation. That makes the Lee County median value only 45.4% of the state average value and 47.2% of the national value.

Agriculture

Agriculture is a significant part of the local economy of Lee County. However, agriculture is not a major endeavor within the North Fork of the Powell River watershed. Agriculture is even less important where the abandoned acid mine and tipples sites and severely eroding areas are located. The abandoned mine sites typically are in the upper sections of each subwatershed where agriculture simply has not existed, and still does not exist. These areas are too steep for agriculture

¹ Social Security Administration at <http://www.ssa.gov/notices/supplemental-security-income/>

² U.S. Census Bureau - Census of Population & Housing, 2000 Summary; File 3 Table P64 and <http://www.acf.hhs.gov/programs/ofa/>

and active forestry activities aren't common because the area was timbered before mining took place and the trees and forest cover have not recovered to the point that would justify widespread timber harvesting once again. Mining severely degraded soil quality on the slopes of the mountains. The degraded soils have effectively limited/slowed recovery of forest cover ever since.

The following summary is comprised of 2002 Agricultural Census data. It presents an overview of agricultural statistics for Lee County as a whole and compares them with the same statistics for the entire state:

	<u>Lee County</u>	<u>Virginia</u>
Number of Farms:	1,103	47,606
Land in farms:	128,042 acres	8,624,829 acres
Average size of a farm:	116 acres	181 acres
Average value of land and buildings per farm:	\$222,467	\$490,064
Average value of machinery and equipment per farm:	\$33,109	\$43,303
Average market value of products sold per farm:	\$10,986	\$49,593
Average net cash income per farm:	\$2,228	\$10,586

Transportation

None of the nation's interstate highways pass within Lee County. Interstate highways 81 and 181 pass within 32 miles of the county and Interstate 40 passes within 46 miles (both within Tennessee).¹ However, several 4-lane state highways serve the county with the principal ones being highways 58 and 23. Commercial air service is available about 30 miles away in Blountville, Tennessee or about 50 miles away outside of Knoxville, Tennessee. General aviation services are available locally via a 5,000 ft. long runway at the Lee County Airport in Jonesville, VA. Freight rail service is available within the county from CSX Transportation and the Norfolk Southern Railway Company.

Commuting Patterns

Fifty-five percent of Lee County residents live and work within the County. Table H displays commuting patterns as determined in the 2000 Census.

¹ From <http://virginiascan.yesvirginia.org/CommunityProfiles/Profiles/CCounty51105.pdf> prepared by the Commonwealth of Virginia

Table H – Commuting Patterns For Lee County

Live and work in Lee County:	5,072	55.3%
Total In-Commuters:	995	10.8%
Total Out-Commuters:	3,107	33.9%
Net Out-Commuters:	2,112	23%
In-Commuter Origins:		
From: Wise Co., VA	306	40.4%
Scott Co., VA	127	16.8%
Harlan Co., KY	124	16.4%
Claiborne Co., TN	108	14.2%
Sullivan Co., TN	93	12.3%
Out-Commuter Destinations:		
To: Wise Co., VA	1,079	44.8%
Claiborne Co. TN	403	16.7%
Bell Co., KY	391	16.2%
Scott Co., VA	271	11.2%
Sullivan Co., TN	266	11.0%

Recreation

The watershed offers an abundance of recreational opportunities associated with living in a mountainous and scenic region, but they are to be found mainly away from the coal-mined areas. Indeed, given the watershed's impaired water quality, primary body contact recreation such as swimming is not advisable due to exceedance of state standard for fecal coliform. In addition, fishing is significantly poorer than existed before coal mining degraded stream conditions. Likewise, hunting opportunities abound in Lee County, but are severely diminished within the abandoned mine land areas and areas of the watershed affected by active surface and underground mining.

Health Status

The health of Lee County residents is generally poorer as compared to state-wide data for many health measurements. According to the Virginia Department of Health, the incidence of death from cancer in 2004 was 13% higher than for the state as a whole (288.3/100,000 vs. 255.3/100,000). The teenage pregnancy rate in 2004 for 18-19 year olds in Lee County was 21 percent higher than the state-wide rate (111.6 per 1,000 as compared to 92 per 1,000). This is significant because children born to teens tend to receive poorer health care and thus start life at a disadvantage. Indeed, across all births in Lee County in 2004, only 66.2% began to receive health care within the first 13 weeks of life as compared to 84.8% for the state as a whole (22% below the state average). The occurrence of infant deaths in Lee County in 2005 was 12 per 1,000 live births as compared to 7.4 per 1,000 live births across the entire state. This represents an incidence rate for infant deaths that was 62% higher than the state-wide average.

The incidence of heart diseases was more than twice (210% higher) the average observed across the entire state (390 per 100,000 vs. 185.7 per 100,000). Unintentional injuries within Lee County were almost three times (281%) the state-wide average (92.3 per 100,000 vs. 32.9 per 100,000). Diabetes occurred 62% more frequently among Lee County residents as compared to the state as a whole (33.6 per 100,000 vs. 20.8 per 100,000). Disturbingly, suicide rates for Lee County were

more than 3 times the state-wide rate in 2004 (33.6 per 100,000 vs. 10.8 per 100,000). The homicide and legal intervention rate among Lee County residents was also significantly higher than the state-wide numbers (8.4 per 100,000 as compared to 5.5 per 100,000 or 53% higher).

The following quotes from “*Suffering It Out: Meeting the Needs of Health Care Delivery in a Rural Area*” by Huttlinger, et. al., provide a good overview for the reasons why health statistics in Lee County are poor in many categories compared to the entire state¹. “It is generally accepted that when more primary care providers are available, a population will be healthier (McBride & Mueller, 2002). However there is a paradox in the coal-producing counties of southwest Virginia where the health status of the people is poor despite an apparent adequate supply of primary care providers (GMEC, 2000). Morbidity and mortality rates for heart disease, malignant neoplasms, chronic obstructive pulmonary disease and diabetes are high and people in this region tend to die at a younger age than the U.S. median life expectancy (East Tennessee State University, 1996; HRSA, 2000). ...The research question that guided the project was, “If there is no acute shortage of primary care providers in southwest Virginia, what accounts for relatively poor health in the region?”

“The reality is that access to basic health care services in southwest Virginia is complicated by poverty, inadequate transportation, geographical distances, the seclusion of small communities, an aging population and economic decline (AH CPR, 1996). The population includes disproportionately small numbers of younger adults and large numbers of elderly people. Low educational attainment and a high percentage of individuals on government assistance (over 25%) also contribute to low economic status and consequent poor health. A recent report by the Virginia Health Care Foundation (2001) indicated that southwest Virginia led the state in the percentage, 20.4%, of medically uninsured people and consequently, in the percentage of people not being seen by a primary care provider.”⁷

The trade off between daily economic demands and health care needs is well expressed in the following quote from a participant in the study: “When you get old, you just have to make do, do without and suffer it out. When I was working and had health insurance, I could go more often and it didn’t seem to cost as much.”

“For many people in this study, putting food on the table and providing housing and clothing for their families came before their own health care needs. Although all expressed the importance of maintaining their health, it was seen as something intangible and difficult to obtain...When asked how they would compare their health and the health of their family members to the rest of Virginia, the informants and over half of the focus group participants identified themselves or someone in their household as having chronic illness. This finding supports research from other rural areas that indicates people in rural areas are at greater risk for such diseases as cancer, heart disease and diabetes and have greater difficulty seeking out preventive care (Krummel, Humphries and Tessaro, 2002; MMWR, 2002; Rosswurm, 2001).”

Cigarette smoking is highly correlated with income according to the Virginia Department of Health. The higher annual income is, the lower the incidence of smoking. The lower annual income is, the

¹ “Suffering It Out: Meeting the Needs of Health Care Delivery in a Rural Area” by Kathleen Huttlinger, Ph.D., Jennifer Schaller-Ayers, Ph.D., Tony Lawson, and James Ayers, DSW, ACSW published in The Online Journal of Rural Nursing and Healthcare; Vol. 3, Issue 2, 2003

higher the incidence of smoking. Given Lee County’s low average incomes, smoking should be more prevalent than in most areas of the state. Indeed, in 2005 greater than 30% of adults 18 years of age and older in Lee County smoked¹. This compares to 20.6% of all Virginia adults as smokers (46% higher than the state-wide rate).

Poverty, Health and Economic Participation

Poverty and health are codependent according to the Government Accountability Office (GAO) report *“Poverty in America – Economic Research Shows Adverse Impacts on Health Status and Other Social Conditions as well as the Economic Growth Rate”* (GAO-07-344), January, 2007. “Health outcomes are worse for individuals with low incomes than for their more affluent counterparts. Lower-income individuals experience higher rates of chronic illness, disease, and disabilities, and also die younger than those who have higher incomes.”...“They also report higher rates of chronic conditions such as hypertension, high blood pressure, and elevated serum cholesterol, which can be predictors of more acute conditions in the future.”²...“One study showed that individuals with low incomes had life expectancies 25 percent lower than those with higher incomes.”³ Although the relationship between poverty and adverse outcomes is very complex due to the fact that health status can be both a cause of and a result of poverty, the following bullets summarize the main conclusions from this GAO report. Individuals living in poverty and impoverished areas face:

- decreased access to health insurance and therefore less access to health care, particularly preventive health care, which diminishes one’s ability to avoid health problems before the associated symptoms can manifest;
- data on access to health care, measured by visits to doctors, demonstrate that those who are poor and without health insurance, access health care far less often than those who are either insured or wealthier;⁴
- poverty and less access to health care increase the risk of adverse outcomes occurring in one’s life such as poor health and involvement in criminal activity;
- poor health and higher crime generally decrease participation in the labor market and result in higher unemployment;
- it follows that if one is less active in productive, beneficial economic endeavors, then higher unemployment rates will ensue and higher unemployment is associated with higher levels of property crimes;
- poverty is associated with lower educational quality and achievement, and this coupled with poor childhood health directly affects a child’s future success as an adult;
- lower rates of accumulation of human capital (education, work experience, training, and skills of the workforce); and
- lower rates of human capital accumulation in turn result in a negative effect on economic growth because human capital is considered one of the fundamental drivers of economic growth.

¹ Source: Virginia Behavioral Risk Factor Surveillance System, Center for Disease Control, 2005

² “Poverty in America – Economic Research Shows Adverse Impacts on Health Status and Other Social Conditions as well as the Economic Growth Rate” (GAO-07-344), January, 2007, page 9, referenced with footnote no. 14 referring to the Centers for Disease Control and Prevention, report “Health, United States, 2006; 1998 (Hyattsville, Maryland);

³ Ibid, p. 9; Deaton, Angus, “Policy Implications of The Gradient of Health and Wealth,” Health Affairs, Vol. 21, No. 2, March 2002;

⁴ Ibid, p. 11, “For example, data from the National Center on Health Statistics show that children in families with income below the poverty line who were continuously without health insurance were three to four times more likely to have not visited a doctor in the last 12 months than children in similar economic circumstances who were insured.”

“According to the Census Bureau, approximately 37 million people in the United States, nearly 13 percent of the total population, lived below the poverty line in 2005. This percentage was significantly larger for particular population groups, specifically children, minorities, and those living in certain geographic areas such as inner cities.”¹ The “poverty line” is established by the Census Bureau and is considered the threshold level of income at which or near is deemed minimally adequate to support a family. Thus, for statistical purposes any family with household income below the poverty line is considered to be living in poverty, i.e., at a level of income that is inadequate to meet their basic human needs.

“Another reason that individuals living in poverty may have more negative health outcomes is because they live and work in areas that expose them to environmental hazards such as pollution or substandard housing.”² Acid mine drainage with in-stream pH values measured as low as 2.2, coupled with significant quantities of potentially poisonous heavy metals and pathogens from straight pipe delivered human sewage, certainly qualifies as environmental pollution. In addition, since many well water sources within the watershed are contaminated with fecal coliform and heavy metals, clearly it could be argued that environmental contamination and impoverished conditions exist within the watershed. Nothing is more basic to human health and economic prosperity than clean sources of water.

Low incomes, poorer educations, limited access to health care and the resulting poorer health also conspire to lead many poor people to more sedentary lifestyles and poor dietary habits such as lower consumption of needed fiber, fresh fruits and vegetables which can lead to being overweight and obese. Impoverished conditions, i.e., living at or below the poverty line, also are correlated with higher incidences of smoking, and greater use of alcohol and illegal drugs, all of which damage one’s health and negatively affect one’s ability to succeed in the work force.

Lastly, low wages and unemployment both exert an influence on behavior, increasing levels of property crimes. “Economic theory predicts that low wages or unemployment makes crime more attractive, even with the risks of arrest and incarceration, because of lower returns to an individual through legal activities.”³ Therefore, impoverished conditions are clearly correlated with less than ideal human conditions and achievements. “Regardless of whether poverty is a cause or an effect, the conditions associated with poverty limit the ability of low-income individuals to develop the skills, abilities, knowledge, and habits necessary to fully participate in the labor force, in turn, leads to lower incomes.”⁴

Socio-Economic Summary and Conclusions

From “*Suffering It Out: Meeting the Needs of Health Care Delivery in a Rural Area*” by Huttlinger, et al., “Interestingly, the informants and participants in this study related the “poor economy” of the region with the “poor health of the people.” When asked to explain this relationship, most people explained that “when you live in a poor area,” it was expected that the health of the people here would be also poor (Krummel, Humphries and Tessaro, 2002; MMWR, 2002; Rosswurm, 2001).” This sentiment is reinforced by the fact that the public health clinic in Keokee had to be closed in 1998 due to an inadequate and unsuitable water supply. The clinic was built beyond the service

¹ Ibid, p. 1; In 2005 the poverty threshold for a family of four was \$19,971;

² Ibid, p. 13;

³ Ibid, p. 16;

⁴ Ibid, p. 17;

area of the existing Keokee water supply system and an attempt to use a well failed because it was simply too contaminated and unreliable. Such is the nature of ground water sources in geographic areas that have fractured and severely disturbed geology due to mining.

The conditions of surface waters in abandoned mine land areas are often just as problematic as ground water. Acid mine drainage within the watershed has yielded in-stream pH values measured as low as 2.2. Such acid surface water, coupled with significant quantities of potentially poisonous heavy metals and pathogens from straight pipe delivered human sewage, certainly qualifies as environmental pollution. Clearly it could be argued that environmental contamination and impoverished conditions exist within the watershed. Nothing is more basic to human health and economic prosperity than clean sources of water.

Thus, from the socio-economic statistics presented here, particularly the education, income, poverty, housing and health status data, one may conclude that Lee County in general, and the watershed in particular, are within an economically depressed region of the state. Limited education and economic opportunities conspire to limit the health and well-being of many residents of the area. The degraded state of natural resources resulting from historic and current coal mining reinforces cycles of poverty, lowers individual progress and achievements, economic and otherwise, and acts to sustain levels of poor health and suffering.

FORECASTED CONDITIONS

There are many planned and ongoing activities in the watershed that will address the Sponsors' goals. Many agency, citizens groups, nonprofit organizations, and individuals have plans for improving this watershed. A TMDL study has already been completed for one subwatershed (Straight Creek) within the North Fork Powell River Watershed. The state DEQ will develop an implementation plan for the Straight Creek subwatershed and other subwatersheds, as needed. These plans that address the fecal coliform problems associated with sewage, straight pipes and gray water will be implemented concurrently with the proposed NRCS project. The Lee County Board of Supervisors, the State Department of Health, and the Daniel Boone SWCD are currently seeking funding for several waste water treatment projects and intend to apply for additional grants to continue this work in other parts of the watershed. These efforts are collaborative and are intended to make significant improvements to local water quality over the next several years. The PL-566 Small Watershed Program will be complementary and can be used to assist with the goals for improving water quality that are related to AMD or critical erosion.

DMME and other organizations are also engaged in ongoing activities related to development of potable water supplies, tipple site reclamation and local recreation opportunities. For example, DMME has already completed three potable water supply projects in the area. These activities are independent of the Small Watershed Program project and are expected to continue into the foreseeable future.

Forty-four of the 61 sites identified by DMME are eligible to be included in the plan. Of these, 28 have AMD as the primary water quality impairment. Nine sites are specifically described as having both AMD and critical erosion, and seven sites have critical erosion only as the primary impairment. However, due to the interactions with mining and erosion, most sites will have some elements of both impairments. Given that these sites are in the upper watershed areas, fecal coliform bacteria and nitrogen loadings from human waste disposal problems do not limit a majority of the potential warm water fishery. In addition, the human waste problems are already being dealt with outside of this project plan and should diminish over the same timeframe as the project. Therefore, the potential for a warm water fishery, even in the lower reaches of the North Fork of the Powell, are projected to be limited mainly by acid mine drainage and severely eroding abandoned mine lands.

Through a similar program, the COE has identified 12 AMD sites that are particularly harmful to the water quality in the watershed. At the present time, five projects have been completed. Positive impacts of these treatments on water quality were observed immediately. The remaining seven COE sites are planned for construction as funds become available.

For the purposes of this plan, NRCS will focus on both AMD sites and on critically eroding sites that are affecting water quality. Evaluation of the critically eroding sites will also include one non-mine related landslide that is contributing sediment to the watershed. The efforts made by NRCS will complement the work already implemented or planned by the COE.

Acid Mine Drainage increases water treatment costs for human and industrial uses and makes the water unsafe for human contact activities. The overall effect is one of depressing the local economy, degrading the quality of life residents can enjoy and limiting the educational and economic opportunities available locally. In short, the degraded natural environment has direct

METHODS AND ANALYSIS

effects on the quality of daily life and the economic possibilities of the residents of the watershed. Improvement to the natural environment should contribute to an improved quality of life for the residents.

METHODS AND ANALYSIS

The purpose of this analysis is to evaluate the identified problem sites, their contributions to degradation of the area's surface streams and to project the costs and benefits of alternative projects intended to accelerate local land treatment and reclamation. This study also will attempt to design and evaluate intervention strategies that are complimentary to the existing TMDL process, as well as implementation of treatment of the high priority sites by DMME and the COE.

Natural resource conditions in coal counties are subject to change due to the fractured nature of the local geology. DMME has for the past twenty-six years maintained an inventory of abandoned mine land features in the North Fork of the Powell River watershed. DMME's inventory has focused on high priority human health and safety features, but has also gathered information on environmental problems such as acid mine drainage (AMD). DMME's partnership with the COE has contributed to the inventory, especially with data on AMD. This partnering effort has identified both large and small AMD discharges. With collective decades of field experience, the existing inventory, and the partnering effort, DMME and the Corps are confident that current and existing AMD discharges are documented. However, our experience directs us to qualify any statement on AMD and abandoned mine land features. An extended period of wet weather, an intense rainfall event, or an underground event might result in new acid seeps or, in the worst case, a sudden release of a large volume of AMD. Summing this up, it could be stated that DMME's inventory of abandoned mine land features, including AMD, in the watershed is thorough, well documented and spans a quarter century, but has to remain dynamic due to the nature of abandoned mine lands.

For the purposes of this watershed plan, pH is used as the primary indicator of water quality. Stream segments are characterized for the pH parameter as Acceptable, Recovering, or Impaired. Other possible measures of impairment were Total Dissolved Solids (TDS), Iron, Aluminum, Total Suspended Solids, and Dissolved Oxygen. This data was documented for each site and stream segment in the resource inventory but only pH was used in the analysis for three reasons: 1) pH data was available for most sites and stream segments; 2) most of these other parameters are pH dependent and 3) the analysis would have been significantly more complex. Table I provides the numerical criteria used in the resource inventory to characterize streams in the watershed.

For assessment of the critical erosion sites, the amount of sediment delivered to the stream and the estimated number of affected stream miles will be used for evaluation of the severity of the problem. Since the available data is focused on the water chemistry, and the data points are located accordingly, there is insufficient data to use the water sample results to estimate the effects of the landslides that are located further upstream in the watershed.

Water quality samples in seven of the eight subwatersheds were evaluated against the numerical criteria described above and in Table I, and a table of impaired waters was developed (See Table J). Subwatershed 12 has no water quality data available.

**Table I - Numerical Water Quality Standards & Criteria
Used to Classify Receiving Streams**

Water Quality Parameter	Impaired (I)	Recovering (R)	Acceptable
pH, s.u. ⁽¹⁾	<6.0 or >9.0	6.0-6.9 ^(1a)	7.0-9.0
Iron, mg/l ⁽²⁾	≥ 2.0		< 2.0
Aluminum, mg/l ⁽²⁾	≥ 0.5		< 0.5
Total Dissolved Solids, mg/l ⁽³⁾	> 335		0-335
Total Suspended Solids, mg/l ⁽⁴⁾	>80		25-80
Dissolved Oxygen, mg/l ⁽¹⁾	≤ 4.0		> 4.0

Note: This table is for information only. NRCS pH criteria were used to evaluate the effects of the study.

⁽¹⁾ State Water Control Board, Virginia Water Quality Standards, January 12, 2006. pH Standard is 6.0-9.0 measured in standard units (s.u.).

^(1a) Designation of pH at 6.0-6.9 as “Recovering” by the NRCS facilitated interpretation of water quality improvements and fisheries recovery.

⁽²⁾ Powell River Basin, Virginia: Feasibility Study for Ecosystem Restoration. August 2005. USACOE, Nashville, TN.

⁽³⁾ Fecal Bacteria and General Standard Total Maximum Daily Load Development for the Powell River Basin – Straight Creek. September 2005. MapTech, Inc., Blacksburg, Virginia.

⁽⁴⁾ Report of the Committee on Water Quality Criteria: Report of the National Technical Advisory Committee to the Secretary of the Interior. April 1968. Federal Water Pollution Control Administration, Washington, D.C.

Determination of Potential Improvements to Fisheries

NRCS, in consultation with VDGIIF biologists, determined that all third and fourth order streams were deemed large enough to support recreational fishing. In addition, some of the larger second order streams were also deemed to have sections that were fishable given adequate water quality. Thus, the basis for analyzing project evaluation units was the number of miles of stream moved from a pH-Impaired condition to pH-Recovering or pH-Acceptable water quality for water chemistry and from a Critical Erosion-Impaired condition to non-impaired for sediment delivery conditions. In turn, improved water chemistry and reduced sedimentation conditions are the basis for our planning assumptions for fishery recovery. The fishery potential for these streams precludes expansion of the existing 3.5 miles of high valued put-and-take cold water fishery (rainbow and brown trout). This is because exposure of long stretches of these streams elevates water temperatures above levels appropriate for trout. In addition, a put-and-take fishery established by DGIF requires agreement from all adjacent landowners for full public access. Given the number of landowners potentially involved where a put-and-take trout fishery could be expanded, the DGIF biologists believed that such conditions could not be achieved. Therefore, the analysis is solely based upon expected expansion of the warm water fishery potential and associated benefits derived from angler days from local residents only. Table K describes the existing and potential fisheries in the watershed.

Technical Review and Support of Planning Assumptions

The above assumptions were presented to various natural resources agencies, organizations and interest groups during the Scoping Meeting. They were also refined and developed during several work sessions with cooperating agencies. Support has been unanimous during the planning process.

Table J - Inventory of Impaired Waters

Subwatershed Number	Major Streams	Stream Miles		
		pH Impaired (<6.0)	pH Recovering (6.0 – 6.9)	CE-Impaired
1 – Upper Stone and Ely Creeks	Stone Creek, Ely Creek, Goose Creek, Bean Creek	1.18	1.32	0.40
2 – Straight Puckett Creeks	Straight Creek, Baileys Trace, Fawn Branch, Gin Creek, Big Branch of Straight Creek, Puckett Creek, Big Branch of Puckett Creek, Lick Branch (Puckett Creek), Cooper Hollow (Puckett Creek)	1.66	1.55	10.34
3 – Reeds and Summers Creeks	Reeds Creek, Summers Creek, Meadow Fork	1.30	1.91	0.24
4 – Jones and Mud Creeks	Jones Creek, Mud Creek, Allen Hollow	0.41	0.48	1.44
5 - Cox Creek	Cox Creek	0.05	0.09	0.86
6 – Jordan Branch	Jordan Branch	0.42	0.79	0
7 – Craborchard Creek and Wells Branch	Craborchard Creek, Wells Branch	0.12	0.33	0
12 - Bobs Branch	Bobs Branch	0	0	0

Note: pH-Impaired and pH-Recovery stream miles are mutually exclusive of one another. CE-Impaired stream miles may be concurrent with pH-Impaired or pH-Recovering miles. CE-Impaired segments were estimated based on location in the watershed and the projected extent of detrimental effects from sediment.

Table K – Existing and Potential Fisheries in the Watershed

Subwatershed Number	Major Streams	Stream Miles of Fishery	
		Existing	Potential
1 – Upper Stone and Ely Creeks	Stone Creek, Ely Creek, Goose Creek, Bean Creek	0.93	1.84
2 – Straight Puckett Creeks	Straight Creek, Baileys Trace, Fawn Branch, Gin Creek, Big Branch of Straight Creek, Puckett Creek, Big Branch of Puckett Creek, Lick Branch (Puckett Creek), Cooper Hollow (Puckett Creek	1.20	11.72
3 – Reeds and Summers Creeks	Reeds Creek, Summers Creek, Meadow Fork	2.40	4.40
4 – Jones and Mud Creeks	Jones Creek, Mud Creek, Allen Hollow	1.64	5.15
5 - Cox Creek	Cox Creek	0	2.79
6 – Jordan Branch	Jordan Branch	1.48	1.48
7 – Craborchard Creek and Wells Branch	Craborchard Creek, Wells Branch	0.33	3.51
12 - Bobs Branch	Bobs Branch	0	0

FORMULATION AND COMPARISON OF ALTERNATIVES

BACKGROUND

Concern for water quality and associated aquatic resources and species is central to the goals and objectives established by the local sponsors for this planning effort. Thus, with the sponsors' goals and objectives in mind, alternatives were formulated to meet their desire to effectively deal with the long-standing concerns for abandoned mined land contributions to water quality degradation. At one point, the possibility of chemical treatment facilities was discussed. These systems involve active treatment of AMD drainage in physical plant facilities where alkaline materials such as hydrated lime or crushed limestone are added to the effluent to neutralize acidity. Such systems of treatment require very high initial capital investment costs and substantial annual operation and maintenance associated with management and labor, as well as materials costs to stock and meter chemicals at rates responsive to highly varied flows to assure system performance. In addition, such systems require even more cost and management if removal of heavy metals from the effluent is to be accomplished in addition to neutralizing acidity. In view of the costs and complexity associated with "active treatment" approaches, the sponsors and technical advisors/planners jointly deemed such systems impractical and inappropriate. They are considered especially inappropriate for remote and hard to access areas such as the North Fork Powell River Watershed. Thus, a majority of our collaborative deliberations to formulate alternatives focused on an array of "passive", gravity-fed land treatment systems, some of which treat the acidity and also separate/trap heavy metals for removal. These systems will be described in detail within this section of the project plan.

OVERALL COLLABORATIVE INTERAGENCY/WATERSHED PLANNING APPROACH

To fully assess the negative effects of abandoned mine lands, a partnership approach was used to identify and quantify the contributions from abandoned mine land sites on a subwatershed by subwatershed basis, and within an overall watershed perspective. The partnership was comprised primarily of the USDA/NRCS, Daniel Boone Soil and Water Conservation District, the Virginia Department of Mines, Minerals and Energy and the COE. The partnership approach was crucial to identify other ongoing efforts funded by separate sources so as to avoid duplication of efforts and to attempt to maximize collaboration by making the disparate efforts complementary to each other. The concept of complementing existing efforts was central to the NRCS for planning this project. The conservation partners were equally adamant from the beginning that any potential PL-566 project should be formulated to complement existing and ongoing efforts by helping to achieve a higher level of control of target pollutants. If this is achieved, then the NRCS effort would not only contribute to achieve higher levels of control, but would serve to protect the investments of the other partners.

During the formulation of alternatives, DMME articulated that State funds annually appropriated through the Abandoned Mine Land program deal with a fraction of the total number of abandoned mine sites in southwest Virginia. The COE communicated that their Ecosystem Restoration Project will achieve significant reductions in pollutant loadings within the North Fork of the Powell but even after completion will remain subject to the risk that loadings from untreated AMD sites could sporadically and temporally negate the water quality improvements from their investments. Such

FORMULATION AND COMPARISON OF ALTERNATIVES – DESCRIPTION OF ALTERNATIVE TREATMENTS

disruptions to the flow of benefits from the Corps' projects could occur when the smaller AMD sites experience high flows during wet cycles.

Understanding these dynamics is critical to understanding the approach taken to formulate alternatives for this watershed. This same understanding led DMME and the COE to collaborate with the NRCS planning effort. To do this, they have assisted by providing data, knowledge, interpretations, and coordination to conduct site visits. The COE awarded a contract to the consulting firm of David Miller and Associates, Inc. (DMA, Inc.) for the sole purpose of providing technical support to the NRCS planning effort. This level of collaboration and support for water resource planning is unprecedented in NRCS/Virginia history.

The COE has already completed 12 AMD sites on five construction projects in the Ely and Puckett Creek subwatersheds. The Bean Creek tributary on Ely Creek had six AMD sites that were completed in 2004. The three Bog sites on Goose Creek (ECWAMD3) were also completed in 2004. Three sites on Puckett Creek were completed in 2006. Significant improvements in pH, TDS, iron, and aluminum were noted in the October 2005 to July 2006 data set (four samples). The pH was primarily in the Acceptable range with some minor fluctuations into the Recovering range. The fluctuations of pH values into less than Acceptable ranges all occurred at very low flows (< 0.01 cfs). The pH values are expected to become consistently acceptable as the vegetation on the sites matures.

Therefore, the experience gained from the COE sites demonstrates the efficacy of the installed treatments and provides concrete evidence that similar investments on similar sites within the watershed should yield similar water quality results. With this knowledge in mind, the NRCS project sites were evaluated and prioritized based on the following ranking parameters:

- proximity to existing COE project sites (within the same subwatershed and beneficially affecting/complementing the COE investments);
- benefits to water quality;
- cost of treatment per evaluation unit (evaluation units are logical groupings of sites within the same subwatersheds or within reasonable proximity that are grouped together for the purpose of achieving water quality improvements); and
- projected miles of fishable stream segments along with the associated beneficial effects on warm water fishery potential.

DESCRIPTION OF ALTERNATIVE TREATMENTS

The following practices comprised the array of potential treatment solutions available for consideration at each AMD site:

- **Anoxic Limestone Drain** – an underground limestone drain that raises effluent pH by passive contact with the basic nature of limestone;
- **Aerobic Wetland**: a shallow wetland with oxygenated conditions that causes aluminum to precipitate out on the surface of the wetland;
- **Anaerobic Wetland**: a shallow wetland with a limestone base covered with organic material that absorbs oxygen and creates anaerobic conditions that allows heavy metals to stay in suspension in the water column even as the pH of the effluent is lowered;
- **Limestone Pond**: a limestone lined pond that allows for the interaction of acid effluent with the base nature of limestone which has the effect of raising effluent pH;
- **Open Limestone Channel (OLC)** – a surface drainage ditch with limestone to stabilize channel and side-slopes while raising drainage pH;
- **Reducing Alkaline Producing System (RAPS)** – a vertical flow system with the generalized design of an influent cell with a limestone layer of varying size depending on required residence time, covered by an organic layer of 12 – 18 inches to promote reducing conditions. This is followed by an oxidation/settling pond to provide for precipitation and storage of metals from the solution.
- **Settling Ponds** – an open body of water designed to allow heavy metals to settle-out.
- **Successive Alkaline Producing System (SAPS)**¹ – these systems begin with capturing AMD from the mine source and directing it to a very small flow-equalization pond where gravity flow slowly moves manageable quantities to the vertical flow treatment cell where the water moves through an organic layer into a limestone bed. A drop-inlet spillway with a flashboard riser controls the surface level of the effluent as it passes into an anaerobic or aerobic wetland cell that is designed to trap any remaining metals that have passed through the previous treatment cells. The clean passively treated water is then free of excessive heavy metals and with a pH that will support aquatic species when discharged into the stream.

For the critically eroding sites, the following practices were evaluated:

- **Critical Area Planting** – a combination of earth movement via shaping and grading to create more stable slopes, along with liming, fertilizing (if needed) and either seeding or planting appropriate plant materials (usually grasses, shrubs and trees) to both prevent soil erosion and also create wildlife habitat;

¹ SAPS are also sometimes called “Anaerobic Subsurface Flow Wetlands”

- **Diversions and Water-bars** (mini-diversions across roads and trails): mounds of vegetated earth installed to divert runoff and prevent concentrated flow of water from causing or expanding gullies;
- **Rock-Lined Waterway or Outlet**: constructed channel designed to safely convey runoff from a given area;
- **Tree/Shrub Establishment**: the planting of appropriate shrub and tree species to:
 - stabilize the soil and prevent erosion,
 - enhance the natural assimilative capacity of the environment to buffer and/or ameliorate the presence and movement of nutrients and toxic substances such as heavy metals and acidity,
 - provide wildlife habitat, and
 - provide shading of streams so as to lower stream temperatures and make the aquatic habitat more favorable.
- **Spoil Spreading**: earth movement and stabilization with permanent vegetative cover to reduce the steepness of slopes and to create habitat more favorable for locally desired wildlife, songbirds, etc.;
- **Upland Wildlife Habitat Management**: treatment of a site along with planting of plant species of value to wildlife for cover, nesting, feeding, and reproducing.

ANALYSIS OF ALTERNATIVE TREATMENTS

Selection of Treatment for Each Site

In order to evaluate potential project performance and costs, the software entitled “AMDTREAT” was utilized. AMDTREAT is a software tool created by the Federal Office of Surface Mining, Reclamation and Enforcement (OSMRE). The software allows the user to enter pre-treatment water chemistry parameters and volumes along with post-treatment effluent objectives in a way that interactively allows the user to evaluate alternative treatments and determine the most cost-effective means to achieve the desired water quality. The alternatives all have expected useful lives of 25 years, although individual components, such as the compost used in some SAPS, have shorter lives and must be replaced during the life of applicable practices. Each practice also has an expected relationship between the water chemistry entering and the volume of practice needed to achieve the water quality objectives. Lastly, each practice must be evaluated within a context of practical sense for each site. Some alternatives simply won’t fit within the space and topography that exists at a given site. This is where knowledge of the practice requirements and the topography of each site is crucial. Otherwise, alternatives could be recommended that technically are infeasible from a space/layout and/or physical relief/elevation perspective.

The AMDTREAT program produced a printout with a recommended treatment system for specific AMD sites. It included post-treatment effluent quality, installation costs, and operation and maintenance costs. Some AMD sites with limited input data were evaluated without use of the AMDTREAT program by comparing them to sites with similar characteristics. Potential treatments were evaluated within a cost-effectiveness framework tempered by common sense understanding regarding which treatments will physically fit and work within the specific geographic confines and layout of each site needing treatment. Thus, the use of AMDTREAT

was applied using methods consistent with the NRCS Conservation Options Procedure for identifying the least cost approach. Table L lists the recommended treatment for each of the 44 sites.

Development of Evaluation Units

Evaluation Units were developed within each subwatershed by grouping individual sites based on characteristics such as proximity to one another, ownership, effect on COE sites and degree of expected improvement to water quality and fishery. Evaluation units within each subwatershed are listed in the order in which the most benefits are derived. There is an underlying assumption that all of the COE and AML sites will be completed prior to the installation of NRCS projects. The projected additional benefits to the water quality for each evaluation unit are then attributable to the NRCS work. It is further assumed that NRCS projects will take approximately two years after completion to attain the projected water quality benefits. The anticipated fishery benefits will also accrue in that time frame. It should be noted that all first order streams are ecologically linked to the downstream segments and they contribute to the well-being of the aquatic ecosystem whether or not fish can be caught within them.

For the purposes of this analysis, three groupings were made. The projected effects of individual Evaluation Units were identified first and then the projected cumulative effects when multiple Evaluation Units were implemented within a subwatershed. These effects are described in the following section. The third grouping compares the benefits and costs between the subwatersheds. This comparison is done in the section that addresses selection of an overall treatment plan.

FORMULATION AND COMPARISON OF ALTERNATIVES – ANALYSIS OF ALTERNATIVE TREATMENTS

Table L – Proposed Treatment by Individual Site

Subwatershed	Site ID	Treatment	Cost (\$)
1 – Upper Stone and Ely Creeks	ECEAMD1	SAPS and aerobic wetland	88,300
	ECEAMD2	OLC, grade and stabilize	8,600
	ECEAMD3	Anaerobic wetland	83,800
	ECEAMD4	OLC	23,000
	ECEAMD5	OLC	44,900
	ECWAMD4	SAPS and aerobic wetland	84,500
	SCUAMD1	OLC	14,200
	SCUAMD2	OLC, grade, and revegetate	32,100
2 – Straight Puckett Creeks	BBAMD1	OLC, wet mine portal closure	21,900
	BTAMD1	Two SAPS and aerobic wetland sets	124,100
	BTCE1	Rock toe buttress, grade, shape, revegetate, water control	30,700
	BTCE2	Rock toe buttress, grade, shape, revegetate, water control	21,500
	LSCAMD1	OLC	135,600
	LSCAMD2	OLC	7,900
	LSCAMD3	OLC and closure of mine portal	18,200
	LSCCE1	Rock toe buttress, grade, shape, revegetate, water control	56,300
	PCAMD2	Anaerobic wetland	151,400
	PCAMD3	OLC and anaerobic wetland	40,800
	PCCE1	Grade and stabilize, water control, OLC, aerobic wetland, revegetation	90,500
	USCCE1	Rock toe buttress, grade, shape, revegetate, water control	30,700
	3 – Reeds and Summers Creeks	RCUAMD1	Capture water, pipe to existing pond
RCUAMD2		OLC ¹	13,000
RCUAMD3		OLC, portal closure/seals, reconstruct wetlands	54,800
RCUAMD4		Rehabilitate existing pond (treat w/ RCUAMD3)	9,900
RCUAMD8		Pond	7,200
RCUAMD9		Drain pond, topsoil, revegetate, OLC, wetlands	54,900
4 – Jones and Mud Creeks	JCLAMD1	Aerobic wetland and pond	19,800
	JCUAMD1	OLC ¹	16,700
	MCAMD1	Ditch and pond	12,100
	MCCE1	Backfill and regrade mine pit, eliminate highwall, OLC, pond, and revegetation	42,800
	MCCE2	Backfill and regrade mine pit, eliminate highwall, OLC, pond, and revegetation	29,300
5 - Cox Creek	CCAMD1	SAPS and aerobic wetland	93,500
	CCAMD2	OLC and aerobic wetland	78,200
	CCCE1	Riprap ditch, grade, revegetate	36,100
6 – Jordan Branch	JBAMD1	No treatment is planned (TDS impairment only)	0
	JBAMD2	OLC ¹	21,200
	JBAMD3	OLC ¹	21,200
	JBAMD4	No treatment is planned due to recovering water quality	0
7 – Craborchard Creek and Wells Branch	COEAMD1	No treatment is planned due to existing beaver ponds.	0
	COEAMD2	No treatment is planned due to existing beaver ponds.	0
	COWAMD2	OLC and pond	54,400
	WBAMD1	No treatment is planned due to recovering water quality	0
12 - Bobs Branch	NFPCE1	Remove waste material, grade, revegetate, water control	54,600
	NFPCE2	Remove waste material, grade, revegetate, water control	54,600
Total Cost			1,759,950

1 - Treatment and cost are projected based on very limited site specific data and information.

Effects of Treatments by Subwatershed

Subwatershed 1 – Upper Stone and Ely Creeks

Evaluation Unit **SW1-EU1** includes ECEAMD1 (Lenges), ECEAMD2 (M&H Coal), ECEAMD4 (Knuckles), ECEAMD5 (SW-12), and ECEAMD3 (Aubra Dean). Due to the individual toxicity of each site, all five sites must be treated in order for any benefit to accrue on Ely Creek. This evaluation unit directly affects the main stem of Ely Creek. It also indirectly affects the Goose Creek tributary because the existing pH-Impairment on the main stem continues below the confluence of the two streams and prevents fish movement. With treatment, 0.40 miles of stream will improve from pH-Impaired to pH-Recovering (and then to pH-Acceptable in two years), and 0.34 miles of pH-Recovering will improve to pH-Acceptable within a year. Fishery access will be gained to 0.45 miles of stream on Ely Creek and 0.17 miles on Goose Creek for a total gain of 0.62 miles. This has the effect of making all of the total fishable miles in the Ely Creek subwatershed available to fish (1.84 miles).

Only ECWAMD4 is in Evaluation Unit **SW1-EU2**. After treatment, 0.37 stream miles would become pH-Recovering and 0.12 stream miles would become pH-Acceptable. All impairments due to critical erosion would be removed (0.49 miles). No quantifiable fisheries benefits would be accrued because the entire reach is a first order stream. However, completion of this site, in conjunction with the completion of SW1-EU1, would eliminate all of the known water quality impairments on Ely Creek.

Stone Creek has two Evaluation Units. Evaluation Unit **SW1-EU3** (SCUAMD2) is located on a first order stream with impairments extending into the second order stream. After treatment, 0.41 miles of pH-Impaired water will improve to pH-Recovering and 0.47 miles of pH-Recovering water will improve to pH-Acceptable. Approximately 0.29 miles of fishery would be added to the existing 0.24 miles to achieve the total potential fishable length of 0.53 miles.

The proposed treatment for **SW1-EU4** (SCUAMD1) is an OLC. However, since the intermittent seeps on this site flow into 0.42 miles of road ditch before reaching Stone Creek, downstream stream segments are only occasionally affected. Treatment of this site has low priority, according to DMME. Table M lists the projected benefits of treatment of these evaluation units.

Table M - Subwatershed 1 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles) ¹	Miles of Potential Fishery Recovered ²
SW1-EU1	ECEAMD1 ECEAMD2 ECEAMD3 ECEAMD4 ECEAMD5	Yes	0.74 pH 0.40 Critical Erosion (CE)	0.62
SW1-EU2	ECWAMD4	No	0.49 pH; 0.49 CE	0
SW1-EU3	SCUAMD2	No	0.88 pH	0.29
SW1-EU4	SCUAMD1	No	0.44 Overland	0

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 2 – Straight and Puckett Creeks

Evaluation Unit **SW2-EU1** contains Petry Spring (LSCAMD3) and St. Charles Landslide (LSCCE1). Although these are two independent problems, the sites are adjacent to one another and the land is owned by the same person. Neither one has specifically identified impacts on the water quality of Straight Creek but they both have the potential to impact the stream during the larger precipitation events. The critical erosion from St. Charles Landslide could impair as much as 2.2 miles of Straight Creek. An overland flow event from Petry Spring, projected to occur once in four years, would cause a pH-Impairment of 0.42 miles and a pH-Recovery length of 0.43 miles. If these periodic impairments are prevented by treatment of these two sites, then fish access to 2.75 miles of upstream water and 2.58 miles of downstream fishery will be maintained. Access to 0.42 miles on Big Branch will also be maintained.

The three sites in Evaluation Unit **SW2-EU2** are impaired by Critical Erosion: Bonnie Blue Slide (BTCE1), Fawn Branch Refuse Slide (BTCE2), and Gin Creek Slide (USCCE1). These sites were grouped together because they have one owner. Treatment of BTCE1, BTCE2, and USCCE1 will remove the impairment from 1.73, 1.87, and 3.01 miles of streams, respectively. It will add 3.42 miles of fishable water to the upstream watershed. Permanent fish access to these streams is dependent on treatment of Evaluation Unit SW2-TU1. Otherwise, only the resident fish population of these reaches would be available consistently.

Evaluation Unit **SW2-EU3**, the Slick Lizard site (BTAMD1), is located at the confluence of Baileys Trace and Straight Creek but the very low pH water coming from the site does not enter into Straight Creek except during precipitation events that cause overland flow from the site. As with Petry Spring, an overland flow event is projected to occur once in four years. In such an event, 0.69 miles of stream will be pH-Impaired and 0.62 miles would be pH-Recovering. Fish access would be blocked for 6.33 miles upstream, 0.69 miles downstream, and 0.42 miles on Big Branch. If this periodic impairment is prevented by treatment of this site and Evaluation Units SW2-EU1 and SW2-EU2 are complete, then fish access to 6.33 miles of upstream water and 2.58 miles of downstream fishery will be maintained. Access to 0.42 miles on Big Branch will also be maintained.

The Wagonertown Seeps and streambank erosion site (LSCAMD1) and the Water Tank Road seeps (LSCAMD2) are the two sites in Evaluation Unit **SW2-EU4**. The Water Tank Road seeps drain from a road ditch into the Wagonertown tributary near its confluence with Straight Creek. An impairment of Straight Creek could occur if the overland flow from these seeps is increased during a large precipitation event. The anticipated occurrence of this event is once in four years. A pH-Impaired reach of 0.55 miles and a pH-Recovering reach of 0.73 miles are projected on Straight Creek. On the tributary, there will be 0.09 miles of pH-Impaired stream treated to pH-Recovering, 0.16 miles pH-Recovering treated to pH-Acceptable, and 0.23 miles of pH-Impaired overland flow treated to pH-Recovering. There are 7.51 miles of fishery upstream of this tributary that would have only resident fish populations if an impairment occurred. The same impairment could occur if the Wagonertown Seeps are flushed into Straight Creek. However, existing treatment on the tributary is likely to mitigate much of the possible impact before reaching the confluence.

For Evaluation Unit **SW2-EU5**, the impairment is only observed on Big Branch (BBAMD1) with no effect on the main stem of Straight Creek. With treatment, the fishable portion of this stream will increase from 0.42 to 0.63 miles.

Treatment of Evaluation Units SW2-EU1 through SW2-EU5 will allow fish access to the entire main stem of Straight Creek and all its major tributaries (except Puckett Creek). Of the 9.36 miles of potential fishery, only 0.38 miles of Straight Creek are consistently available at the present time. With these treatments, 8.98 miles will be added to this number.

Evaluation Unit **SW2-EU6**, Triple R Mine (PCCE1), is a critically eroding site on a hill above Puckett Creek. Critical erosion from the site adversely affects 0.28 miles of stream, inhibiting access to upstream fisheries. In addition, there is the potential for pH impairment from overland AMD flow from the site. With treatment, 0.78 miles of fishable stream will be added to the existing 0.82 miles.

The Richard Davis wetland site (PCAMD2) and the Lanningham Seeps (PCAMD3) together make up Evaluation Unit **SW2-EU7**. Since the Lanningham Seeps drain into the Richard Davis site when there is overland flow, it is logical to treat these sites as one unit. Although no direct stream impacts have been identified for the Lanningham Seeps, its location would indicate that the potential for stream impairments exists during periods of high runoff. Since the drainage from the wetland blocks the confluence of Puckett Creek and Big Branch of Puckett Creek (Cooper Hollow), treatment of this site will add 0.76 miles to the fishable waters.

Upon completion of Evaluation Units SW2-EU6 and SW2-EU7, all potential fishable water in Puckett Creek will be accessible (2.36 miles). Table N lists the projected benefits of treatment of these evaluation units.

Table N – Subwatershed 2 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Miles) ¹	Miles of Potential Fishery Recovered ²
SW2-EU1	LSCAMD3 LSCCE1	No	0.85 pH; 0.10 overland; 2.20 CE	4.95
SW2-EU2	BTCE1 BTCE2 USCCE1	No	6.61 CE	3.42
SW2-EU3	BTAMD1	No	1.31 pH; 0.09 overland	0.16
SW2-EU4	LSCAMD1 LSCAMD2	No	1.53 pH; 0.23 overland	0.76
SW2-EU5	BBAMD1	No	0.40 pH; 1.25 CE	0.21
SW2-EU6	PCCE1	No	0.24 pH; 0.28 CE	0.76
SW2-EU7	PCAMD2 PCAMD3	Yes	0.06 pH; 0.18 overland	0.78

¹ Miles of stream impairment improved or avoided. Not cumulative.

² Miles of fisheries impacted by each site. Not cumulative.

Subwatershed 3 - Reeds and Summers Creeks

On Reeds Creek, there is one Evaluation Unit, **SW3-EU1**, that is critical to the success of the work on this stream. RCUAMD1 (Coolers), RCUAMD2 (Tomlinson), RCUAMD3 (Rivers Wetland), RCUAMD4 (Rivers Tipple) and RCUAMD9 (Orphan land site above Coolers) must be treated together in order to eliminate the water quality impairment on this section of Reeds Creek. With treatment, 0.44 miles of pH-Impaired water will improve to pH-Recovering and 0.38 miles will improve to pH-Acceptable. In the same reach, 0.24 miles of stream impairment from Critical Erosion will be removed. RCUAMD9 has 0.51 miles of pH-Impaired water that will no longer have the potential to discharge into Reeds Creek. Completion of this reach will also optimize the effectiveness of the COE sites in this watershed, RCUAMD6 and RCUAMD7, and the AML site (RCUAMD5). The entire potential fishery of Reeds Creek will be accessible (3.14 miles).

Evaluation Unit **SW3-EU2** is the Maw Bee site (RCUAMD8) located above the Bee Mine site (RCUAMD7) that is planned for completion by the COE. This site has water quality in the pH-Recovering range. There are very few benefits associated with the treatment of this site based on the available water quality data since only 0.04 miles would be improved from pH-Recovering to pH-Acceptable. No fisheries improvements would occur. Table O lists the projected benefits of treatment of these evaluation units.

Table O – Subwatershed 3 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles) ¹	Miles of Potential Fishery Recovered ²
SW3-EU1	RCUAMD1 RCUAMD2 RCUAMD3 RCUAMD4 RCUAMD9	Yes	0.82 pH; 0.51 overland; 0.24 CE	1.98
SW3-EU2	RCUAMD8	No	0.04 pH	0

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 4 – Jones and Mud Creeks

The limited data available for Evaluation Unit **SW4-EU1**, Kitty Kat (JCLAMD1), appears to show that this site has minimal impacts on water quality. However, the data used to develop the proposed treatment with the AMD Treat program indicates that the water quality is much lower and does constitute a pH-Impairment on the main stem of Jones Creek. For the purposes of planning, the AMD Treat solution will be used. With treatment, 0.07 miles of pH-Impaired water will improve to pH-Recovering and 0.23 miles will improve to pH-Acceptable. There are 5.15 miles of potential fishery in this subwatershed. The existing fishery is 1.64 miles. About 2.68 miles will be gained by treatment of this site.

In Evaluation Unit **SW4-EU2**, the Mud Creek Mine Pits #1 and #2 (MCCE1 and MCCE2) are contributing impairments from both pH and critical erosion. There are 0.23 miles that will

improve from pH-Impaired to pH-Recovering, 0.14 miles that will improve from pH-Recovering to pH-Acceptable, and 1.44 miles impacted by critical erosion that will no longer be impaired. There are 0.77 miles of fisheries gained by treatment of these two sites. Since the pH impairment is all on first order tributaries, all of the fishery gains can be attributed to treatment of the critical erosion.

Evaluation Unit **SW4-EU3**, MCAMD1 (Blackwood Land Seeps), is located on a first order stream in the headwaters of Mud Creek. The pH impairments from this site extend into the second order stream below. Due to its location in the headwaters, the fisheries recovery potential is limited to about 0.06 miles.

There was no data available for Evaluation Unit **SW4-EU4**, Allen Hollow (JCUAMD1) because of its location in the headwaters of the Jones Creek watershed. However, that does not mean that a problem does not exist. For the purpose of this analysis, a cost of \$20,000 will be estimated for a pH-Impairment of 0.1 stream miles and a pH-Recovering segment of 0.1 stream miles. No fisheries will be gained because the site is located on a first order stream. Table P lists the projected benefits of treatment of these evaluation units.

Table P – Subwatershed 4 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles)¹	Miles of Potential Fishery Recovered²
SW4-EU1	JCLAMD1	Yes	0.30 pH	2.68
SW4-EU2	MCCE1, MCCE2	No	0.37 pH; 1.44 CE	0.77
SW4-EU3	MCAMD1	No	0.23 pH	0.06
SW4-EU4	JCUAMD1	No	0.20 pH	0

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 5 – Cox Creek

Subwatershed 5 has only one evaluation unit. Evaluation Unit 1, **SW5-EU1**, includes the Bailey AMD site (CCAMD1), the Christine Coal/Fanhouse site (CCAMD2), and the Hilltop Raceway Critical Erosion site (CCCE1). Due to the location of the Bailey site, all of the second order streams in the watershed are unavailable to fish because of a pH impairment. At the Christine Coal site, the water quality is pH-Recovering and is no impediment to fish movement. However, erosion from the Hilltop Raceway creates a sediment impairment of the water that extends to the outlet into the North Fork Powell River. Treatment of these sites will allow access to all the potential fisheries in the entire subwatershed (2.79 miles). Table Q lists the projected benefits of treatment of these evaluation units.

Table Q – Subwatershed 5 Evaluation Unit and Projected Benefits

Evaluation	Site ID	Impact	Projected Water Quality	Miles of Potential
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FORMULATION AND COMPARISON OF ALTERNATIVES – ANALYSIS OF ALTERNATIVE TREATMENTS – Effects of Treatment by Subwatershed

Unit		on COE Sites	Improvement (Stream Miles) ¹	Fishery Recovered ²
SW5-EU1	CCAMD1 CCAMD2 CCCE1	No	0.14 pH; 0.86 CE	2.79

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 6 – Jordan Branch

Evaluation Unit **SW6-EU1**, JBAMD2 (Carroll Hollow) and JBAMD3 (Whisman Hollow), have no site data available. Since water quality samples downstream of the sites indicate some pH contamination, it was assumed that each site has a water quality impairment. A length of pH-Impaired stream and a length of pH-Recovering stream were estimated for each site. For JBAMD2, the pH-Impaired miles and pH-Recovering miles were estimated to be 0.25 and 0.30, respectively. The pH-Impaired and pH-Recovering miles for JBAMD3 were estimated to be 0.17 miles and 0.43 miles, respectively. An approximate cost of \$15,000 each was assumed for the purpose of analysis. There are no anticipated fisheries improvements associated with these sites because they are both located on first order streams.

Evaluation Unit **SW6-EU2** is located on the main stem of Jordan Branch. This site, JBAMD4 (Jordan Branch) is shown to be pH-Recovering in the available water quality data (0.06 miles). For this reason, no treatment is recommended for this site. There is no change in the potential fisheries in the watershed because pH-Recovering stream reaches are not considered to be a barrier to fish passage.

For Evaluation Unit **SW6-EU3**, Jordan Seeps (JBAMD1), the water quality data indicates that only TDS-Impairments are occurring at this site. No treatment is recommended on this site for this reason. Table R lists the projected benefits of treatment of these evaluation units.

Table R – Subwatershed 6 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles) ¹	Miles of Potential Fishery Recovered ²
SW6-EU1	JBAMD2 JBAMD3	No	1.15 pH	0
SW6-EU2	JBAMD4	No	0	0
SW6-EU3	JBAMD1	No	0	0

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 7- Craborchard Creek and Wells Branch

Evaluation Unit **SW7-EU1**, COWAMD2 (Railroad Seeps), is located in the lower reaches of the watershed and has a significant impact on the potential for fisheries improvements. With

treatment, 0.12 miles will go from pH-Impaired to pH-Recovering and 0.33 miles improve to pH-Acceptable. There are 3.50 miles of potential fishery in this subwatershed. Treatment of this site will allow access to the 3.17 miles not currently available, encompassing all of the fishable waters Treatment of this site will allow access to the fishable waters below the COE site at Wilson Bench (COWAMD1).

Evaluation Unit **SW7-EU2** has two named sites on the east branch of Craborchard Creek, COEAMD1 (Snake) and COEAMD2 (Crest and Beaver Pond). However, these sites are not recommended for treatment because of the extensive beaver activity in the vicinity. The ponding caused by the beavers serves to reduce the effect on water quality of the AMD sites and, at the same time, makes it very difficult to access the area.

Wells Branch (WBAMD1), in Evaluation Unit **SW7-EU3**, is also not recommended for treatment at this time. The existing water quality data indicates that the stream is in a pH-Recovering state for the lower half of its length. Future treatment of this site may be necessary if supported by valid water quality data. Table S lists the projected benefits of treatment of these evaluation units.

Table S – Subwatershed 7 Evaluation Units and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles) ¹	Miles of Potential Fishery Recovered ²
SW7-EU1	COWAMD2	Yes	0.45	3.17
SW7-EU2	COEAMD1 COEAMD2	No	0	0
SW7-EU3	WBAMD1	No	0	0

¹ Miles of streams directly impacted by treatment.

² Net gain in fisheries.

Subwatershed 12- Bobs Branch

There are two critically eroding sites in Evaluation Unit **SW12-EU1**: Route 606 Tipple (NFPCE1) and J&H Coal Tipple (NFPCE2). At the present time, each site is delivering about 14 tons/year of sediment to the North Fork Powell River. Due to the nature of the sites, the sediment is assumed to be contaminated by coal refuse, waste liquids, and heavy metals. Although there are no water quality sample sites in the vicinity, these sites are recommended for treatment because of their location within the put-and-take trout waters on the river. Table T lists the projected benefits of treatment of these evaluation units.

Table T – Subwatershed 12 Evaluation Unit and Projected Benefits

Evaluation Unit	Site ID	Impact on COE Sites	Projected Water Quality Improvement (Stream Miles)	Miles of Potential Fishery Recovered
SW12-EU1	NFPCE1 NFPCE2	No	Elimination of critical erosion of contaminated soil from four acres	No data available.

Summary

Completion of the 52 COE, AML, and NRCS sites will have significant benefits to the water quality and fisheries in the watershed. These project benefits are summarized in Table U. Alternative plans for achieving all or part of these benefits are evaluated in the following sections.

Note that although the COE and AML sites show little progress in miles of fisheries gained, the amount of water treated and planned for treatment is about three-quarters of the known AMD flows in the watershed.

FORMULATION AND COMPARISON OF ALTERNATIVES – ANALYSIS OF ALTERNATIVE TREATMENTS – Effects of Treatment by Subwatershed

Table U – Benefits Associated with Completion of COE, AML, and NRCS Projects

Subwatershed	COE and AML Projects	NRCS Projects	Units of Measurement
1 – Upper Stone and Ely Creeks	0.64 (3 COE sites) 440.8 0 0 0 0	2.11 (8 NRCS sites) 182 10 44.8 0.91 49.5	miles of stream protected gallons per minute (gpm) treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
2 – Straight and Puckett Creeks	1.23 (4 COE sites) 198.5 4 17.92 0 0	10.65 (12 NRCS sites) 51 26.75 119.84 10.52 89.8	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
3 – Reeds and Summers Creeks	1.69 (3 COE sites) 221.6 (1 AML site) 0.5 2.24 0.33 25.4	1.01 (6 NRCS sites) 26 0.5 2.24 1.98 63.9	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
4 – Jones and Mud Creeks	0.08 (1 COE site) 60 0 0 0 0	2.17 (5 NRCS sites) 16 10 44.8 3.51 68.2	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
5 – Cox Creek	N/A	0.6 (3 NRCS sites) 30 5 22.4 2.79 100	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
6 – Jordan Branch	N/A	1.15 (4 NRCS sites) ND 0 0 0 0	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
7 – Craborchard Creek and Wells Branch	7.8 (1 COE site) 45 0 0 0 0	0.45 (4 NRCS sites) 10 0 0 3.24 92.3	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
12 – Bobs Branch	N/A	0 (2 NRCS sites) 0 4 17.9 0 0	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered
Summary	4.34 (12 COE sites) 965.9 (1 AML site) 4.5 20.2 0.33 1.1	18.40 (44 NRCS sites) ** 315 56.25 252.0 22.95 74.3	miles of stream protected gpm treated acres of Critical Erosion treated reduction in sediment delivery, tons/year miles of fishery gained % of fishery recovered (of potential 30.89 miles)

*ND = No Data

** 39 sites will be completed by the NRCS project

DESCRIPTION OF ALTERNATIVE PLANS

Several different plans were considered as listed below.

Table V – Alternative Plans of Action

Alternative 1 – No NRCS Action (Future Without Project)

Alternative 2 – Positive Net Benefits Plan

Alternative 3 – Treatment of 39 AMD and Critically Eroding Sites in the Watershed

Alternative No. 1 - No NRCS Action (Future Without Project)

This scenario is based on four key assumptions: 1) the COE will complete all 12 of their identified project sites; 2) the Abandoned Mine Land (AML) program will complete one site on Reeds Creek; 3) grant funds will be sought and obtained by local and state agency coalitions to treat the four tipple sites and streambank erosion sites within the watershed; and 4) other efforts led by the State's TMDL initiative and projects led by DMME and the State Department of Health will deal with agricultural non-point source pollution and fecal contamination from human sources within the watershed. The fisheries of the North Fork Powell River tributaries are expected to remain in overall poor condition. This is because the watershed will still contain the 44 AMD and/or Critical Erosion sites evaluated for NRCS action within this plan. These sites will continue to contribute significant amounts of acid mine drainage and sediment to the streams.

Alternative No. 2 – Positive Net Benefits Plan

Of the eight subwatersheds evaluated, there are two that have a better than one to one benefit/cost ratio. Thus, installation of project funds in these subwatersheds is projected to yield positive net benefits, i.e., benefits that exceed projected costs. They are the Jones and Mud Creeks subwatershed (five sites in four Evaluation Units) and the Craborchard and Wells Branch subwatershed (one site in this Evaluation Unit). Treatment of these two subwatersheds will remove pH and Critical Erosion impairments, protect the ground water, enhance the fisheries, improve the aquatic and terrestrial habitat, create wetlands, improve aesthetic appearance of the sites, and, in general, create a better environment in these two subwatersheds.

Alternative No. 3 - Treatment of 39 identified Sites in the Watershed (Recommended Plan)

Under this alternative, seven of the eight impaired subwatersheds would receive treatment. There are a total 20 Evaluation Units with 39 individual sites that have been recommended for treatment. This alternative would treat all sites which impact stream segments capable of supporting fish. It would provide access to potential fisheries that are currently inaccessible due to downstream water quality impairments. It would also treat those sites located on impaired first order streams that have insufficient flow for a warm-water fishery to develop but that affect the health of the aquatic ecosystem. Treatment of these seven subwatersheds will remove pH and Critical Erosion impairments, protect the ground water, enhance the fisheries, improve the aquatic and terrestrial habitat, create wetlands, improve aesthetic appearance of the sites, and, in general, create a better environment for the entire watershed.

Alternative Plans of Action were presented to the public at a public meeting on April 3, 2007. Public meeting participants identified no additional viable alternative plans of actions to be considered during the planning process.

EFFECTS OF ALTERNATIVE PLANS

Overview

This section describes the economic, environmental and social effects of each alternative. The various effects of each alternative on the identified resource concerns will be discussed in detail.

Air Quality

Existing Conditions: There are no known air quality impacts within the watershed.

Alternative 1 - Future Without Project (No NRCS assistance): There will be some short-term negative effects on air quality associated with construction activities on the remaining seven COE projects and the one planned AML project.

Alternative 2 – Positive Net Benefits Plan: There will be some short-term negative effects on air quality associated with construction activities in the two treated subwatersheds.

Alternative 3 – Recommended Plan: There will be some short-term negative effects on air quality associated with construction activities. Air quality will benefit in the long-term due to increased vegetation on critically eroding lands and the resulting plant photosynthesis and carbon sequestration.

Benefits and Costs

Existing Conditions: The existing economy of the watershed is depressed. Poor water quality is just one of the potential causes of this condition.

Alternative 1 - Future Without Project (No NRCS assistance): Installation of the COE and AML projects will have a positive impact on the local economy during the construction period. This alternative does not have any direct project costs or benefits.

Alternative 2 - Positive Net Benefits Plan: Treatment of six sites will have a positive impact on the local economy during the construction period. Long-term benefits are associated with improved recreational opportunities created by the improvements in water quality. Initial installation costs plus technical assistance and administrative costs are \$175,000 for this alternative. The average annual benefit is \$21,600 and the average annual cost is \$14,900. The Benefit/Cost Ratio is 1.5 to 1.0.

Alternative 3 - Recommended Plan: Installation of works of improvement on 39 NRCS sites will have a positive impact on the local economy during the construction period. Long-term benefits are associated with improved recreational opportunities created by the improvements in water quality. Initial installation costs plus technical assistance and administrative costs are

\$1,800,000 for this alternative. The average annual benefit is \$55,500 and the average annual cost is \$111,100. The Benefit/Cost Ratio for this alternative is 0.5 to 1.0.

Cultural Resources

Existing Conditions: There are 40 known archaeological or historic sites within the watershed.

Alternative 1 - Future Without Project (No NRCS assistance): No known effects.

Alternative 2 - Positive Net Benefits Plan: All disturbance associated with the mine reclamation project will occur in areas previously disturbed during mining activities. Given the review of known sources and the extent of planned disturbance, the project will not impact any known cultural resources.

Alternative 3 – Recommended Plan: All disturbance associated with the mine reclamation project will occur in areas previously disturbed during mining activities. Given the review of known sources and the extent of planned disturbance, the project will not impact any known cultural resources. The planned work at the Tex Rivers Tipple site (RCUAMD4) will occur on the adjacent ground and will not impact the existing tipple structure which may become part of the Coal Heritage Trail that is under development by the community.

Economy

Existing Conditions: Per the detailed socio-economic write-up, Lee County in general and the subwatershed in particular, may be characterized as economically depressed due to low income levels, housing values, levels of education, poverty and health status.

Alternative 1 – Future Without Project (No NRCS assistance): This scenario will result in some local economic stimulus as the COE and DMME implement their remaining AMD projects. In the short-term, these already planned projects will provide some local employment effects as well as demand for materials and supplies, some of which will be provided locally. Over the longer-term, post-implementation of the projects will mainly see existing DMME personnel carrying out O&M activities associated with the COE and DMME AML projects. For these reasons no major or permanent employment effects are expected with this scenario. It is anticipated that there will be an increase in demand for materials and supplies procured locally associated with O&M and replacement of needed project components. However, the stimulus to the local economy is expected to be very limited. Therefore, the fundamental characteristics of the local economy will not change with implementation of the Future Without Project scenario.

Alternative 2 – Positive Net Benefits Plan: Like the COE and DMME project investments mentioned in the Future Without Project scenario, this alternative will also have limited short-term employment effects. In the long run, there will be some limited demands for materials and supplies associated with annual O&M and replacement. This project is projected to involve only \$175,000 in total costs including initial capital, technical assistance and administrative costs. Annual O&M is estimated to be \$5,200. DMME personnel also will carry-out annual O&M responsibilities associated with this alternative. As with Alternative 1, the Positive Net Benefits will not change the fundamental conditions and characteristics of the Lee County economy.

Alternative 3 – Recommended Plan: Like the COE and DMME project investments associated with the Future Without Project scenario and the Positive Net Benefits alternative, the Recommended Plan will have limited short-term employment effects. In the long run, there will be some limited demands for materials and supplies associated with annual O&M and replacement. The Recommended Plan is projected to entail a total investment of \$1,800,000 including initial capital, technical assistance and administrative costs. Annual O&M and replacement costs are estimated to be \$27,000. DMME personnel also will carry-out annual O&M and replacement responsibilities associated with this alternative. The Recommended Plan will stimulate the local economy significantly more than the Positive Net Benefits plan, but will not change the fundamental conditions and characteristics of the Lee County economy.

Education

Existing Conditions: With respect to general levels of education, the population within the watershed and Lee County as a whole suffers from low educational achievement compared to the state and national averages. The evaluated alternatives will not significantly affect existing or future education levels.

Alternative 1 – Future Without Project (No NRCS assistance): Projects such as the Osbourne Tipple Outdoor Classroom will increase educational opportunities within the watershed.

Alternative 2 – Positive Net Benefits Plan: No change anticipated.

Alternative 3 – Recommended Plan: No change anticipated.

Erosion and Sedimentation

Existing Conditions: At the present time, there are 18 sites in the watershed that have identified critical erosion problems. The 46.75 eroding acres contribute an average of 6.84 tons/acre/year of sediment to the stream system.

Alternative 1 – Future Without Project (No NRCS assistance): There are two planned projects that will include treatment of critical erosion. The sites have a total of 4.5 acres. Sediment delivery from these acres will be reduced to 2.36 tons/acre/year for a total of 10.6 tons/year.

Alternative 2 – Positive Net Benefits Plan: Reduced erosion and sedimentation will result from the implementation of treatment on 10 acres of critically eroding land. Sediment delivery from these acres will be reduced to 2.36 tons/acre/year for a total of 23.6 tons/year. Sediment delivered to the streams will be reduced by an estimated total of 44.8 tons annually on the 1.44 miles of stream identified as being impacted by critical erosion in these two subwatersheds.

Alternative 3 – Recommended Plan: Reduced erosion and sedimentation will result from the implementation of this alternative. Approximately 56.25 acres on 16 critically eroding areas will be graded, shaped and seeded to appropriate vegetation. Sediment delivery from these acres will be reduced to 2.36 tons/acre/year for a total of 132.75 tons/year. Sediment delivered to the streams will be reduced by an estimated total of 252 tons annually on the 13.77 miles of stream segments identified as being impacted by critical erosion.

Fisheries and Aquatic Resources

Existing Conditions: There are only 7.6 fishable miles of stream in the impaired subwatersheds of the 30.89 potential miles of fishable streams. Of these, 5.2 miles are pH-Acceptable and 2.4 miles are pH-Recovering. Benthic macro-invertebrates are also adversely affected by the AMD seeps and sedimentation from erosion within the watershed. Bacterial contamination and TDS also contribute to the degraded habitat conditions.

Alternative 1 – Future Without Project (No NRCS assistance): With the completion of the 12 COE projects, the two tipple reclamation sites, the two bank/gully erosion sites, and the AML site, there will be improvement to water quality. By treating the AMD, the pH and the associated metals contamination at these sites will improve to acceptable ranges and sedimentation will be reduced. Only about 0.33 miles of fisheries benefits are anticipated because most of the treatment sites are on first order streams. However, the COE and AML sites will treat approximately 966 gallons per minute of AMD water which could provide much suitable potential habitat if the downstream sites are treated by NRCS. The treated volume of water from these sites encompasses about 75 percent of the AMD water currently discharging into the streams.

Alternative 2 – Positive Net Benefits Plan: With the completion of the sites in these two subwatersheds, 2.62 miles of sediment and pH stream impairments will be removed and 6.75 miles of potential fisheries will be available. Approximately 26 gallons per minute of AMD water will be treated.

Alternative 3 – Recommended Plan: It is expected that with the installation of treatment measures on 24 AMD only sites, 7 critically eroding only sites, and 9 AMD and critically eroding sites will sustain the fisheries improvement already seen in the North Fork of the Powell River, and remove existing pH and sediment barriers on 18.4 stream miles which will allow fisheries reestablishment in those areas. The project will add 22.95 miles of unimpaired water for warm water fisheries. The benthic macro-invertebrate population will be substantially enhanced as these impairments are removed. Approximately 315 gallons per minute of AMD water will be treated.

Floodplains

Existing Conditions: Flooding has not been identified as a major issue in the watershed.

Alternative 1 – Future Without Project (No NRCS assistance): One house that is regularly flooded will be purchased and removed. No other changes are known.

Alternative 2 – Positive Net Benefits Plan: No changes are anticipated.

Alternative 3 – Recommended Plan: No changes are anticipated.

Forestry

Existing Conditions: The number of woodland acres is in decline in the watershed due to ongoing mining and timber harvesting activities.

EFFECTS OF ALTERNATIVE PLANS

Alternative 1 – Future Without Project (No NRCS assistance): Approximately 4.5 acres of critically eroding land will be re-vegetated, some of which may be planted to trees.

Alternative 2 – Positive Net Benefits Plan: Approximately 10 acres of critically eroding land will be re-vegetated, some of which may be planted to trees.

Alternative 3 – Recommended Plan: Approximately 56.25 acres of eroding land will be planted to trees, shrubs or grasses. Natural reforestation will occur over time where the grasses are planted.

Ground Water

Existing Conditions: Some of the ground water in the watershed is impaired to the point where it cannot be used as a reliable source of drinking water.

Alternative 1 – Future Without Project (No NRCS assistance): There will no immediate measurable changes to ground water as a result of these projects. However, improvements to surface water quality may contribute to improved ground water quality over time.

Alternative 2 – Positive Net Benefits Plan: There will no immediate measurable changes to ground water as a result of these projects. However, improvements to surface water quality may contribute to improved ground water quality over time.

Alternative 3 – Recommended Plan: There will no immediate measurable changes to ground water as a result of these projects. However, improvements to surface water quality may contribute to improved ground water quality over time.

Mined Land

Existing Conditions: There are 5,712 acres of permitted mine land and 2,700 acres of abandoned mined land in the watershed. Post-SMCRA mine reclamation has reduced the impact of mining within the watershed. Abandoned mine land is contributing the majority of the water quality impairments associated with mining.

Alternative 1 – Future Without Project (No NRCS assistance): Reclamation of sites within the watershed will reduce the water quality impairment from these sites.

Alternative 2 – Positive Net Benefits Plan: Reclamation of 6 AMD and/or Critically Eroding sites within the watershed will improve water quality.

Alternative 3 – Recommended Plan: Reclamation of 39 AMD and/or Critically Eroding abandoned mine sites within the watershed will improve water quality.

Prime Farmland

Since there are no prime farmlands in the watershed, there will be no change expected as a result of the plan.

Private Property

EFFECTS OF ALTERNATIVE PLANS

Existing Conditions: About 90% of the land in the watershed is owned by private landowners and businesses. Mining companies represent a large portion of the business sector. Many people are concerned that project activities within the watershed will involve a “taking” of their land.

Alternative 1 – Future Without Project (No NRCS assistance): Projects that are completed by the COE often require acquisition of the actual property by the local government. For AML projects, only an easement is required. However, since participation in these programs is voluntary, private property rights are respected.

Alternative 2 – Positive Net Benefits Plan: Participation in NRCS projects is also voluntary and no land acquisition is needed. However, participation does often require the use of an easement in order to install the proposed treatment and for the anticipated life of the project to facilitate maintenance.

Alternative 3 – Recommended Plan: Participation in NRCS projects is also voluntary and no land acquisition is needed. However, participation does often require the use of an easement in order to install the proposed treatment and for the anticipated life of the project to facilitate maintenance.

Recreation

Existing Conditions: There are limited opportunities for water-based recreation within the watershed due to the poor water quality. Currently, the North Fork Powell River has 3.5 miles of put-and-take trout fishery upstream of the confluence with Straight Creek. Warm water fisheries in the tributaries are limited due to water quality impairments.

Alternative 1 – Future Without Project (No NRCS assistance): Some water quality improvements will occur with installation of these projects. Approximately 0.33 miles of warm water fisheries will be regained by this alternative.

Alternative 2 – Positive Net Benefits Plan: With the completion of 6 sites, there will be 6.75 miles of additional unimpaired water that will be suitable for use as a warm-water fishery.

Alternative 3 – Recommended Plan: With the completion of these projects, there will be an additional 22.95 miles of unimpaired water that will be suitable for use as a warm-water fishery.

Sewage, Gray Water

Existing Conditions: Inadequate or failing septic systems are contributing to the water quality degradation seen in the watershed. Concerns by the public about gray water were expressed at the scoping meeting.

Alternative 1 – Future Without Project (No NRCS assistance): The planned COE and AML projects will have no impact on sewerage or gray water. The Lee County Board of Supervisors, the Virginia Department of Health, the Daniel Boone SWCD, and Lenowisco Planning District Commission are jointly addressing the sewerage and gray water issues. These activities are expected to continue.

Alternative 2 – Positive Net Benefits Plan: The planned projects will have no impact on sewerage or gray water.

Alternative 3 – Recommended Plan: The planned projects will have no impact on sewerage or gray water.

Socio-Economic Considerations

Existing Conditions: Lee County as a whole has income levels reflective of a depressed local economy. Education levels, housing values, and health statistics all point to depressed economic performance and social conditions.

Alternative 1 – Future Without Project (No NRCS assistance): Water quality within the watershed will improve with completion of the AML site and the remaining COE sites. There will be some short-term effects on the economy due to construction activities associated with installation of the remaining COE's project sites, as well as the State funded AML projects.

Alternative 2 – Positive Net Benefits Plan: Water quality within the watershed will improve with the completion of the six sites. There will be some short-term effects on the economy due to construction activities (temporary employment and the procurement of materials and supplies). Long-term economic impacts will be relatively small, limited to added materials purchases associated with operation and maintenance of the works of improvement. However, since these activities will be carried-out by existing personnel of DMME, no net gains in employment are expected over the long-term. There will also be some long-term improvements to health and recreation.

Alternative 3 – Recommended Plan: Water quality within the watershed will improve with the completion of the 39 sites. There will be some short-term effects on the economy due to construction activities (temporary employment and the procurement of materials and supplies). Long-term economic impacts of this alternative will also be relatively small, limited to added materials purchases associated with operation, maintenance and replacement of some components of the works of improvement. However, since these activities will be carried-out by existing personnel of DMME, no net gains in employment are expected over the long-term. There will also be some long-term improvements to health and recreation.

Solid Waste Disposal

Existing Conditions: Local residents have expressed concerns about the illegal trash dumping that is occurring within the watershed. This practice is detrimental to the aesthetics in the watershed and, therefore, is a deterrent to attracting businesses to the area.

Alternative 1 – Future Without Project (No NRCS assistance): Illegal trash dumping will not be addressed by the planned projects.

Alternative 2 – Positive Net Benefits Plan: Illegal trash dumping will not be addressed by the planned projects.

Alternative 3 – Recommended Plan: Illegal trash dumping will not be addressed by the planned projects.

Threatened and Endangered Species

Existing Conditions: The poor water quality throughout the watershed adversely affects both the aquatic and terrestrial Threatened and Endangered Species.

Alternative 1 – Future Without Project (No NRCS assistance): Some water quality improvements will be seen with implementation of the COE and AML projects. However, T&E species recovery is not anticipated due to the large numbers of sites that will not be treated.

Alternative 2 – Positive Net Benefits Plan: Some water quality improvements will be seen with treatment of the six sites. However, significant recovery for the 15 T&E freshwater mussel species and the five listed fish species is not anticipated due to the large numbers of sites that will not be treated.

Alternative 3 – Recommended Plan: Improvement of in-stream water quality from AMD treatment system discharges and critically eroding sites will not only allow re-establishment of aquatic communities and fisheries, and provide some benefit to several terrestrial species, but will set the stage for the recovery of the 15 threatened and endangered aquatic mussel species and the five fish species. While the re-establishment of aquatic communities can often be measured in terms of years, it is expected that the re-establishment of mussel species will probably be measured in decades. Prior to closing any adits or portals, the possible impacts to bats will be evaluated.

Transportation

Existing Conditions: Due to the existing low pH water, the Virginia Department of Transportation must select culvert materials that will resist corrosion damage. These materials are more expensive to purchase and install than standard materials used in neutral pH water. There are 14 culverts in the watershed affected by this condition.

Alternative 1 – Future Without Project (No NRCS assistance): The pH value will be raised for the water affecting one culvert on Jones Creek.

Alternative 2 – Positive Net Benefits Plan: The pH value will be raised for the water affecting one culvert on Craborchard Creek. No other changes are anticipated.

Alternative 3 – Recommended Plan: As a result of the completion of the project, the 12 culverts affected by AMD will gain about 10 years of useful life. In addition, when replacement is required, standard materials can be used. The water quality for one culvert on Craborchard Creek will remain unchanged.

Water Quality

Existing Conditions: The water quality in the watershed is degraded due to contamination from fecal coliform/E. coli bacteria, abandoned mines and their associated discharge of AMD, metals, and critical erosion, illegal trash dumps, abandoned tipples site, and eroding stream banks.

EFFECTS OF ALTERNATIVE PLANS

Alternative 1 – Future Without Project (No NRCS assistance): Completion of the COE and AML sites will treat 966 gallons per minute of AMD and its associated pH and metal contamination. They will also address 4.5 acres of critically eroding areas. This represents about 75% of the AMD flow and about 7% of the critical erosion that is impairing the water in the watershed.

Alternative 2 – Positive Net Benefits Plan: Completion of the six sites will treat AMD flows of 26 gallons per minute and 10 acres of critically eroding land. This will improve 2.62 miles of sediment and pH impaired water.

Alternative 3 – Recommended Plan: The net result of the installation of AMD treatment systems on 23 sites, seven critically eroding sites, and nine combined AMD and critically eroding sites, will be a gradual improvement of pH to more neutral levels, and reduction of sediment delivered to streams. When fully installed, the flow volume treated with this project is about 315 gallons per minute.

Wetlands

Existing Conditions: There are approximately 4.76 acres of wetlands in the watershed.

Alternative 1 – Future Without Project (No NRCS assistance): The wetlands that are already established by the five completed COE projects will be maintained in their existing condition and extent. New wetlands will be created as the remaining seven COE projects are completed.

Alternative 2 – Positive Net Benefits Plan: An estimated 0.2 acres of wetlands will be created by the AMD treatment of the six sites.

Alternative 3 – Recommended Plan: An estimated 7.8 acres of wetlands will be created by the proposed AMD treatment systems.

Wild and Scenic Rivers, Natural and Scenic Areas, and Visual Resources

Existing Conditions: There are no Wild and Scenic Rivers within the watershed. There are three conservation sites in the drainage listed as General Location Natural Heritage Resource Sites, and Cox Creek is listed as a Stream Conservation Unit for State Listed Species.

Alternative 1 – Future Without Project (No NRCS assistance): The visual appearance of the streams in the treated areas will assume a more natural appearance. No other change is anticipated.

Alternative 2 – Positive Net Benefits Plan: The visual appearance of the streams in the treated areas will assume a more natural appearance. No other change is anticipated.

Alternative 3 – Recommended Plan: The visual appearance of the streams in the treated areas will assume a more natural appearance. No other change is anticipated.

Wildlife Habitat

EFFECTS OF ALTERNATIVE PLANS

Existing Conditions: Wildlife habitat is impaired by the existing degraded water quality and sparsely vegetated areas that are critically eroding.

Alternative 1 – Future Without Project (No NRCS assistance): Some improvements to wildlife habitat will occur with completion of the 12 COE and one AML projects. Vegetation will be restored on 4.5 acres in Straight Creek and Reeds Creek subwatersheds. Wetlands and riparian fringe areas created by these treatments will also benefit terrestrial wildlife. Some impairment to pH will be removed from the stream in the Straight Creek, Summers Creek, Reeds Creek, Jones Creek, and Craborchard Creek subwatersheds, improving the available drinking water for wildlife in the vicinity of the treated sites.

Alternative 2 – Positive Net Benefits Plan: Wildlife habitat will be created on 10 acres due to the establishment of improved vegetation on critically eroding areas. Approximately 0.2 acres of wetlands and five ponds will be created which will benefit terrestrial wildlife. All known Impairments to pH will be removed from the Mud and Jones Creeks and Craborchard Creek which will improve the available drinking water for the wildlife within these subwatersheds.

Alternative 3 – Recommended Plan: Critical wildlife habitat in riparian zones will be improved along the streams where pH impairments are removed. The riparian vegetation will no longer be adversely affected by exposure to the acid water that occurs during overbank flow situations. Wildlife will also have better quality drinking water. The creation of 7.8 acres of wetlands, six ponds, and 56.25 acres of upland wildlife habitat throughout the watershed will provide new habitat for a variety of organisms. Species benefited will include amphibians, reptiles, shorebirds, tree and ground nesting birds, insect species, and mammals dependent on watercourses such as raccoons, beaver and muskrats.

Cumulative Effects

Existing Conditions: Water quality within the watershed will remain impaired and limit all beneficial uses of the streams.

Alternative 1 – Future Without Project (No NRCS assistance): The cumulative effects of the expected AMD projects to be funded by the Army Corps of Engineers and other funding sources will be to incrementally improve stream water quality and associated aquatic ecosystems, but within very limited areas of influence. Thus, the level of land treatment required to achieve critical mass and significantly alter the watershed's aquatic resource conditions will not be achieved.

Alternative 2 – Positive Net Benefits Plan: The cumulative effects of treatment of six sites under the Positive Net Benefits Plan would be characterized by substantial improvement in in-stream water quality and associated aquatic ecosystems, but within very limited areas of the overall watershed. Thus, the level of land treatment required to achieve critical mass and significantly alter the entire watershed's aquatic resource conditions will not be achieved.

Alternative 3 – Recommended Plan: The cumulative effects of the planned 39 AMD and critical erosion control projects to be implemented with the Recommended Plan, along with the already planned Army Corps and DMME projects, are expected to achieve the critical mass necessary to significantly alter the watershed's aquatic resource conditions and associated beneficial uses.

COMPARISON OF ALTERNATIVE PLANS

The following table displays the summary and comparison of the Candidate Plans.

Table W – Summary and Comparison of Candidate Plans

Effects	Alternative 1 – Future Without Project (No NRCS Action)	Alternative 2 – Positive Net Benefits Plan	Alternative 3 – Treatment of 39 Identified Sites (Recommended Plan)
Measures	Treat 17 AMD and CE sites	Treat six sites	Treat 39 AMD and CE sites
Project Investment	\$0	\$175,000	\$1,800,000
Project Costs and Benefits			
Annualized Benefits (AAEs ¹)	---	\$21,600	\$55,500
Annualized Costs (AAEs)	---	\$14,900	\$111,100
Net Benefits (AAEs)	---	\$6,700	- \$55,600
Benefit/Cost Ratios	---	1.5 to 1.0	0.5 to 1
Estimated OM&R	---	\$5,200	\$26,500
Environmental Considerations			
Air Quality	No effects	No effects	No effects
Cultural Resources	No adverse effect	No adverse effect	No adverse effect
Erosion and Sedimentation	- Negative effects continue from untreated critically eroding sites. - Sediment delivered to streams will be reduced by 10.6 tons/year	- Treatment on 10 acres of critically eroding sites. - Sediment delivered to streams will be reduced by 44.8 tons/year	- Treatment on 56.25 acres of critically eroding sites. - Sediment delivered to streams will be reduced by 252 tons/year
Fisheries & Aquatic Resources	- Negative effects continue from untreated AMD sites - 0.33 miles of fishery gain	6.75 miles of fishery gained	22.95 miles of fishery gained
Floodplains	No effects	No effects	No effects
Forestry	4.5 acres revegetated	10 acres revegetated	56.25 acres revegetated

¹ AAEs = Average annual equivalents which is the means for amortizing project benefits and costs. AAEs take into account a period of analysis based on an installation period and each investment's anticipated useful life. In this case, the expected installation period is 10 years and the expected useful life of each project is 25 years for a 35 year period of evaluation.

EFFECTS OF ALTERNATIVE PLANS – COMPARISON OF ALTERNATIVE PLANS

Effects	Alternative 1 – Future Without Project (No NRCS Action)	Alternative 2 – Positive Net Benefits Plan	Alternative 3 – Treatment of 39 Identified Sites (Recommended Plan)
Ground Water	Some surface water improvements due to treating ground water discharge on COE and AML treated sites.	Additional surface water improvements due to treating ground water discharge on six NRCS sites.	Additional surface water improvements due to treating ground water discharge on 39 NRCS sites.
Prime and Unique Farmlands	No effects	No effects	No effects
Threatened & Endangered Species	No significant change to existing conditions	Limited opportunity for habitat improvement for 15 T&E freshwater mussel species and five listed fish species	Increased long term potential for improved habitat and survival for 15 T&E freshwater mussel species and five listed fish species
Water Quality	- Some water quality improvements due to COE and AML treated sites. - Degraded water quality continues to exist due to untreated sites	- Reduction of 44.8 Tons/Yr. of sediment delivered to streams - 2.62 miles of stream protected through removal of pH and sediment impairments - 26 gpm of AMD discharge treated	- Reduction of 252 Tons/Yr. of sediment delivered to streams - 18.46 miles of stream protected through removal of pH and sediment impairments - 315 gpm of AMD discharge treated
Wetlands	Unknown	0.2 acres created	7.8 acres created
Wild & Scenic Rivers	No effects	No effects	No effects
Wildlife Habitat	4.5 acres created	10 acres created	- 56.25 acres of wildlife habitat created on critically eroding sites - 6 ponds created
Socio-economic Considerations			
Public Health	Negative effects continue	Positive effects across all groups, but especially the poor	Positive effects across all groups, but especially the poor
Economy	Negative effects continue	Positive short-term (5 yrs) & long-term (10-35 yrs)	Greatest positive effects in both the short and long-term
Civil Rights Impacts	No effects	Positive effects across all groups	Positive effects across all groups
Education	Outdoor classroom added	No change anticipated	No change anticipated
Environmental Justice Impacts	Poor disproportionately affected by negative environmental conditions	No disparate treatment	No disparate treatment
Private Property	Voluntary participation	Voluntary participation	Voluntary participation
Recreation	0.33 miles of fishery gained	6.75 miles of fishery gained	22.95 miles of fishery gained

EFFECTS OF ALTERNATIVE PLANS – COMPARISON OF ALTERNATIVE PLANS

Effects	Alternative 1 – Future Without Project (No NRCS Action)	Alternative 2 – Positive Net Benefits Plan	Alternative 3 – Treatment of 39 Identified Sites (Recommended Plan)
Transportation	Positive effects across all groups due to increased useful life of one road culvert	Positive effects across all groups due to increased useful life of one road culvert	Positive effects across all groups due to increased useful lives of 12 road culverts
Land Use & Management	Suppressed resource conditions continue	Limited changes will occur due to improved vegetation	Improved resource conditions due to improved land management
Economic Impact Considerations			
Annualized Benefits:			
Region -	---	\$21,600	\$55,500
Rest of Nation -	---	\$0	\$0
Annualized Costs:			
Region -	---	\$4,600	\$34,300
Rest of Nation -	---	\$10,300	\$76,800

RISK AND UNCERTAINTY

It is the nature of fractured geologic formations arising from mining operations that the subsurface flow of ground water is altered, sometimes drastically. This makes it possible for existing but unknown subsurface flows to contribute AMD that could currently be masked or hidden from observation and understanding. It is also possible that new subsurface, or even surface flows, could develop over time due to the fractured state of mine land geology and these sources could lead to reductions in NRCS project effectiveness. An extended period of very wet weather, an intense rainfall event, or an underground seismic event could result in new acid seeps or, in the worst case, a sudden release of a large volume of AMD. These are real possibilities and the only solution is to treat the site(s) as they become visible.

The estimates for erosion, sedimentation, costs and benefits were based upon the best data available at the time of the evaluation and development of the watershed plan. Many of the estimates are based on a wealth of local agency knowledge of the watershed. The analyses contained herein are substantially dependent upon existing data sets, especially for water quality parameters. These data sets, like all natural resource data, are subject to inaccuracies associated with data collection, management and analysis. However, this risk is considered minimal due to the abundance and consistency of data. The data provides a clear set of cause and effect relationships.

EFFECTS OF ALTERNATIVE PLANS

The implementation of conservation practices to reduce acid mine drainage, erosion and sedimentation and improve water quality and aquatic species habitat are uncertain undertakings due to both the voluntary nature of the program and the risk inherent in understanding the effects of the planned practices on the ecosystem. During planning each site was evaluated based on knowledge of land ownership and past participation in similar projects. It was determined that the majority of landowners would be cooperative and would be expected to allow access to install the planned works of improvement. Of the remaining sites, some were deemed problematic either due to pending changes in ownership or existing access issues. Some were private landowners and some were corporate or railroad properties. The actual number of landowners cooperating with the Sponsors to install systems will be determined during the operational phase of the project. Given that changes in land tenure precluded making a determination about expected participation, no sites were eliminated from consideration for needed treatment based on participation.

The impacts of the ongoing COE, AML, and community programs were accounted for in the “without project” condition. The planned reduction in pH levels, erosion and sedimentation were limited to those additional reductions expected as a result of this project. While the estimates of project impacts were made with the best information available, errors measuring or estimating actual impacts to the ecosystem may occur. Variance between planned and actual costs and benefit estimates may also occur.

RATIONALE FOR PLAN SELECTION

The North Fork of the Powell River Watershed Plan is recommending installation of land treatment practices only. These practices are intended to reduce the delivery of environmental contaminants emanating from abandoned mine lands which currently diminish water quality. All of the recommended practices are contained within the NRCS National Handbook of Conservation Practices. Both treatment alternatives meet the requirements delineated in the NRCS National Watershed Manual (NWSM), Section 503.46, paragraph b), to be designated as a “Watershed Protection Plan”. Furthermore, per NWSM Part 503, subpart 503.02(b), “Projects that include only land treatment measures will be planned in accordance with the procedures of the P&G (Environmental Principles and Guidelines), but identification of the NED plan is not required.”

Alternatively, by installing approved land treatment practices, Watershed Protection Plans only need to identify and recommend the least costly and environmentally most acceptable project investment consistent with the local sponsor’s needs and project purposes. The recommended alternative will accelerate achievement of the level of resource improvement that the local sponsors are seeking by providing the levels of technical assistance and financial resources needed to rapidly moving forward with project implementation. The positive net benefits alternative would deal with only six of 39 sites needing treatment and therefore would serve the local sponsor’s purpose, but would not meet their treatment goal.

The Recommended Plan best meets the Watershed Protection Plan criteria by comprehensively addressing all existing AMD and CE problems of significance in the watershed. The following discussion describes the key differences between the Positive Net Benefits alternative and the Recommended Plan by analyzing each plan in view of the four key criteria specified in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G): completeness, effectiveness, efficiency, and acceptability.

EFFECTS OF ALTERNATIVE PLANS

Completeness: Alternative 3 was selected as the Recommended Plan because completion of the added sites included in this alternative will result in the removal of 39 known sources of pH and critical erosion impairments in need of treatment within the watershed. For this reason, Alternative 3 is considered the plan that best protects the downstream water and aquatic resources while also allowing the on-site resources to recover from their long-standing degraded state. The treatment of these sites will complement the AMD and CE efforts already planned and/or underway by the COE and DMME.

Effectiveness: The Recommended Plan achieves the highest level of water quality improvements and thereby restores a greater percentage of the potential fishery of the three alternatives. The Positive Net Benefits plan would restore 21.8% (6.75 miles) of the potential warm water fishery. The Recommended Plan will restore 74.3% (22.95 miles) of the 30.89 total miles of stream within the subwatersheds where a fishery is possible.

Efficiency: The treatments selected for each individual site covered by the Recommended Plan were identified based on cost effectiveness, i.e., achievement of the desired water quality discharged from each site at least cost consistent with protecting the Nation's environment.

Acceptability: The plan best meets the purpose, needs and water quality goals and objectives of the sponsors and the interests of downstream residents because it treats almost all known sources of AMD and CE. The Recommended Plan also is projected to achieve the highest possible level of restoration of aquatic resources including warm water fishery potential and fresh water mussel habitat.

Positive Net Benefits Plan Description: The Positive Net Benefits plan consists of an investment of \$175,000 to treat two subwatersheds with six sites. This alternative has average annual equivalent costs (AAEs) of \$14,900; the AAE benefits of this alternative are estimated to be \$21,600, and the Benefit/Cost ratio is 1.5 to 1.0.

Description of the Added Increment Beyond the Positive Net Benefits Plan: The increased cost of the recommended plan, above the investment associated with the Positive Net Benefits Plan, is \$1,625,000. The recommended plan would treat a total of 39 sites (33 more than the Positive Net Benefits alternative) within seven of the eight subwatersheds analyzed in this workplan. This added increment has AAE costs of \$111,000 and AAE benefits estimated at \$55,500. Thus, the added increment associated with the recommended plan adds \$96,100 in AAE costs and \$33,900 of AAE benefits. The added increment has \$0.35 in added benefits for each additional \$1 in costs expended. The recommended alternative has an overall benefit/cost ratio of 0.5 to 1.0.

The added increment of investment is justified due to the substantial non-monetary benefits (ecosystem restoration benefits), the substantial amount of additional monetary benefits and due to the fact that this project will perfectly complement ongoing COE's project investments, state-funded AML project investments, and DMME, Lee County, and Virginia Department of Health investments. Investments by DMME, Lee County and the Virginia Department of Health are intended to clean up nonpoint sources of pollution due to agriculture and uncontrolled and improperly disposed human sewage by providing proper sewage treatment. They have also worked to provide potable water for many residents of the watershed. In addition, the recommended alternative will inject greater resources and provide benefits to an economically and socially disadvantaged local economy. Lastly, the recommended alternative will complement ongoing DEQ

EFFECTS OF ALTERNATIVE PLANS

TMDL efforts to remove multiple miles of the North Fork and its tributaries from the impaired streams list due to excessive fecal coliform bacteria and non-conformity to the general standard for benthic organisms, mainly due to AMD, heavy metals and sediment from abandoned mine lands and agriculture. For all of these reasons, the recommended plan is considered a resource protection and ecosystem restoration plan. It best meets the interests and needs of the local sponsors, collaborating agencies and the general public.

Coupled with the other concurrent non-project water quality investments and activities, the recommended alternative will result in restoration of higher water quality from reduced acidity, lower sediment loadings and reduced deposition and transport of heavy metals. These improvements will help create stream ecology conditions conducive to the return of benthic organisms. Return of the benthic organisms will provide the basis for a warm water fishery to re-establish itself on a widespread basis within the watershed after approximately 100 years of degraded conditions. Lastly, one other significant non-monetary water quality benefit will result from implementation of the alternative: a cleaner watershed will contribute cleaner water and therefore should significantly help the threatened and endangered species resident downstream of the watershed to achieve higher survival rates. Improved survival of the area's T&E mussel species will be a major benefit of this project.

Economic Benefits Foregone: No economic benefits directly associated with this project will be forgone as a result of implementing the recommended alternative due to the fact that this plan includes the increment of treatment accomplished by the Positive Net Benefits plan. The Positive Net Benefits plan is an integral component of the recommended plan. The only economic benefits forgone by including the added increment would be those forgone as a result of funding this project and not funding some other alternative federal project investment.

Table X summarizes and compares the Positive Net Benefits Plan and the Recommended Plan with respect to several benefit categories.

Table X – Positive Net Benefits and Recommended Plan Comparison

Positive Net Benefits Plan	Recommended Plan	Net Difference
Some increased potential to restore critical habitat for 15 T&E freshwater mussel species and 5 fish species	Significantly greater potential to restore critical habitat and survival for 15 T&E freshwater mussel species and 5 fish species	Substantial improvement of critical habitat and survival for T&E freshwater mussel species and fish species
Remove pH and/or sediment impairments to water quality on 2.62 miles of streams	Remove pH and/or sediment impairments to water quality on 18.46 miles of streams	Provides 15.84 additional miles of water quality improvements
Gain 6.75 miles of warm water fisheries and associated recreational opportunities	Gain 22.95 miles of warm water fisheries and associated recreational opportunities	Provides 16.2 additional miles of warm water fisheries and recreational opportunities
Treat 26 gallons per minute of acid mine drainage	Treat 315 gallons per minute of acid mine drainage	Treats 289 additional gallons per minute of AMD
Reduce sediment delivered to the streams by 23.6 tons per year	Reduce sediment delivered to the streams by 252 tons per year	Reduces sediment delivered to streams by 228.4 tons per year
Create 0.2 acres of wetlands	Create 7.8 acres of wetlands	Creates an additional 7.6 acres of wetlands
Limited improvements to aesthetics of the local natural resources and aquatic ecosystems which improves the human environment and the regional image of the watershed	Significant improvements to aesthetics of the local natural resources and aquatic ecosystems which improves the human environment and the regional image of the watershed	Offers substantial improvements to natural, aquatic, and human environment as well as the regional image of the watershed
\$21,600 in annualized benefits	\$55,500 in annualized benefits	\$33,900 in added annual benefits
\$14,900 in annualized costs	\$111,000 in annualized costs	\$96,100 in added annual costs
\$6,700 in net annual benefits	-\$55,500 in net annual benefits	-\$62,200 in net annual benefits
1.5 to 1.0 benefit cost ratio	0.5 to 1.0 benefit to cost ratio	0.35 to 1.0 benefit cost ratio for the added increment of treatment

Limited Resource/Disadvantaged Communities or Groups Analysis: The economic cost of the added increment of treatment is justified by the added monetary and non-monetary ecosystem benefits discussed above and is supported by the fact that the added project investments will serve a community that clearly is economically and socially disadvantaged.

Median housing values in Lee County are only 45% of the state-wide value according to the 2000 Census and 47% of the national value. In addition, using 2003-2005 data from the federal Bureau of Economic Analysis, the three-year average per capita income for Lee County is only 64.8% of the national three-year average and only 59.9% of the state-wide value. Although data for these statistics for the entire watershed are unavailable, income and housing value data for three towns

contained within the watershed are available and are presented in Table Y along with the state and national data.

Table Y - Limited Resource/Disadvantaged Communities or Groups Criteria

Region/Locality	Average Housing Value (2000 Census data)	Average Per Capita Income	Current Unemployment (2000 Census data)
USA	\$120,467	\$33,009	5.3%
Virginia	\$125,400	\$35,726	2.8%
Lee County	\$56,900 (45.4% of VA, 47.2% of USA)	\$21,405 (64.9% of USA)	3.8%
Pennington Gap	\$57,300 (45.7% of VA, 47.6% of USA)	\$13,742 (41.6% of USA)	2.7%
St. Charles	\$18,400 (14.7% of VA, 15.3% of USA)	\$10,133 (30.7% of the USA)	1.7%
Keokee	\$42,300 (33.7% of VA, 35.1% of USA)	\$11,025 (33.4% of USA)	0.0%

Sources for per capita income data: 2003-2005 Bureau of Economic Analysis data for USA and VA; 2000 Census, U.S. Department of Commerce data for Lee County Towns;

A more complete picture of the Lee County workforce, employment and poverty conditions emerges looking at the 2000 Census statistics for households with: 1) Social Security Income; 2) Supplemental Security Income; and 3) Public Assistance Income. Social Security Income includes retirement income for individuals, as well as income for persons with disabilities regardless of their age. Social Security Income is funded through Social Security taxes. “Supplemental Security Income (SSI) is a federal income supplement program funded by general tax revenues (not Social Security taxes): It is designed to help aged, blind, and disabled people, who have little or no income; and it provides cash to meet basic needs for food, clothing, and shelter.”¹ Public assistance income includes general assistance and Temporary Assistance to Needy Families (TANF) which is funded through the U.S. Department of Health and Human Services.² Public assistance was formerly known as welfare, but was officially termed Aid to Families with Dependent Children (AFDC). Temporary Assistance to Needy Families is targeted to adults with dependents. The following table displays the 2000 Census data for all three income categories for Lee County, Virginia and the entire USA:

¹ Social Security Administration at <http://www.ssa.gov/notices/supplemental-security-income/>

² U.S. Census Bureau - Census of Population & Housing, 2000 Summary; File 3 Table P64 and <http://www.acf.hhs.gov/programs/ofa/>

Table Z - Participation in Income Assistance Programs of the Federal Government

Program	% of Lee County Households receiving public income assistance	% of Virginia Households receiving public income assistance	% of Households in the USA receiving public income assistance	Lee County Beneficiaries compared to Virginia Beneficiaries (rate/rate)	Lee County Beneficiaries compared to USA Beneficiaries (rate/rate)
Social Security Income	42.2%	23.4%	25.7%	180%	164%
Supplemental Security Income	12.6%	3.5%	4.4%	360%	286%
Public Assistance Income (TANF)	8.7%	2.5%	3.4%	348%	256%

Source: 2000 Census, U.S. Department of Commerce

RECOMMENDED PLAN

Purpose and Summary

The Recommended Plan involves treating 39 sites identified in the watershed as needing treatment. Completion of this plan will address all of the identified impairments that are eligible for the PL-566 Program. This plan will improve the water quality in the watershed by remediating the effects of pre-SMCRA coal mining within the watershed. Implementation of this plan will neutralize the low pH values and their associated pollutants that are presently impairing the use of the water for drinking, recreation, and fisheries. It will also reduce erosion from abandoned surface mines and landslides, thereby reducing the effects of excessive sedimentation in the water.

Measures to be Installed

Of the many possible measures that could be installed, eleven of them were selected consistently throughout the project area. These are listed in Table AA.

Table AA - Measures to be Installed

Measure	Quantity
Aerobic Wetland	8
Anaerobic Wetland	3
OLC	21
Pond	6
Portal Closure	3
SAPS	5
Diversion	7
Eliminate highwall	2
Grade and revegetate	12
Remove waste material	2
Rock toe buttress, grade, shape, revegetate	4

Permits and Compliance

The Sponsors will be responsible to obtain any necessary permits. Some sites may require 404 and/or 401 permits in order to install needed practices. No adverse effects on cultural resources, wetlands or floodplains are anticipated. The Sponsors will be made aware that it is their responsibility to follow recommendations to avoid known cultural resource locations. Should cultural resources be found during the implementation of this project, appropriate federal procedures will be followed to avoid, minimize, or mitigate any adverse effects.

Costs

Table 1 on page 96 displays estimated installation costs. Table 2 displays costs by cost category. Table 4 displays annualized costs. Table 5a displays annualized benefits. Table 6 displays a comparison of the benefits and costs.

RECOMMENDED PLAN

Installation and Financing

The order for installing the planned works of improvement was prioritized based on a ranking table utilizing: 1) scoring that favored proximity to/being complementary to the Army Corp of Engineer project sites; 2) severity/volume of AMD discharged per site; 3) percent of fishery recovered; and 4) each individual subwatershed benefit/cost ratio. Table BB shows the ranking matrix used to prioritize subwatershed investments.

Table BB - North Fork of the Powell River: Subwatershed Ranking Matrix

Subwatershed (SW)	SW #	COE Rank	GPM Treated	GPM Rank	% of Fishery Recovered	% of Fishery Recovered Rank	B/C Ratio	B/C Ratio Rank	Total Score	Overall Rank Order
Ely and Stone Creeks	SW1	1	182	1	49.50%	6	0.1	6	14	4
Straight and Puckett Creeks	SW2	1	51	2	89.80%	3	0.6	3	9	1
Reeds and Summers Creeks	SW3	1	26	4	63.90%	5	0.5	4	14	4
Mud and Jones Creeks	SW4	1	16	5	68.20%	4	1.0	2	12	3
Cox Creek	SW5	8	30	3	100.00%	1	0.3	5	17	5
Jordan Branch	SW6	8	0	7	0.00%	7	0.03	7	29	6
Craborchard Creek and Wells Branch	SW7	1	10	6	92.30%	2	2.0	1	10	2
Bob's Branch	SW12	8	0	7	0.00%	7	0.00	8	30	7

Technical assistance will be provided based on the rank order provided above and the ability of DMME to secure the necessary agreement from the landowners to participate in the program. To the extent practicable, assistance will be provided within each subwatershed based on the stream segments which could become pH-A for the least-cost.

Federal assistance for carrying out this plan will be provided under the authority of Public Law 83-566. Local financing will come from DMME and other sponsors.

Table CC provides the schedule for project installation. Once the project has been authorized and funds appropriated, the sign-up period for landowners to submit applications to the sponsors to participate in the program will be five years with ten years for practice installation, beginning with the first signup. The practices are expected to have a 25-year life. There will be a 35-year period of analysis.

Table CC – Schedule of Obligations¹

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
1	2008	Straight & Puckett Creeks	2	\$99,250	\$53,250	\$152,500
		Technical Assistance		\$24,000	\$0	\$24,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 1 (2008) Subtotals:				\$125,250	\$57,250	\$182,500

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
2	2009	Straight & Puckett Creeks	2	\$99,250	\$53,250	\$152,500
		Technical Assistance		\$24,000	\$0	\$24,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 2 (2009) Subtotals:				\$125,250	\$57,250	\$182,500

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
3	2010	Straight & Puckett Creeks	2	\$99,250	\$53,250	\$152,500
		Technical Assistance		\$24,000	\$0	\$24,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 3 (2010) Subtotals:				\$125,250	\$57,250	\$182,500

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
4	2011	Straight & Puckett Creeks	2	\$99,250	\$53,250	\$152,500
		Technical Assistance		\$24,000	\$0	\$24,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 4 (2011) Subtotals:				\$125,250	\$57,250	\$182,500
Subtotals for the Straight & Puckett Creek Subwatershed:				\$501,000	\$229,000	\$730,000

Table CC – Schedule of Obligations¹ (cont.)

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
5	2012	Craborchard Creek & Wells Branch Mud & Jones Creeks	7 and 4	\$92,000	\$49,000	\$141,000
		Technical Assistance		\$28,000	\$0	\$28,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 5 (2012) Subtotals:				\$122,000	\$53,000	\$175,000
Subtotals for the Craborchard Creek & Wells Branch SW				\$38,000	\$17,000	\$55,000
Subtotals for the Mud and Jones Creek Subwatershed				\$84,000	\$36,000	\$120,000

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
6	2013	Ely & Upper Stone Creeks	1	\$101,500	\$55,000	\$156,500
		Technical Assistance		\$27,000	\$0	\$27,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 6 (2013) Subtotals:				\$130,500	\$59,000	189,500

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
7	2014	Ely & Upper Stone Creeks	1	\$101,500	\$55,000	\$156,500
		Technical Assistance		\$27,000	\$0	\$27,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 7 (2014) Subtotals:				\$130,500	\$59,000	189,500
Subtotals for the Ely and Stone Creek Subwatershed				\$261,000	\$118,000	\$379,000

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
8	2015	Reeds & Summers Creeks	3	\$83,000	\$45,000	\$128,000
		Technical Assistance		\$24,000	\$0	\$24,000
		Project Administration		\$2,000	\$3,000	\$5,000
Year 8 (2015) Subtotals:				\$109,000	\$48,000	\$157,000
Subtotal for Reeds and Summers Creek Subwatershed				\$109,000	\$48,000	\$157,000

Table CC – Schedule of Obligations¹ (cont.)

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
9	2016	Cox Creek	5	\$111,000	\$60,000	\$171,000
		Technical Assistance		\$31,000	\$0	\$31,000
		Project Administration		\$2,000	\$4,000	\$6,000
Year 9 (2016) Subtotals:				\$144,000	\$64,000	\$208,000
Subtotals for Cox Creek Subwatershed :				\$144,000	\$64,000	\$208,000

Year Number	Year	Subwatershed	Sub-Watershed Number	PL-566 Costs	Other's Costs	Total Costs
10	2017	Jordan Branch and Bobs Branch	6 and 12	\$78,000	\$43,000	\$121,000
		Technical Assistance		\$25,000	\$0	\$25,000
		Project Administration		\$2,000	\$3,000	\$5,000
Year 10 (2017) Subtotals:				\$105,000	\$46,000	\$151,000
Subtotals for Jordan Branch SW:				\$27,000	\$15,000	\$42,000
Subtotals for Bobs Branch SW:				\$71,000	\$38,000	\$109,000
Grand Totals for all 8 Subwatersheds				\$1,242,000	\$558,000	\$1,800,000

1/ Price base: March 2007; These cost estimates represent the undiscounted initial investment, technical assistance, and project administration costs only. Excluded are the annual operation and maintenance costs and periodic replacement costs. These other costs are included in the overall benefit/cost analysis.

Contracting

The planned treatment measures are to be installed/implemented under a project agreement between the DMME and the NRCS. The sponsors will accept applications from landowners during the first five years of the operational project. Any landowner of the identified acid mine drainage and/or critically eroding sites within the watershed will be eligible for assistance based on a worst-problems-first priority system developed by the Sponsors and NRCS.

DMME will provide accelerated design and installation assistance to construct the measures on private lands. DMME will perform competitive bidding and award contracts to best qualified contractors. Construction contracts will be implemented under the technical and administrative leadership of the DMME in accordance with provisions stipulated in each contract developed to implement the individual projects. The installation period will be specified in each contract. DMME will be subject to repayment of cost-share payments (or portions thereof) should they fail to properly operate and maintain the installed measures during the 25-year life of the practices.

Conditions For Providing Assistance

This is not a fund obligating document. Financial and other assistance to be furnished by NRCS in carrying out this plan is contingent upon the availability of federal appropriations and the sponsors' ability to obtain the necessary landrights, permits, and technical and financial assistance funds.

RECOMMENDED PLAN

Landowners and/or operators must have land that is contributing to water quality problems in the watershed and have control of the land for the anticipated life of the contract, in order to be eligible to participate. Cost-share assistance under this program is limited to those areas that are in need of improvement measures.

Operation, Maintenance And Replacement

DMME will be responsible for annual operation and maintenance, as well as periodic replacement (OM&R) costs, if applicable, for each installed site. The Sponsors will be responsible for OM&R which includes any activities or materials necessary to assure each measure is performing as it was intended.

Representatives of the Daniel Boone SWCD and DMME will make annual inspections of the installed measures to determine operation and maintenance needs.

Landrights

All of the planned structural measures are to be installed on property controlled by the sponsors or participating landowners. Therefore, secured landrights will be needed on a voluntary basis.

Short-term Versus Long-term Use of Resources

Installation of the plan will be compatible with the projected long-term use of the land, water and other natural resources of the area. Water quality protection is a high priority item within the watershed as well as the Powell River basin. The plan is compatible with the water quality objectives of Lee County, the Daniel Boone SWCD and DMME. Installation of the plan will help alleviate problems associated with the 44 AMD and Critical Erosion sites and will also enhance options available for long-term economic and urban growth. Through the implementation of this plan, the project will protect and improve water quality.

Irreversible and Irretrievable Commitment of Resources

Labor and energy required for construction and maintenance of treatment measures will be irretrievably committed. This area of southwest Virginia, at present, has available labor. Some land use conversion will occur as a result of the installation of project measures.

Relationship to Other Plans, Policies, and Controls

The proposed improvements in this plan will not conflict with the objectives and specific terms of any approved or proposed federal, state, or local land use plans. The improvements in this plan will complement the COE AMD projects, the DMME AML Program and other ongoing programs to the benefit of the land users in the watershed, but not to the detriment of other agencies who administer them. Refer to Table DD for the effects of the plan on the resources of principal national recognition.

Project Interaction

The Daniel Boone SWCD, DMME and NRCS will provide technical assistance to the landusers in the watershed to develop detailed designs and construction plans and specifications. The sponsors will assist the landusers in the application of needed measures. The NRCS will provide cost-share funds for the planned measures.

RECOMMENDED PLAN

The local sponsors and many other supporting agencies and organizations will be complementary participants in this much needed project as demonstrated by their widespread input and support during the planning process.

RECOMMENDED PLAN

Table DD - Effects of the Recommended Plan on Resources of Principal National Recognition

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Air Quality	Clean Air Act, as amended (42 U.S.C. 1857h-7 et seq.)	No change except during the construction period.
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended, (16 U.S.C. 1451, et seq.)	The project area is not located in a coastal zone.
Endangered and Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	Water quality and habitat improved due to higher pH and reduced sedimentation.
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	Water quality and habitat improved due to higher pH and reduced sedimentation.
Floodplains	Executive Order 11988, Floodplain Management	Reduced sediment deposition.
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended, (16 U.S.C. Sec. 470, et seq.)	No adverse effect.
Prime and Unique Farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act. Farmland Protection Policy Act of 1981, (7 U.S.C. 4201 et seq.)	No effect.
Water Quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	Improved due to higher pH and reduced erosion and sedimentation

RECOMMENDED PLAN

Table DD - Effects of the Recommended Plan on Resources of Principal National Recognition (Cont.)

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Wetlands	Executive Order 11990, Protection of Wetlands; Clean Water Act of 1977 (42 U.S.C. 1857H-7, et seq.)	No loss of wetlands. Addition of 7.8 acres of wetlands for treatment of acid mine drainage.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended, (16 U.S.C. U.S.C. 1271 et seq.)	Improved aesthetics. No designated areas in watershed.
Economic	NA	Increased recreation through fishing; improved aesthetics and economic opportunities.
Fisheries	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	All fisheries will benefit from higher pH, better water and reduced sedimentation. 22.95 mi. of fisheries gained.
Forestry	NA	Some critically eroding areas will be planted to trees/shrubs.
Recreation	NA	Increased recreation through improved fisheries. Increased swimming and water contact sports.
Riparian Zone	NA	Improved riparian zone vegetation due to project activities.

CONSULTATION AND PUBLIC PARTICIPATION

Local, State and Federal support for the proposed project has been very strong. Input and involvement of the public has been solicited throughout the planning of the project. Through meetings and correspondence with the local sponsors, public, other agencies and organizations, the members of the Natural Resources Planning Team have received input into the planning of this watershed.

In February 2004, NRCS received a letter of request from the Daniel Boone SWCD to do a watershed assessment on the North Fork Powell River Watershed. In May, 2004 the NRCS Planning Team visited the watershed to conduct a field reconnaissance. The Team agreed that there were enough natural resource problems, issues and concerns in the watershed to warrant additional study.

The study was supported and initiated locally with an Application for Federal Assistance to NRCS in July 2004. The Virginia Soil and Water Conservation Board approved the application in July 2004.

A meeting was held on August 17, 2004 in Big Stone Gap with sponsors and interested agencies to discuss the various roles and responsibilities of each party.

A public meeting with residents and landowners was held at the St. Charles Community Center on August 17, 2004. About 30 people attended. The public meeting was held at the St. Charles Community Center as an attempt to provide persons with low incomes an opportunity to learn about the project and to provide their thoughts and suggestions. Watershed problems and concerns were discussed and prioritized at the meeting.

Consultation has been made with the Virginia Department of Historic Resources on project measures contained in this watershed plan. Consultation with the U.S. Fish and Wildlife Service, in accordance with Section 7 of the Endangered Species Act of 1973, was also conducted. All parties agreed that the project would not have significant negative impacts on the environment.

A scoping meeting was held on December 14, 2006 at the DMME Office in Big Stone Gap to identify issues of economic, environmental, cultural, and social concerns in the watershed. Input was provided by about 30 attendees from local, regional, state and federal agencies and organizations at the meeting.

In March 29, 2007, a first draft of the plan was distributed for comment to the NRCS National Water Management Center in Littlerock Arkansas, to NRCS Planning Team, and to several agency and sponsor representatives that have assisted with the development of the plan.

A second public meeting was held in St. Charles with private citizens and landowners on April 3, 2007 to review the overall planning effort, findings to date, and the proposed alternative solutions. The meeting was attended by a total of about 20 people.

In May 2007, a second draft of the plan was distributed for interagency and public review and comment. Comments were received for 45 days.

Agencies and groups that have participated in the development of the Watershed Plan and Environmental Assessment include the Daniel Boone SWCD, Lee County, DMME, COE, Virginia Department of Game and Inland Fisheries, Virginia Department of Environmental Quality, Virginia

Department of Conservation and Recreation, Virginia Department of Forestry, Virginia Department of Historic Resources, Virginia Department of Transportation, Tennessee Valley Authority, the U.S. Fish and Wildlife Service, the Nature Conservancy, the Black Diamond RC&D, the Lenowisco Planning District Commission. Written comments were not received from the U.S. Fish and Wildlife Service regarding effects on threatened and endangered species. NRCS will request written concurrence from the U.S. Fish and Wildlife Service stating that no adverse effects from project activities are anticipated on threatened and endangered species.

CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE IMPACT ANALYSIS

Treatment of the acid mine drainage and severely eroding sites within the North Fork of the Powell River watershed will have very positive environmental effects. These effects will occur on the aquatic habitats and associated riparian areas below the treated acid mine drainage sites and within and adjacent to the treated sites that had been eroding severely prior to the project. As a result, the environmental benefits generated by the project, will accrue to all residents who reside adjacent to or downstream of the treated sites. The largest and most direct economic benefits will occur associated with the employment, equipment operation and materials purchases made during the construction phase of the project. Afterwards, ongoing operation, maintenance and replacement activities and associated cost expenditures by DMME to keep the AMD sites from polluting, will create a stream of economic benefits within the watershed for the entire life of the project.

All area residents, including low income and minorities, were afforded the opportunity to participate in the planning process through public meetings and review of the draft plan. Both public meetings were held in the Town of St. Charles, a low income community, to reach out to the low income residents within the watershed.

Given that all adjacent and downstream residents will benefit from water quality improvements achieved with this project, and the fact that Lee County has a population with limited diversity, disparate treatment of any particular group of citizens is not expected to occur. On the contrary, all vehicle operators who travel along the roads within the watershed will also benefit due to the fact that the culverts and bridges should experience extended useful lives as the acid drainage flowing through and under them is reduced by the NRCS project. Consequently, VDOT and the Lee County public works authority should experience lower operation and maintenance costs in the future. Therefore, it is reasonable to conclude that extended useful lives for the roads and bridges will benefit all racial, ethnic and socio-economic groups within the watershed. In addition, reductions in road operation, maintenance and replacement costs will directly benefit all residents within the watershed and all taxpayers in general within Lee County and the state of Virginia.

In summary, there are no known disparate impacts expected from this land treatment project. Indeed, the project will result in expenditures with employment and environmental effects that will benefit all socioeconomic groups within the watershed. Given that the North Fork watershed, and the County as a whole, have some of the poorest and most underprivileged citizens in the entire state, the project will serve to improve the lives of people who need all of the help they can get. In addition, this project will complement other efforts within the watershed aimed at improving potable water, water quality of the surface streams, environmental education, and tourism with the hopes of creating conditions more favorable for enhanced economic development.

Table 1 – Estimated Installation Costs for the Recommended Plan ^{1/}
 North Fork Powell River Land Treatment Project, Virginia
 (Dollars)

Land Treatment Evaluation Units - Subwatersheds	No.	Accelerated Land Treatment Expenditures		
		PL-566 Cost	Other Funds	Total Cost
Upper Stone & Ely Creeks	1	\$202,000	\$110,000	\$312,000
Straight & Puckett Creeks	2	\$395,000	\$213,000	\$608,000
Reeds & Summers Creeks	3	\$83,000	\$45,000	\$128,000
Mud & Jones Creeks	4	\$63,000	\$34,000	\$97,000
Cox Creek	5	\$110,000	\$60,000	\$170,000
Jordan Branch	6	\$20,000	\$11,000	\$31,000
Craborchard Creek & Wells Branch	7	\$29,000	\$16,000	\$45,000
Bobs Branch	12	\$60,000	\$32,000	\$92,000
Total Land Treatment Costs:	-	\$962,000	\$521,000	\$1,483
Technical Assistance Costs:	-	\$260,000	\$0	260,000
Project Administration Costs:	-	\$20,000	\$37,000	\$57,000
Total Project Costs:	-	\$1,242,000	\$558,000	\$1,800,000

^{1/} Price base: March 2007

April 2007

Note All works of improvement will be performed on private lands and will consist of engineering practices with vegetative components to prevent erosion. These estimates include all cost categories: installation, technical assistance and project administration.

Table 4 – Average Annual Costs for the Recommended Plan ^{1/}
 North Fork Powell River Land Treatment Project, Virginia
 (Dollars)

Land Treatment Evaluation Units/Subwatersheds	SW No.	Average Annual Equivalent Cost	Average Annual Operation, Maintenance and Replacement Cost	Total Average Annual Equivalent Cost ^{2/}
Upper Stone & Ely Creeks	1	\$17,800	\$7,200	\$25,000
Straight & Puckett Creeks	2	\$34,300	\$9,600	\$43,900
Reeds & Summers Creeks	3	\$7,400	\$1,200	\$8,600
Mud & Jones Creeks	4	\$5,700	\$2,800	\$8,500
Cox Creek	5	\$9,800	\$3,950	\$13,750
Jordan Branch	6	\$2,000	\$350	\$2,350
Craborchard Creek & Wells Branch	7	\$2,600	\$770	\$3,370
Bobs Branch	12	\$5,000	\$630	\$5,630
All Works of Improvement in Subwatersheds 1-7, 12		\$84,600	\$26,500	\$111,100

^{1/} Price base: March 2007

April 2007

^{2/} All costs discounted and amortized based on a 10-year installation period, 25 years of expected useful life for each project investment, and an overall period of analysis of 35 years using the current official Federal discount rate of 4.875%.

Table 5a – Estimated Average Annual Watershed Protection Damage Reduction Benefits for the Recommended Plan ^{1/}
 North Fork Powell River Land Treatment Project, Virginia
 (Dollars)

Damage Reduction Category by Evaluation Unit	SW No.	Damage Reduction Benefits – Average Annual Equivalents	
		Agricultural Related	Nonagricultural Related
Onsite:		---	---
Subtotal:	1-7,12	---	---
Offsite:			
Upper Stone & Ely Creeks - Warm Water Fishery - Road Culverts	1	\$2,360 \$230	--- ---
Straight & Puckett Creeks - Warm Water Fishery - Road Culverts	2	\$27,925 \$40	--- ---
Reeds & Summers Creeks - Warm Water Fishery - Road Culverts	3	\$4,710 \$80	--- ---
Mud & Jones Creeks - Warm Water Fishery - Road Culverts	4	\$8,750 \$40	--- ---
Cox Creek - Warm Water Fishery - Road Culverts	5	\$4,070 \$0	--- ---
Jordan Branch - Warm Water Fishery - Road Culverts	6	\$75 \$40	--- ---
Craborchard Creek & Wells Branch - Warm Water Fishery - Road Culverts	7	\$7,110 \$70	--- ---
Bobs Branch - Warm Water Fishery - Road Culverts	12	\$0 \$0	--- ---
Offsite/Public Benefits Subtotal: - Warm Water Fishery - Road Culverts	1-7,12	\$55,000 \$500	--- ---
Subtotal:	---	\$55,500	---

^{1/} Price base: March 2007

April 2007

^{2/} All damage reduction benefits will accrue to rural communities with populations numbering less than 50,000 each. Therefore, as defined NRCS policy, all benefits in this project are considered “agricultural” and were discounted and amortized based on a 10 year installation period, and 25 years of expected useful life for each project investment and an overall period of analysis of 35 years using the current official Federal discount rate of 4.875%.

Table 6 – Comparison of Project Benefits and Costs for the Recommended Plan ^{1/}
 North Fork Powell River Land Treatment Project
 (Dollars)

Land treatment Evaluation Units/Subwatersheds	SW No.	Projected Monetary Benefits ^{2/}			Costs	Net Change	Benefit/Cost Ratio
		Average Annual Equivalent Benefits ^{3/}		Total Average Annual Equivalent Benefits	Total Average Annual Equivalent Costs	Net Average Annual Equivalent Benefits	
		Offsite Water/ Downstream Quality Benefits	Offsite/ Downstream Road Culvert Benefits				
Upper Stone & Ely Creeks	1	\$2,360	\$230	\$2,590	\$25,000	-\$22,410	0.10 to 1.0
Straight & Puckett Creeks	2	\$27,925	\$40	\$27,965	\$43,900	-\$15,935	0.64 to 1.0
Reeds & Summers Creeks	3	\$4,710	\$80	\$4,790	\$8,600	-\$3,810	0.56 to 1.0
Mud & Jones Creeks	4	\$8,750	\$40	\$8,790	\$8,500	\$290	1.03 to 1.0
Cox Creek	5	\$4,070	\$0	\$4,070	\$13,750	-\$9,680	0.30 to 1.0
Jordan Branch	6	\$75	\$40	\$115	\$2,350	-\$2,235	0.05 to 1.0
Craborchard Creek & Wells Branch	7	\$7,110	\$70	\$7,180	\$3,370	\$3,810	2.13 to 1.0
Bobs Branch	12	\$0	\$0	\$0	\$5,630	-\$5,630	0.0 to 1.0
All Works of Improvement	---	\$55,000	\$500	\$55,500	\$111,100	-\$55,600	0.50 to 1.0

^{1/} Price base: March 2007

April 2007

^{2/} Benefits that could not be quantified and converted to monetary units include substantial improvements in the ecological systems and to the general welfare of the local population. The rationale for selection of this plan can be found on pages 80-85.

^{3/} All benefits are considered agricultural and rural. Their associated costs were discounted and amortized based on a 10-year installation period, 25 years of expected useful life for each project investment, and an overall period of analysis of 35 years using the current official Federal discount rate of 4.875%.

REPORT PREPARERS

The North Fork Powell River Watershed Plan and Environmental Assessment was prepared primarily by the NRCS Planning Team located in Richmond, Virginia. The Plan/EA was reviewed and concurred in by state staff specialists having responsibility for engineering, resource conservation, soils, agronomy, biology, economics, geology, and contract administration. The Plan/EA was reviewed by the NRCS National Water Management Center staff and was followed by an interagency and public review.

Table EE identifies and lists the experience and qualifications of those individuals who were directly responsible for providing significant input to the preparation of the Plan/EA. Appreciation is extended to many other individuals, agencies and organizations for their input, assistance and consultation, without which this document would not have been possible.

Table EE – LIST OF REPORT PREPARERS

<u>Name</u>	<u>Present Title and Years in Current Position</u>	<u>Education</u>	<u>Previous Experience</u>	<u>Other</u>
R. Wade Biddix	Assistant State Conservationist for Water Resources – 5	M.S. Public Administration B.S. Agriculture	Supervisory District Cons. – 2 yrs. Planning Coordinator – 11 yrs. Area Resource Cons. - 2 yrs. District Conservationist - 4 yrs. Soil Conservationist - 4 yrs.	
Edward J. Fanning	Resource Conservationist – 4	B.S. Wildlife & Fisheries Management B.S. Range Management Graduate Course Work in Range Management	District Conservationist – 1.25 yrs. Soil Conservationist - 5 yrs. Sr. Environmental Analyst – 13 yrs.	
David L. Faulkner	Natural Resource Economist – 18	M.S. Ag. Economics B.S. Ag. Education	Ag. Economist (SCS) - 2.5 yrs. Ag. Economist (U.S.A.I.D.) - 4.5 yrs.	
Fred M. Garst	GIS Specialist – 9	B.S. Geology	GIS/Soil Scientist - 7 yrs. Soil Cons. Tech. - 7 yrs. Geologist (Private) – 4 yrs.	

<u>Name</u>	<u>Present Title and Years in Current Position</u>	<u>Education</u>	<u>Previous Experience</u>	<u>Other</u>
Alica J. Ketchem	Plng./Environmental Engineer – 14	M.S. Ag. Engineering B.S. Civil Engineering	Civil Engineer – 10 yrs.	PE
Bryan Lee	Cultural Resource Specialist – 3	M.A. Anthropology B.A. Anthropology	Archaeologist (Private) 10 years	
Mathew J. Lyons	State Conservation Engineer- 5	B.S. Civil Engineering	Civil Engineer – 12 yrs.	PE
Jeffrey D. McClure	Geologist –2.5	B.A. Geology B.A. Biology B.S. Geology	NRCS Geologist – total 4 yrs. Geologist (WV Dept. of Env. Prot.) - 11 yrs. Geologist (Private) – 8.5 yrs.	CPG in KY, VA, DE and PA
Wess Stanley	District Conservationist - 3	B.S. Agriculture	Soil Conservationist – 2 yrs	

Special acknowledgement goes to the following people who spent many hours in the North Fork Powell River Watershed finding AMD and critically eroding sites, collecting and analyzing data, meeting with landowners, and attending public meetings.

- DMME Staff - Roger Williams, Mike Giles, Steve Jaynes, and Bruce Miles
- DMA, Inc. – Steve Gebhardt
- Army Corp of Engineers – Jeff Linkinhoker
- Daniel Boone SWCD – Kalena Porter

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APPENDIX A

LETTERS OF COMMENT ON DRAFT PLAN – EA

Comments were requested on the Draft Plan and EA from the following agencies and organizations. and they have responded as follows:

<u>Federal Agencies</u>	<u>Draft Plan/EA</u>
Environmental Protection Agency	
Region III, Philadelphia	No
U.S. Army Corps of Engineers	No
U.S. Department of Agriculture	
Forest Service	No
Farm Service Agency	No
Rural Development	No
U.S. Department of the Interior	
Fish and Wildlife Service	
Annapolis, Maryland Office	No
Gloucester, Virginia Office	No
Office of Surface Mining, Reclamation and Enforcement	No
<u>Virginia State Agencies</u>	
Office of Environmental Impact Review	Yes
(State Clearinghouse)	
Virginia Soil and Water Conservation Board	No
(Governor's Designated Agency)	
Virginia Department of Mines, Minerals and Energy	Yes
Virginia Department of Environmental Quality	
Virginia Department of Agriculture and Consumer Services	Yes
Virginia Department of Conservation and Recreation	Yes
Virginia Department of Forestry	No
Virginia Cooperative Extension Service	No
Virginia Department of Game and Inland Fisheries	Yes

Virginia State Agencies

Draft Plan/EA

Virginia Marine Resources Commission

No

Virginia Department of Health

No

Virginia Department of Historic Resources

Yes

Virginia Department of Transportation

Yes

Other

Virginia Association of Soil and Water Conservation Districts

No

Daniel Boone Soil and Water Conservation District

Yes

Lee County Board of Supervisors

Yes

Tennessee Valley Authority

No

DIRECTORS:
John D. Bailey, Chairman
Jerry L. Ingle, Vice-Chairman
John M. Britton, Sr., Sec./Tres.
Harold Jerrell
Wayne Denson



ASSOCIATE DIRECTORS:
Judy Combs
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R. Shawn Morris
A. Kalena Porter

COMMONWEALTH of VIRGINIA

DANIEL BOONE SOIL AND WATER CONSERVATION DISTRICT
ROUTE 2, BOX 2010 • JONESVILLE, VIRGINIA 24263

Phone: (276) 346-1658, EXT. 3 • Fax: (276) 346-1262 e-mail:
dbswcd@mounet.com

May 24, 2007

Jack Bricker, State Conservationist
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Dear Mr. Bricker,

The USDA, Natural Resources Conservation Service (NRCS) is currently seeking comments on the draft plan for the North Fork Powell River Watershed in Lee County, Virginia. The proposed project's intent is to sufficiently reduce pollution entering streams from acid mine drainage and severely eroding abandoned mine sites. Treatment of these problems is necessary to improve water quality and fish habitat within the North Fork and its tributaries. I am writing to express my sincere hope that NRCS will continue to move this project forward with the haste and attention to detail they have shown thus far.

If this project is completed, it will have far-reaching effects in our county and on the overall health of the Powell River. The plan will enhance water quality in our streams, improve habitat for fish and other aquatic species, and reduce erosion and sediment damage. Upon project completion, Lee County will have an improved habitat for 15 threatened and endangered mussel species and 5 fish species. Not only will this project improve water quality, but it will also potentially result in economic opportunities in the area, such as recreational fishing and tourism.

The Powell River is part of one of the most biodiverse watersheds in the world, but its health is threatened. Lee County currently has over 50 miles of stream listed on the 303(d) list of impaired waters. It is also one of the poorest counties in the state. The estimated cost of this project is \$1,800,000. Lee County needs assistance in restoring the health of its streams, and, as of now, we have found no alternative funding sources for this project.

Many agencies, such as NRCS, the Daniel Boone Soil & Water Conservation District, the Virginia Department of Mines, Minerals, and Energy, and the Lee County Board of Supervisors, have devoted countless hours to this project. We do not want to see this project fail because of a lack of interest on the part of stakeholders or your agency. Thank you for your time and attention to this matter.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jerry Ingle".

Jerry Ingle, Chairman
Daniel Boone SWCD



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-1691
Fax: 804/287-1737

June 26, 2007

Mr. Jerry Ingle
Chairman
Daniel Boone SWCD
Rt. 2, Box 2010
Jonesville, VA 24263

Dear Mr. Ingle:

Thank you for your support of the North Fork Powell River Watershed project. The Daniel Boone SWCD has been a steadfast advocate of this effort from its beginning and has provided much assistance to the NRCS Watershed Planning Team.

We look forward to working with you in the future, as federal funding permits. We would encourage you to use this watershed plan to seek funding for the non-federal portion of the cost-share dollars, such as are needed for treatment of the St. Charles Landslide. Grant money and other similar funds could also be used to treat some of the smaller sites without NRCS assistance. The Virginia Department of Mines, Minerals, and Energy will be a valuable partner in the design and construction of these sites.

Again, we appreciate your on-going support and look forward to signing the final plan with the Sponsors in the near future.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Bricker", is written over a printed name and title.

JOHN A. BRICKER
State Conservationist

Cc: Wess Stanley, DC, Jonesville, VA
Alvin Phelps, ASTC (FO), Christiansburg, VA

1

MR. BRICKER,
MY COMMENTS ON THE NORTH
FORK PROPOSAL ARE HEART FELT.
THIS RIVER IS VERY NEAR AND
DEAR TO MY HEART. I HAVE
SOME WONDERFUL MEMORIES ON
THIS BEAUTIFUL STREAM, AND HOPE
MY KIDS AND GRANDKIDS WILL
BE ABLE TO SAY THE SAME.
I LIVE IN THE ROBBINS CHAPEL
SECTION OF KEOKEE. I'VE TROUT
FISHED ON THE NORTH FORK SINCE
1975, AND I'VE SEEN SO MUCH
ABUSE FROM MINING AND LOGGING
OVER THE YEARS. THE MINING
OPERATION THATS STARTING UP
NOW ON THE HEADWATER SECTION
OF THIS STREAM, TIMBER REMOVAL
ARE REALLY CONCERNING TO ME.
I KNOW THE EFFECTS THIS WILL
HAVE. AND ALL THEY KNOW TO
DO IS BUILD BIG SEDIMENT
PONDS. WELL I DONT HAVE
→

TO TELL YOU, THAT DURING SUMMER, THIS WILL MAKE THE WATER TOO WARM FOR THE TROUT. THE ORIGINAL STORY IN THE POWELL VALLEY NEWS, LISTED THE NORTH FORK AS A WARM WATER FISHERY, THAT IS NOT CORRECT. THIS STREAM SUPPORTS TROUT YEAR-ROUND AND A WARM WATER STREAM CANT DO THAT. I'M SO PROUD THAT YOU GUYS ARE DOING THIS FOR THE NORTH FORK, BUT I PRAY YOU'LL PAY SPECIAL ATTENTION TO THE TROUT, AND GO THE EXTRA MILE TO PROTECT THEM, AND MAKE IT BETTER FOR THEM. I WISH A COMPROMISE COULD BE REACHED WITH THIS MINING COMPANY TO SPARE THE STREAM, MINE AROUND IT, BUT LEAVE THAT STRETCH OF LAND ALONE. I'M SENDING WITH THIS →

3

A STORY FROM FLY-FISHERMAN
MAGAZINE ON THEY DID TO
ADDRESS MINE DRAINAGE. ITS THE
THE MOST SUCCESSFUL SOLUTION
IVE EVER HEARD OF. ACTUALLY
TWO STORIES. PLEASE READ NORTH
BRANCH OF THE POTOMAC IN
MARYLAND, AND WEST VIRGINIA'S
CRANBURY RIVER BOTH USED
LIMESTONE DOSERS, NOT PONDS
AND BOTH HAVE SEEN TROUT NOT
ONLY SURVIVE, BUT THEY ARE
SPAWNING AND REPRODUCING.
THAT HAS TO BE GOOD WATER.
AND THE POTOMAC WAS COMPLETELY
DEAD. SO IF YOU TRY, YOU CAN
FIND A BETTER WAY, BUT I DO
THINK WHAT YOU'VE PLANNED
FOR THE OTHER SITES WILL
BENEFIT THE OVERALL SYSTEM,
THE HEADWATERS ARE MY
BIGGEST CONCERN. I HOPE
SOMETHING CAN BE PUT

↓

IN PLACE NOW TO PROTECT
THAT PART OF THE STREAM.
IT BREAKS MY HEART TO
TO THINK ABOUT WHAT A
DESIGNED THAT

YOU'LL SEE A
PICTURE OF THE DOSER
THAT WAS USED ON
THE THE POTOMAC,
ITS SMALL AND I
DONT SEE WHY IT
COULDN'T BE DESIGNED
TO BE GRAVITY FED
JUST FILLED UP
WITH POWDERED
LIMESTONE FROM
TIME TO TIME.
I WOULD EVEN
VOLUNTEER TO OVERSEE
THAT AND HELP
ANYWAY I COULD.

YOU'LL SEE A
PICTURE OF THE DOSER
THAT WAS USED ON
THE THE POTOMAC,
ITS SMALL AND I
DONT SEE WHY IT
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United states Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-1691
Fax: 804/287-1737

June 26, 2007

Mr. Jeff Mosko
Route 1, Box 183
Keokee, VA 24265

Dear Mr. Mosko:

Thank you for your comments on the Draft North Fork Powell River Watershed Plan and Environmental Assessment. Your comment on trout fishing on the North Fork since 1975 is very informative and certainly changes NRCS perceptions of the potential fishery in the headwaters of the watershed. NRCS staff has previously met with the Virginia Department of Game & Inland & Fisheries (VDGIF) to discuss our evaluation of the fishery. They have classified the North Fork as a warm water fishery, although they have stocked rainbow and brown trout on a three mile section above Pocket. They did not seem to be aware of a reproducing trout population on the North Fork. NRCS will discuss your information with VDGIF and make note of it in the Final Plan.

The information you supplied on limestone dosers which have been used to restore the North Branch of the Potomac River to a productive trout fishery certainly merits consideration as one of several possible treatment technologies. We will discuss it with the project sponsors and include it, as deemed appropriate, as a possible treatment.

Thank you again for your sincere interest in this project and the health of the North Fork of the Powell River. The interest of the affected public provides the foundation on which successful remediation efforts are accomplished. NRCS hopes you will continue to be actively involved with the progress of this project, and that you will also invite some of your neighbors to do the same.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Bricker", is written over a printed name and title.

JOHN A. BRICKER
State Conservationist

Helping People Help the Land

An Equal Opportunity Provider and Employer



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
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L. Preston Bryant, Jr.
Secretary of Natural Resources

David K. Paylor
Director
(804) 698-4000

June 11, 2007

John A. Bricker
State Conservationist
U.S. Department of Agriculture
Natural Resource Conservation Service 1606
Santa Rosa Road, Suite 209 Richmond, VA
23229-5014

RE: Draft Plan and Environmental Assessment for the North Fork Powell River
Watershed in Lee County, Virginia (DEQ Project Number: 07-093F).

Dear Mr. Bricker:

The Commonwealth of Virginia has completed its review of the above-referenced Environmental Assessment (hereinafter "EA"). The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents prepared pursuant to the National Environmental Policy Act (NEPA) and responding to appropriate Federal officials on behalf of the Commonwealth. The following agencies joined in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Department of Agriculture and Consumer Services
Department of Mines, Minerals, and Energy
Virginia Marine Resource Commission
Department of Transportation
Department of Historic Resources
Department of Forestry

The Department of Health, Lee County, the Town of Pennington Gap, Saint Charles and the Lenowisco Planning District Commission (PDC) were also invited to provide comments.

Mr. Bricker Page 2

Project Description:

The Environmental Assessment (EA) describes alternatives considered to improve water quality in the 57,620 acre North Fork Powell River Watershed, located in the northeast portion of Lee County, Virginia. The primary goals of the watershed plan are to improve degraded water quality and enhance stream habitat for fish and other aquatic species by treating acid mine drainage, and stabilizing areas to reduce the damages caused by erosion and sedimentation. The economic benefits generated, costs incurred, and environmental impacts produced vary, depending on the alternative considered (EA, page i). The document includes a section titled Analysis of Alternative Treatments (EA, page 53) describing the "AMDTREAT" software tool created by the Federal Office of Surface Mining Reclamation and Enforcement (OSMRE) that was used to evaluate the performance and costs of the potential project treatments. The recommended plan includes installing and constructing: eleven wetlands, twenty-one open-limestone channels, six ponds, three portal closures, five successive alkaline producing systems (SAPS), seven diversions, grading and vegetating twelve sites, removing waste material from two sites and constructing a rock-toe buttress, grading, shaping and revegetating four sites, and eliminating two high-wall strip mine areas.

General Comments

The Commonwealth has no objection to the proposed plan, provided the work is performed in accordance with all applicable federal, state, and local regulations, and in accordance with the recommendations herein. The Commonwealth acknowledges that according to the EA (Overall Collaborative Interagency/Watershed Planning Approach, page 50), the USDA - NRCS watershed plan was developed in partnership with the U.S. Army Corps of Engineers, Virginia Department of Mines, Minerals and Energy, and the Daniel Boone Soil and Water Conservation District. The conservation partners are in agreement that potential PL-566 projects need to be designed to complement their existing and ongoing efforts to maximize available resources and achieve a higher level of target pollutant control. Agencies of the Commonwealth support the proposed plan (see Item 2 "Endorsements," below), and the ongoing interagency effort to improve water quality by reducing erosion from abandoned surface mines and landslides and addressing the effects of coal mining in the watershed (see comments from the DEQ - Southwest Regional office).

Environmental Impacts and Mitigation

1. Water Quality & Wetlands. The EA acknowledges that some sites may require Section 401 and/or 404 permits in order to install the needed practices (*Permits and Compliance*: EA, page 84).

The DEQ Division of Water Resources (DEQ - DWR) has reviewed the project designed to treat damages from surface mining and improve water quality in the North Fork Powell Watershed and has no objection. According to DEQ - DWR, the project involves

manipulation of existing waters of the State (installation of six ponds, eleven wetlands and twenty-one limestone channels). Questions pertaining to these comments may be addressed to Joe Hassell of the DEQ - DWR (telephone (804) 698-4072). However, DEQ - DWR defers to the DEQ - South West Regional Office to provide specific guidance pertaining to potential permit requirements for those actions.

The DEQ - Southwest Regional Office (DEQ - SWRO) believes the recommended plan should improve water quality by:

- Remediating the effects of coal mining in the watershed;
- Neutralizing the low pH values and associated pollutants that impair the use of the water for drinking, recreation, and fisheries, and
- Reducing erosion from abandoned surface mines and landslides, thus reducing the effects of excessive sedimentation in the streams, and thereby improve the 303(d) listed Total Maximum Daily Load (TMDL) segments identified in the 2006 Water Quality Assessment.

DEQ - SWRO stated that it supports the recommended plan and has no objections, provided that the applicant abides by all applicable Federal, state, and local laws and regulations. See Regulatory and Coordination Needs, Item 1, below.

2. Air Pollution Control. According to the EA (Table CC: Effects of the Recommended Plan on Resources of Principal National Recognition, pages 91 and 92), with the exception of the construction period the project will not result in changes to air quality. Project construction will involve the operation of machinery during removal of the high-wall, grading, excavation, contouring, and stone crushing. The construction activities are likely to generate fugitive dust. Fugitive dust generated from these construction activities must be kept to a minimum. This requires, but is not limited to measures such as the application of water or chemicals for dust control; use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials; covering of open equipment for conveying materials; and prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion. Also, if burning is planned, any open burning must meet the applicable requirements and may require a permit (see Regulatory and Coordination Needs, Item 3, below). NRCS should contact the appropriate Lee County officials to determine what local requirements, if any, apply.

3. Erosion and Sediment Control, and Stormwater Management. The purpose of the project is to reduce erosion and sedimentation associated with abandoned mines by grading, shaping and re-seeding approximately 56.25 acres on 16 critically eroding areas (EA, pages 1, 68 and 69). As stated in the EA (page 90), the NRCS is aware of the need to develop detailed designs, specifications and construction plans, and will coordinate with DMME and the Daniel Boone Soil and Water Conservation District to provide technical assistance. For information pertaining to Virginia's Erosion and Sediment Control Law and Regulations (VESCL&R), and Virginia Stormwater Management Law and Regulations (VSWML&R), see Regulatory and Coordination Needs, Item 4, below.

4. Natural Heritage Resources. The Department of Conservation and Recreation (DCR) strives to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreational, and natural heritage resources. The DCR's Division of Natural Heritage (DCR - DNH) maintains a Biotics Data System documenting occurrences of natural heritage resources under its jurisdiction. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, significant geologic formations, and similar features of scientific interest. DCR also maintains a database of the locations of any State Natural Area Preserves under DCR's jurisdiction in the Commonwealth.

Findings: The DCR - DNH has searched its Biotics Data System for occurrences of natural heritage resources in from the area outlined on the submitted map. According to the information currently in Biotics files, three portal site closures have the potential to support bat populations (i.e., Indiana bat). Next, the Powell River- North Fork Powell River and the Cox Creek- North Fork Powell River Stream Conservation Unit are within the project site. Stream Conservation Units (SCUs) identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. Stream Conservation Units are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Powell River- North Fork Powell River has been ranked as a B3 conservation site, which indicates it is of high significance. The natural heritage resources associated with this site are:

<u>Common name:</u>	<u>Scientific Name:</u>	<u>Ranking:</u>
Popeye Shiner	<i>Notropis ariommus</i>	G3/ S2S3/NL/SC
Sauger	<i>Stizostedion canadense</i>	G5/S2S3/NL/SC
Rough Rabbits Foot	<i>Quadrula cylindrica strigillata</i>	G3T2/S2/LE/LE
Spiny Riversnail	<i>Io fluvialis</i>	G2/S2/S0C/LT

The Cox Creek- North Fork Powell River has a ranking of B4, which represents a site of moderate significance. The natural heritage resource associated with this site is:

<u>Common name:</u>	<u>Scientific Name:</u>	<u>Ranking:</u>
Tennessee dace	<i>Phoxinus tennesseensis</i>	G3/S1/NL/LE

According to DCR, although this project is not anticipated to result in adverse impact to protected plants, insects, or State Natural Area Preserves, the project may result in habitat alteration that could be detrimental to the protected species known to occur in Lee County. For example, being sedentary organisms, freshwater mussels are sensitive to water quality degradation caused by increased sediment and pollution. Mussels require aquatic habitat with good water quality that is capable of supporting host fish species (Williams et al., 1993).

Recommendations: DCR provided the following recommendations for minimizing potential impacts to protected species:

- Implement and adhere to strict erosion and sediment control measures during all land disturbing activities to minimize adverse impacts to the aquatic ecosystem.
- Conduct a site-specific search for natural heritage resources that includes the areas downstream.
- Conduct a site-specific inventory and evaluation of portal sites proposed for closure, and provide the results to DCR to address potential impacts to bats and their habitat.
- Coordinate with the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (DGIF) to ensure compliance with protected species legislation (see Item 5, below).

New and updated information is continually added to Biotics. Contact Rene Hypes DCR-DNH (telephone (804) 786-7951) for an update on this natural heritage information if a significant amount of time passes before it is utilized.

5. Wildlife Resources. The EA mentions Threatened and Endangered Species, and Wildlife, however the EA does not provide detailed site plans showing site-specific information for each site where work is proposed. As stated in Item 3, above, the NRCS is aware of the need to develop detailed designs, specifications and construction plans, and will coordinate with DMME and the Daniel Boone Soil and Water Conservation District to provide technical assistance.

Under Section 7 of the endangered Species Act of 1973 (as amended), if any protected species (to include state or federally listed species, or their critical habitats) are sighted or would be impacted by the proposed project, the NRCS is required to notify the U.S. Fish and Wildlife Service (USFWS) and Virginia Department of Game and Inland Fisheries (DGIF) and suspend the project until the Section 7 consultation process has been completed. The Department of Game and Inland Fisheries, as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects (*Virginia Code* Title 29.1). DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 *et seq.*), and provides environmental analysis of projects or permit applications coordinated through DEQ and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce, or compensate for those impacts.

Findings: The Department of Game and Inland Fisheries (DGIF) believes this project should benefit fisheries resources in North Fork Powell River and will result in overall benefits to wildlife resources under its jurisdiction. DGIF acknowledges the discussion of critical wildlife resources, including threatened and endangered species, and Species of Greatest Conservation Need (EA, pages 27 to 33). As stated in the EA, there are 15 threatened or endangered mussels and 5 threatened or endangered fish within the North Fork Powell River watershed that could be affected by the project. The State Threatened

(ST) peregrine falcon, ST loggerhead shrike, State Endangered (SE) Bewick's wren, Federal/State Endangered (FESE) Indiana bat, and ST brown supercoil are also found in the watershed. DGIF notes that Indiana bats and other bats often use abandoned mine portals, and Peregrine falcons are known to nest along cliff faces, often near water.

Recommendations: DGIF provided the following recommendations:

- Evaluate the 3 abandoned mine portals for potential bat habitat. Prior to closing the 3 abandoned mine portals, a qualified biologist should evaluate the sites for potential bat habitat. If potential bat habitat is observed, contact Rick Reynolds DGIF biologist (540) 248-9360) for additional guidance regarding conducting bat surveys that may be required to ensure that bats are not trapped within a closed portal.
- Evaluate the 2 high-wall sites for potential peregrine falcon habitat. Prior to any work on the 2 high-walls, a qualified biologist should evaluate the sites for potential peregrine falcon habitat. If peregrine falcon habitat is observed, contact Jeff Cooper DGIF biologist (540) 899-4169) for additional guidance.
- Preserve and restore tree canopies to the greatest extent possible, to ensure project activities do not alter stream temperatures and to help maintain cooler stream temperatures.
- Maintain and plant riparian and wetland buffers to a minimum of 100 feet.
- Use native vegetation to enhance the wildlife habitat value of the restored sites, to the fullest extent possible.
- Continue to coordinate with DGIF biologists to address potential site-specific impacts, as necessary

Questions about these recommendations may be addressed to Andrew K. Zadnik, DGIF Environmental Services Section Biologist (telephone (804) 367-2733).

6. *Geologic and Mineral Resources.* The DCR - DNH stated in its May 30, 2007 letter that this project has been sent to the Virginia Karst Program and to the Virginia Speleological Survey for review for documented sensitive karst features and caves, because a portion of this project may take place on karst topography.

The Department of Mines, Minerals, and Energy (DMME) stated that its agency has been involve with the development of this project intended to improve water quality and no significant impact to future extraction of mineral resources is anticipated. Questions pertaining to the geology and mineral resources of the Commonwealth should be addressed to Matt Heller at the DMME (telephone (434) 951-6351).

7. Forest and Tree Protection. The Department of Forestry (DOF) believes the project would result in a positive impact to the forest resources of the Commonwealth and encourages the NRCS to implement Alternative 3. Questions pertaining to protection of trees and forest resources of the Commonwealth may be addressed to Todd Groh at DOF (telephone (804) 633-6992; email: todd.groh@dof.virginia.gov).

Other Matters:

8. Solid and Hazardous Wastes and Hazardous Materials. Based on the extent of the North Fork Powell River watershed, the DEQ's Waste Division recommends conducting an environmental investigation of each project site and the surrounding area to identify potential solid or hazardous waste sites or issues, before commencing work. Each investigation should include a search of waste-related databases (see Regulatory and Coordination Needs, Item 8, below).

9. Transportation. According to the Virginia Department of Transportation (VDOT), there are no conflicts with current or future construction projects. For additional information pertaining to VDOT's comments, please contact Mary T. Stanley (telephone (804) 786-0868).

10. Historic Structures and Archaeological Resources. The Department of Historic Resources (DHR) stated that it does not anticipate the proposed actions to impact intact archaeological sites and no further archaeological studies are warranted. According to DHR, the EA identifies three abandoned coal tipples located at remediation sites and suggest that one, the Tex Rivers Tipple (site RCUAMD4) may be historically significant and should be avoided during the implementation of the project. DHR concurs with this finding and requests the NRCS submit reconnaissance-level data documenting the Tex Rivers Tipple to DHR (see Regulatory and Coordination Needs, Item 9, below). DHR also noted (see attached) discrepancies in the draft EA (page 33) that must be corrected in the final EA. NRCS should also include a *finding of no adverse effect* in the final EA, along with DHR's letter of concurrence. In accordance with 36 CFR 800.5(c) of the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended), NRCS must also provide the interested public the opportunity to inspect the documentation prior to approval of the undertaking.

Regulatory and Coordination Needs

1. Water Quality & Wetlands. A Virginia Water Protection permit, and Corps of Engineers section 401 Certification and/or section 404 permit (Clean Water Act) may be required. Contact Alice Warren of the DEQ - SWRO (telephone (276) 676-4803) for information pertaining to potential water permit requirements.

2. Subaqueous Beds. Pursuant to Section 28.2-1200 et seq of the Code of Virginia, permits may be required from the Virginia Marine Resources Commission (VMRC) for any encroachments in, on, or over the beds of the bays, ocean, rivers, streams, or creeks which

are property of the Commonwealth channelward of ordinary high water along natural rivers and streams above the fall line, or mean low water below the fall line. VMRC permits may be required for the placement of any structures in, on or over State-owned submerged lands. Contact Randy Owen, VMRC (telephone (757) 247-2200) for additional information regarding pertaining potential VMRC permit requirements.

3. Air Quality Regulations. Construction activities will be subject to regulation by the Department of Environmental Quality. The following sections of the Virginia Administrative Code (VAC) are applicable: 9 VAC 5-50-60 *et seq.* of the Regulations governing fugitive dust; 9 VAC 5-40-5600 *et seq.* of the Regulations governing open burning; and 9 VAC 5-80-11 *et seq.* of the Regulations governing stationary sources such as rock crushers. Contact DEQ - Southwest Regional Office Permit Manager (telephone (276) 576-4829; email: ccbazyk@deq.virginia.gov) for additional information and coordination pertaining to Regulations for the Control and Abatement of Air Pollution.

4. Non-point Source Pollution Control: Erosion & Sediment Control and Stormwater Management.

4(a) Erosion and Sediment Control, and Stormwater Management. The project must comply with Virginia's Erosion and Sediment Control Law (Virginia Code §10.1-563D). Federal agencies and their authorized agents conducting regulated land disturbing activities on private and public lands in the state must comply with the Virginia Erosion and Sediment Control Law and Regulations (VESCL&R), Virginia Stormwater Management Law and Regulations (VSWML&R), and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act Section 313, etc.). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, or other structures, soil/dredge spoil areas, or related land conversion activities that disturb 10,000 square feet or more would be regulated by VESCL&R and those that disturb one acre or greater would be covered by VSWML&R. Accordingly, the NRCS should prepare and implement all applicable erosion and sediment control (ESC) and stormwater management (SWM) plans to ensure compliance with state law. The NRCS is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and/or other mechanisms, consistent with agency policy. NRCS should direct all questions pertaining to the development and implementation of E&S and/or Stormwater Management Plans to the DCR - Tennessee and Big Sandy Watersheds Office (telephone (276) 676-5528).

4(b) Stormwater Permit for Construction Activities. The project may require a Virginia Pollutant Discharge Elimination System (VPDES) Permit for Control of Stormwater Discharges for construction activities and municipal separate storm sewer systems (MS4s). General information and registration forms for the General Permit are available on DCR's website at:

<http://www.dcr.virginia.gov/sw/vsmp.htm#geninfo>.

Mr. Bricker
Page 9

Contact Holly Sepety (telephone (804) 225-2613, e-mail: hollv.sepety@dcr.virginia.gov) for additional information and coordination pertaining to Stormwater Management Program requirements.

5. Wildlife Resources. NRCS must continue to coordinate with DGIF, to ensure compliance with protected species legislation. See Environmental Impacts and Mitigation Item 5, above.

6. Geologic and Mineral Resources. If karst topography features are encountered during the project, NRCS should coordinate with Wil Orndorff DCR - Karst Program Coordinator (telephone (540) 831-4056, email: Wil.Orndorff@dcr.virginia.gov) to document these features and minimize adverse impacts.

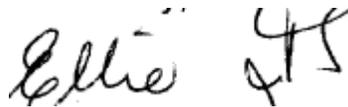
7. Solid and Hazardous Wastes and Hazardous Materials. Prior to commencing work, NRCS should conduct an environmental investigation of each project site and the surrounding area to identify any potential solid or hazardous waste sites or issues. This investigation should include a search of waste-related databases (see the attached guidance for additional information). Contact Paul Kohler, DEQ - ORP (telephone (804) 698-4208) with any questions.

8. Transportation. Any VDOT land use requirements, lane closures, traffic control or work zone safety issues should be closely coordinated with VDOT's Jonesville Residency Office (telephone (276) 346-1911).

9. Historic Structures and Archaeological Resources. To ensure compliance with the Section 106 of the National Historic Preservation Act of 1966 (as amended), contact Roger W. Kirchen of DHR's Office of Review and Compliance (telephone (804) 367-2323, ext. 153). In the event that archaeological resources are encountered during project activities, cease all work immediately and contact Dr. Ethel Eaton (telephone (804) 367-2323; ext. 112).

Thank you for the opportunity to review this project. Detailed comments of reviewers are attached. If you have questions, please feel free to call me (telephone (804) 698-4325) or Ernie Aschenbach (telephone (804) 698-4326).

Sincerely,



Ellie L. Irons
Program Manager
Office of Environmental Impact Review

Enclosures

CC: Kotur S. Narasimhan, DEQ - ADA
Paul Kohler, DEQ - ORP
Joe Hassell, DEQ - DWR
Alice Warren, DEQ - SWRO
Randy Owen, VMRC
Matt Heller, DMME
Andrew Zadnik, DGIF
Susan E. Douglas, VDH - ODW
Mary T. Stanley, VDOT
Keith R. Tignor, VDACS
Tonia Horton, DHR
Todd Groh, DOF
Robert Munson, DCR - DPRR
Robbie Rhur, DCR
Rene Hypes, DCR - DNH
Keith Tignor, VDACS
Tina Rowe, Town of Pennington Gap
Larry Floyd , Town of Saint Charles
D. Dana Poe, Lee County
Ronald C. Flanary, Lenowisco PDC

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
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Telephone: 804/287-1691
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June 28, 2007

Ms. Ellie L. Irons
Office of Environmental Impact Review
Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Ms. Irons:

Thank you for coordinating the multi-agency review of the North Fork Powell River Watershed Plan. It is tremendously helpful to have all the comments in one document, especially since you have included the contact information for various resource people that we might need.

NRCS, in cooperation with the project sponsors, will perform the work in compliance with all of the State and local laws and regulations discussed in this letter. In particular, the Regulatory and Coordination Needs section of your letter will be very useful to us as we proceed with the installation process.

We will also work in cooperation with Federal and State wildlife agencies to minimize any adverse effects on the threatened and endangered species in the area. To the extent possible, we will follow the recommendations noted under the Natural Heritage Resources and Wildlife Resources sections of your letter. It is unlikely that this project will result in significant alteration of freshwater mussel habitat, except for the better. Since the project is designed to minimize erosion and sedimentation, and to treat acid mine drainage (AMD), which directly and indirectly affects mussel populations, NRCS expects to restore suitable mussel habitat over the long term.

NRCS sent copies of the Draft North Fork Powell Watershed Plan and EA to the Annapolis, Maryland and Gloucester, Virginia offices of the U.S. Fish & Wildlife Service but did not receive comments. NRCS has directly coordinated this planning effort with the Virginia Department of Game and Inland Fisheries and has obtained their support for the methods used in defining stream impairment and recovery for potential fisheries.

The Spiny Riversnail, *Io fluviialis*, will be added to the text as a Federal Species of Concern, State Threatened species (FSST), as well as the Brown Supercoil, *Pravitrea septadens*, a State Threatened (ST) species. The Tennessee Dace, *Phoxinus tennesseensis*, will be added to the text as a Federal Species of Concern, State Endangered Species (FSSE).

The two highwall sites will be evaluated for potential peregrine falcon habitat with the assistance of a qualified biologist, and if it is determined the habitat exists, NRCS will contact Jeff Cooper, DGIF Biologist, for further guidance. The Peregrine Falcon, *Falco peregrinus*, a State Threatened (ST) species, will be added to the text. Three other threatened and endangered bird species will be added to the text. These are the Loggerhead Shrike, *Lanius ludovicianus*, an ST species; the Migrant Loggerhead Shrike, *Lanius ludovicianus migrans*, an FSST species; and Bewick's Wren, *thyromanes bewickii*, an FSSE species.

NRCS will try to incorporate 100 foot riparian and wetland buffers into the plans and specifications at each site, as much as this is possible considering landowner constraints and required site acreages. Where possible, existing tree canopies over streams will be preserved. Site revegetation specifications will include native grasses, forbs and shrubs.

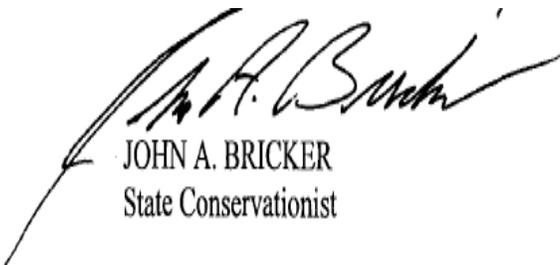
NRCS will conduct a site-specific search for natural heritage resources, including downstream areas, at each project site. Portal sites proposed for closure will be inventoried and evaluated for potential impacts to bats and their habitats, in consultation with Rick Reynolds, DGIF Biologist. The results will also be reported to DCR. The Gray Bat, *Myotis grisescens*, FESE, and the Indiana Bat, *Myotis sodalis*, FESE, will be added to the Threatened and Endangered Species text.

In the Solid and Hazardous Wastes and Hazardous Materials section, there is a recommendation that an environmental investigation should be done at each site prior to commencing work. NRCS policy requires the completion of an Environmental Evaluation prior to design. The database information provided in your letter will be a great asset in this process. Additionally, contractors for each of the sites will be required to obtain the necessary stormwater discharge permits, and to have in place required erosion and sediment control measures during land disturbing activities.

The Cultural Resources section of the report has been revised to address the comments from the Department of Historic Resources. The Finding of No Significant Impact for this project has been issued to State and Federal agencies. We will include a copy of DHR's concurrence letter in the report, as suggested.

This review of the North Fork Powell Watershed Environmental Assessment will be used to ensure that the proposed reclamation of the AMD and Critically Eroding sites in Lee County will be environmentally sound and properly permitted, and will address the needs of the residents and their surroundings. Thank you again for providing the review of this watershed plan.

Sincerely,



JOHN A. BRICKER
State Conservationist



COMMONWEALTH *of* VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street, Suite 206 Richmond, Virginia 23219

Phone: (804) 786-2064 Fax: (804) 786-1798

June 11, 2007

Mr. Jack Bricker, State Conservationist
USDA-NRCS
Culpepper Building, Suite 209
1606 Santa Rosa Road
Richmond, VA 23229-5014

Dear Jack,

My Upper Tennessee and Big Sandy Watersheds Regional Office staff and I have reviewed the draft plan and environmental assessment for the North Fork Powell River Watershed prepared under the PL-566 program. On behalf of our agency, I wish to express our support for this project.

Lee County has an existing infrastructure of knowledgeable, willing, and devoted staff from all of the partnering agencies. As you well know, this can make all the difference in a successful project. The North Fork Powell River is a biologically diverse watershed and home to many endangered species. Reducing the impacts of historic mining activities will increase the chances for these species to thrive.

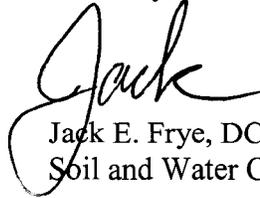
As your plan emphasizes, the North Fork Powell watershed is scarred by unreclaimed coal mining affecting the usefulness and quality of the surface and ground water. Funding to reclaim these areas is limited by the priority system used by the Office of Surface Mining and the Virginia Department of Mines, Minerals, and Energy where public safety and health take priority over environmental impacts in ranking abandoned mine land sites for available restoration funds.

I do wish to clarify two points in the plan document. The Total Maximum Daily Load study for Straight Creek was completed by our sister agency the Virginia Department of Environmental Quality. The State Water Control Board recently approved a Use Attainability Study to be completed on Straight Creek. Before the Use Attainability Study can be completed, the Board directed the Implementation Plan be completed prior to any change in Straight Creek's designated use.

J. Bricker
June 11, 2007
Page 2 of 2

Please let our Upper Tennessee & Big Sandy Watersheds Office know if we can be of further assistance.

Sincerely,

A handwritten signature in cursive script that reads "Jack". The signature is written in black ink and is positioned above the printed name and title.

Jack E. Frye, DCR
Soil and Water Conservation Director

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-1691
Fax: 804/287-1737

June 26, 2007

Mr. Jack E. Frye, Director
Virginia Department of Conservation & Recreation,
Division of Soil and Water Conservation
203 Governor St., Suite 206
Richmond, VA 23219

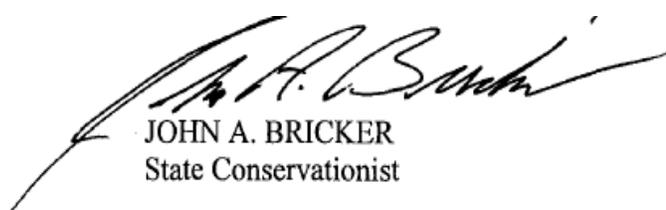
Dear Mr. Frye:

Thank you and your staff for your review of the Draft North Fork Powell River Watershed Plan and Environmental Assessment, and your support for the plan objectives. NRCS anticipates considerable improvement in water quality, fisheries and the aquatic community if the plan is fully implemented.

Suggested corrections to the plan have been noted and will be made in the Final Plan. DCR was inadvertently entered in Table B for completion of the TMDL in place of DEQ. NRCS has participated in the Use Attainability meetings and awaits the outcome of that study with considerable interest.

We appreciate your contribution to the review of this watershed plan.

Sincerely,



JOHN A. BRICKER
State Conservationist

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COMMONWEALTH *of* VIRGINIA
DEPARTMENT OF TRANSPORTATION

P.O. BOX 1768
BRISTOL, VA 24203

DAVID S. EKERN, P.E.
COMMISSIONER

June 14, 2007

Mr. John A. Bricker
State Conservationist
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229-5014

Dear Mr. Bricker:

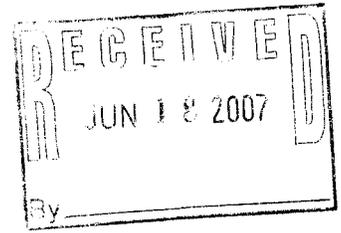
The Virginia Department of Transportation appreciates the opportunity to comment on the proposed water quality improvements to the North Fork Powell River Watershed.

Understanding the importance of this project to the preservation of the relatively pristine habitat for numerous endangered species in the Lee County area and the significance of our responsibility for environmental stewardship, the Department commends and fully supports this effort.

We have reviewed the Draft Plan and Environmental Assessment and there appear to be no adverse effects to any VDOT properties or operations. However, should proposed mitigation activities in any way involve encroachment upon VDOT rights of way or possible impact to any VDOT facility or the traveling public, please contact James Parsons, the Jonesville Residency Administrator responsible for Lee and Scott Counties at (276) 346-1911.

Such potential situations may include access across VDOT rights of way to work areas, changes to stream flow that could affect velocity and location leading to inundation of roadways, erosion, and adjacent private property disturbance. Another concern is the potential for effects resulting from mine portal closures that could generate additional and/or redirect ground water or surface water flow to VDOT drainage structures.

VDOT.Virginia.gov
WE KEEP VIRGINIA MOVING



Mr. John A. Bricker Page 2 of 2
June 14, 2007

VDOT is appreciative of the positive effects of this endeavor in decreasing the _
corrosivity of water flowing through our drainage structures, potentially lowering materials and
maintenance costs. If further assistance is needed, please call Mr. James Parsons.

Sincerely,

A handwritten signature in black ink, appearing to read "James Parsons".

 Givens
District Administrator

/bjs

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-1691
Fax: 804/287-1737

June 26, 2007

Mr. James S. Givens
Bristol District Administrator
Virginia Department of Transportation
P.O. Box 1768
Bristol, VA 24203

Dear Mr. Givens:

Thank you for your review and comments on the Draft North Fork Powell River Watershed Plan and Environmental Assessment. NRCS appreciates VDOT's understanding and support of this important water quality project.

NRCS does not anticipate any adverse impacts to the traveling public or to VDOT facilities as a result of the project. We also do not anticipate any encroachment on VDOT rights-of-way, but we will advise the Jonesville Residency Administrator should any of these situations arise. After funding is obtained for the project and detail designs are generated, specific plans and specifications can be made available to the Jonesville Administrator for review of any potential effects on VDOT facilities.

We appreciate your contribution to the review of this watershed plan.

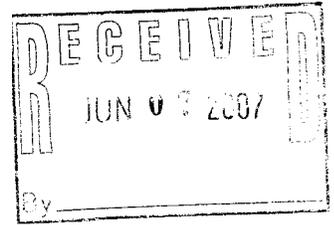
Sincerely,

A handwritten signature in black ink, appearing to read "John A. Bricker".

JOHN A. BRICKER
State Conservationist

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COMMONWEALTH of VIRGINIA

Department of Historic Resources

2801 Kensington Avenue, Richmond, Virginia 23221

L. Preston Bryant, Jr.
Secretary of Natural Resources

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TOO: (804) 367-2386
www.dhr.virginia.gov

June 6, 2007

Jack

Mr. W. Ray Dorsett, Acting State Conservationist
USDA – Natural Resources Conservation Service
1606 Santa Rosa Rd., Suite 209
Richmond, Virginia 23229-5014

Re: Environmental Assessment - North Fork Powell River Watershed
Lee County, Virginia
DHR File No. 2007-0630; DEQ Project # 07-093F

Dear Mr. Dorsett:

Our office has received the Environmental Assessment (EA) for the project referenced above. The plan addresses potential impacts from the remediation of 39 acid mine sites within the North Fork Powell River watershed. As presented, these remedial actions will take place in areas previously disturbed by mining activities.

It is our opinion that these actions will not likely impact intact archaeological sites and no further archaeological studies are warranted. The EA identifies three abandoned coal tipples located at remediation sites and suggests that one of these tipples, Tex Rivers Tipple at site RCUAMD4, may be historically significant. We concur with this assessment and recommend its avoidance during implementation. We also request reconnaissance-level documentation and DSS data entry for the Tex Rivers Tipple so that it may be considered during future projects. Based on the information provided, we recommend a finding of *no adverse effect* on the condition that the Tex River Tipple is avoided. Inclusion in the final EA of your finding of no adverse effect along with our letter of concurrence, will provide the interested public the opportunity to inspect the documentation prior to approval of the undertaking in accordance with 36 CFR 800.5(c) of the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended).

On a technical note, the Cultural Resources section (p.33) of the EA states that there are no archaeological or architectural sites within the watershed. Our Archives shows numerous resources within the watershed. Please check our DSS and revise this section to reflect the number and nature of those historic resources. Also, while there are no resident Federally-recognized tribes in Virginia, several non-resident tribes are currently consulting on projects in Virginia. In the preparation of the State Level Agreement between NRCS and our office, numerous tribes were consulted. Please revise this section of the EA to reflect the results of this consultation.

Administrative Services 10
Courthouse Avenue
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(804) 863-1624 Fax: (804)
862-6196

Capital Region Office
2801 Kensington Ave.
Richmond, VA 23221
Tel: (804) 367-2323
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Tidewater Region Office
14415 Old Courthouse Way, 2nd Floor
Newport News, VA 23608
Tel: (757) 886-2807
Fax: (757) 886-2808

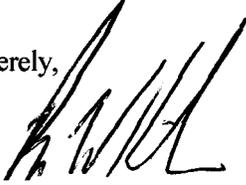
Roanoke Region Office
1030 Penmar Ave., SE
Roanoke, VA 24013 Tel:
(540) 857-7585 Fax:
(540) 857-7588

Winchester Region Office 107
N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

Page 2
June 6, 2007
Mr. W. Ray Dorstt

We appreciate the opportunity to comment on this project. If you have any questions concerning these comments, please contact me at (804) 367-2323 x153 or email roger.kirchen@dhr.virginia.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. Kirchen', written over the word 'Sincerely,'.

Roger. W. Kirchen, Archaeologist
Office of Review and Compliance

Cc: Mr. Ernst Aschenbach, DEQ - EIR
Mr. E. J. Fanning, USDA - NRCS



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-1691
Fax: 804/287-1737

June 26, 2007

Mr. Roger W. Kirchen, Archaeologist
Office of Review & Compliance
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221

Dear Mr. Kirchen:

Thank you for your detailed comments on the Draft North Fork Powell River Watershed Plan-Environmental Assessment. They have proved especially useful with clarifying the status of the Tex Rivers Tipple site, and have laid out a course of action for Section 106 compliance during future activities as well as for this particular project. NRCS will proceed with reconnaissance-level documentation and Data Sharing System (DSS) data entry as soon as possible after this plan is approved and authorized.

NRCS has revised the Cultural Resources section of the plan to reflect your concern for DSS listed resources. The section now reads as follows:

"A search of the VDHR Data Sharing System (DSS) was conducted for listed cultural resources in the watershed. Overall, forty listed cultural resources were located. The majority of these sites and properties are located directly south of Pennington Gap, just north of the confluence of the North Fork of the Powell River with the Powell River. A much smaller group of one archaeological site and two historical properties occur just west of Keokee in the northeast end of the watershed.

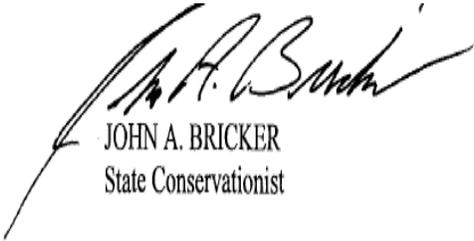
Of the forty listed resources, nine are archaeological sites. Of the nine archaeological sites, five are Native American, ranging in period from Archaic to Woodland. The other four archaeological sites include one natural phenomenon, a rock face; two historic period sites, one with artifacts and one with dwellings, and one cemetery. Of the remaining thirty-one listed historical properties, seventeen have been recommended Not Eligible for listing, and fourteen have not been evaluated.

Although Virginia has no Federally recognized tribes, several Federally recognized tribes including the Eastern Band of Cherokees in North Carolina, the Catawba Indian Nation in South Carolina, and the Tuscarora Indian Nation in New York all claim ancestral lands in Virginia. Consequently, NRCS consults with these tribes on projects affecting lands where traditional cultural places, artifacts and native graves may be

encountered. The Virginia Council on Indians, a State agency, is also consulted on projects that may affect any of the eight State recognized tribes."

We believe that these changes to the document satisfy your comments and concerns. We appreciate your contribution to the review of this watershed plan.

Sincerely,



JOHN A. BRICKER
State Conservationist



COMMONWEALTH *of* VIRGINIA

Department of Agriculture and Consumer Services

PO Box 1163, Richmond, Virginia 23218
Phone: 804/786-3501 • Fax: 804/371-2945. Hearing Impaired: 800/828-II20
www.vdacs.virginia.gov

May 30, 2007

Mr. John A. Bricker
Natural Resources Conservation Service
1606 Santa Rosa Rd., Suite 209
Richmond, VA 23229-5014

Dear Mr. Bricker:

I received your recent letter requesting comments regarding the North Fork Powell River Watershed in Lee County, Virginia.

Our agency works closely with the Department of Conservation and Recreation (DCR) in determining potential impact of proposed projects on state endangered and threatened plant and insect species. Through a Memorandum of Agreement between our agencies, DCR reviews these projects and submits comments on our behalf. Consequently, we defer to DCR's response to your inquiry. Please note that if after researching its database of natural resources, critical habitats and species locations, DCR finds that a project poses a potential adverse impact on an endangered or threatened plant or insect species, the appropriate information will be referred to this agency for further review and possible mitigation.

Should you require additional information from our agency on this issue, please contact Mr. Keith Tignor, Endangered Species Coordinator, in our Office of Plant and Pest Services, at (804)786-3515 or Keith.Tignor@vdacs.virginia.gov. Thank you.

Sincerely,

A handwritten signature in black ink that reads "Donald G. Blankenship".

Donald G. Blankenship
Deputy Commissioner

cc: Andres Alvarez
Roy Seward

United States Department of Agriculture



Natural Resources Conservation Service
1691
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804/287-

Fax: 804/287/1737

June 26, 2007

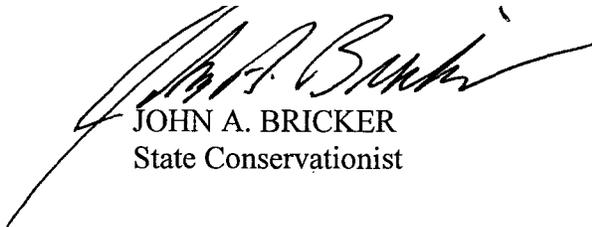
Mr. Donald G. Blankenship Deputy Commissioner
Department of Agriculture and Consumer Services P.O. Box 1163
Richmond, VA 23218

Dear Mr. Blankenship:

Thank you for responding to the request for comments on the North Fork Powell River Watershed project. We have received the comments from the Department of Conservation and Recreation (DCR) mentioned in your letter. Responses to these comments will be addressed in our response to DCR.

We appreciate your contribution to the review of this watershed plan.

Sincerely



JOHN A. BRICKER
State Conservationist

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APPENDIX B

INVESTIGATIONS AND ANALYSES

Investigations and Analysis Report

Investigation and analysis of critical resources used in the planning for the North Fork Powell River Land Treatment Watershed was conducted as follows:

Air Quality: The website of the Virginia Department of Environmental Quality, Air Quality Division, was consulted for air quality monitoring and description for Lee County. The Division does not maintain air quality monitoring stations in Lee County.

Aquatic Resources: Benthic macroinvertebrate sampling was conducted by David Miller & Associates, Inc., a consultant working for the COE for several years. NRCS assisted with data collection at 14 sites in October, 2006. Five of the 14 sites were also sampled by DMA, Inc. in October, 2005. Samples were shipped to a regional laboratory for taxonomic classification. The lab reports were used to calculate a Stream Condition Index (SCI) for each sample site following the methodology described in the manual "A Stream Condition Index (SCI) for Virginia Non-coastal Streams" (Virginia Department of Environmental Quality and USEPA, Sept., 2003). The results are displayed in Table D and analyzed in the text.

Critically Eroding Lands: Erosion estimates were made through on-site visits to various sites. In addition, the sedimentation rates were taken from the TMDL study done by the Virginia Department of Environmental Quality.

Cultural Resources, Natural and Scenic Areas, and Visual Resources: The NRCS Cultural Resources Specialist conducted pedestrian surveys of several AMD sites during October, 2006. The Virginia Department of Historic Resources Data Sharing System was searched for listed archaeological and architectural sites within the watershed. Forty sites were listed for the watershed, 9 archaeological and 31 architectural. Most of the sites are clustered south of Pennington Gap. None of the sites will be affected by the project treatment systems or erosion stabilization activities. Natural and Scenic Areas, and Visual Resources were described using the Natural Heritage Map for Lee County (DCR-DNH, 2003), and the Virginia Outdoors Plan (DCR-Planning & Recreation, 1996).

Economics: The methods used in making the economic investigations and analyses follow those approved by the Natural Resources Conservation Service for the benefit/cost evaluation of land and water resources. Specifically, three economic analysis methodology/guidance documents were used to evaluate project benefits and costs: 1) "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies", U.S. Water Resources Council, March, 1983; 2) the "Economics Handbook, Part II for Water Resources", USDA/Soil Conservation Service, March, 1987; and 3) "Conservation Options Procedure" or COP procedure, from Economics Technical Note, 200-LI-1 October 1988, USDA/Soil Conservation Service.

The first of these documents was developed to provide consistent project formulation and evaluation guidance for all federal agencies that carry out water and related land resource implementation studies. The primary goal of the "Principles and Guidelines", or P&G as the document is commonly referred to, is that projected benefits from project actions exceed project costs. P&G also calls for identification of the "National Economic Development" or NED alternative, which maximizes net benefits. It is the intent of P&G for the NED alternative to be selected for implementation. NRCS policy for water resource planning supplements P&G and is specified in the National Watershed Manual (NWM). The NWM requires that the NED alternative be selected unless there is an overriding reason, or set of reasons, for selecting another alternative based on considerations of a federal, state, local or international nature (NWM, Section 505.05). Section 505.05 also specifies the

criteria for selecting a plan other than the NED plan. “Regional Economic Development” and “Resource Protection” plans, for land treatment plans, may also be evaluated. Any one of these alternative plans may be determined to be the “Recommended Plan” based on the characteristics of the analysis. Section 503.46 describes both “Water Resource Plans” which include structural and nonstructural measures, and may include land treatment measures and “Watershed Protection Plans” which include only land treatment measures.

The North Fork of the Powell River Watershed Plan is recommending installation of land treatment practices only. These practices are intended to reduce the delivery of environmental contaminants emanating from abandoned mine lands which currently diminish water quality. All of the recommended practices are contained within the NRCS National Handbook of Conservation Practices. Therefore, this project meets the requirements delineated in the NRCS National Watershed Manual, Section 503.46, paragraph b), to be designated as a “Watershed Protection Plan”. As a Watershed Protection Plan, installing approved land treatment measures only, this project does not have to identify nor evaluate an alternative that meets the “National Economic Development”, or NED plan criteria required for all “Water Resource Plans”.

Basic data were obtained from field interviews with the local sponsors, DMME, ACOE and DGIF officials, and from the secondary data sources listed in the references section of the plan. Benefits were derived from GIS measured reaches of streams projected to have a recovery of the warm water fishery over a two year period after treatment. The costs of treatment for each alternative technology were evaluated within the context of searching for the least-cost means of achieving the stated water quality objectives at each site. The COP Procedure begins with the development of definition of local “evaluation units”. Evaluation units in this study consisted of the subwatersheds and the AMD and critical erosion sites contained within them. Use of COP involves evaluation of alternative treatment systems (logical treatment systems comprised of specific technologies grouped with associated practices that will fit within the physical constraints of the topography of each site). The procedure uses cost efficiency, e.g., average annual cost per gallon of AMD treated or per ton of soil erosion reduction achieved. This first stage determines those sets of technically feasible treatments for which net benefit evaluations are to be made.

The second stage of the COP procedure is a net monetary benefits analysis performed on each of the alternative systems identified in Stage I as cost efficient. Stage III adds non-monetary factors such as social and environmental considerations. Stage III also addresses the tradeoffs among the Stage II alternatives and results in estimates for all monetizable project benefits and costs. These benefits and costs are then translated into average annual equivalent terms based on a determined period of analysis (phased installation period plus the period of time that reflects the useful life of the planned investments). Lastly, Stage III documents the rationale for selecting the various plans evaluated and for the selection of the recommended plan.

Environmental Justice: An environmental justice assessment was conducted for the proposed works of improvement. The socio-economics write-up was prepared, mainly from U.S. Bureau of the Census data, and explicitly sought out information on the income, education, health and social conditions of the resident population within Lee County where the entire watershed lies. The residents were documented to live within some of the lowest income conditions within the state.

It was further determined that treatment of the acid mine drainage and severely eroding sites within the North Fork of the Powell River watershed will have very positive environmental effects; and that these effects will occur on the aquatic habitats and associated riparian areas below the treated acid

mine drainage sites and within and adjacent to the treated sites that had been eroding severely prior to the project. As a result, the environmental benefits generated by the project, will accrue to all residents who reside adjacent to or downstream of the treated sites. The largest and most direct economic benefits will occur associated with the employment, equipment operation and materials purchases made during the construction phase of the project. Afterwards, ongoing operation, maintenance and replacement activities and associated cost expenditures by DMME to keep the AMD sites from polluting, will create a stream of economic benefits within the watershed for the entire life of the project.

All area residents, including low income and minorities, were afforded the opportunity to participate in the planning process through public meetings and review of the draft plan. Both public meetings were held in the Town of St. Charles, a low income community, to reach out to low income residents within the watershed.

Given that all adjacent and downstream residents will benefit from water quality improvements achieved with this project, and the fact that Lee County has a population with limited diversity, disparate treatment of any particular group of citizens is not expected to occur. On the contrary, all vehicle operators who travel along the roads within the watershed will also benefit due to the fact that the culverts and bridges should experience extended useful lives as the acid drainage flowing through and under them is reduced by the NRCS project. Consequently, VDOT and the Lee County public works authority should experience lower operation and maintenance costs in the future. Therefore, it is reasonable to conclude that extended useful lives for the roads and bridges will benefit all racial, ethnic and socio-economic groups within the watershed. In addition, reductions in road operation, maintenance and replacement costs will directly benefit all residents within the watershed and all taxpayers in general within Lee County and the state of Virginia.

In summary, it was concluded that there are no known disparate impacts expected from this land treatment project. Indeed, the project will result in expenditures with employment and environmental effects that will benefit all socioeconomic groups within the watershed. Given that the North Fork watershed, and the County as a whole, have some of the poorest and most underprivileged citizens in the entire state, the project will serve to improve the lives of people who need all of the help they can get. In addition, this project will complement other efforts within the watershed aimed at improving potable water, water quality of the surface streams, environmental education, and tourism with the hopes of creating conditions more favorable for enhanced economic development.

Fisheries: A conservative approach was taken to evaluate the existing fisheries in the watershed and to anticipate recovery. Several assumptions were made to simplify the analysis:

- 1) First order streams do not have sufficient reliable flow to accommodate a viable fishery. [This is variable and dependent on drainage area, seasonal climatic factors, and geology.] This means that only second, third, and fourth order streams are assumed to have the potential for sustaining fish.
- 2) A pH-Impaired section is a barrier to fish movement but a pH-Recovering section is not.
- 3) Based on the choice of pH as the measure of water quality, other chemical barriers will be reduced, improved or removed by treatment of the AMD.

4) Although there may be some physical barriers present in the watershed, there are relatively few impassable barriers on the second, third, and fourth order streams. For this reason, physical barriers were not considered an impediment to the projected extensions of fish habitat. [Again, there may be some exceptions to this assumption.]

5) Treating critical erosion in the subwatersheds will improve fisheries by reducing sediment delivery to the streams. Most of the critically eroding sites are in the headwaters of the watersheds where there is no data on sediment. Other sites are located away from the stream where overland flow is the primary transport mechanism of sediment and other pollutants. It is difficult to quantify the changes in sedimentation and their effects on fisheries without this information. Therefore, a standard sediment delivery rate will be assumed for the treated, well-vegetated condition.

Conclusion: A site that is presently a pH barrier to fish will be treated to eliminate that barrier. This will allow fish movement into all of the second, third, and fourth order stream reaches above the treated sites. When there is sufficient flow, smaller species would also be able to access the larger first order streams that are no longer blocked by the pH impairment of the downstream site.

Threatened and Endangered Species: Identification of Federal and State listed Threatened and Endangered plant and animal species within the project area was determined using the Virginia Fish & Wildlife Information Service computer program which is a publication of the Virginia Department of Game and Inland Fisheries. Freshwater mussels are a major group of concern among the 24 listed fish, mussel and bird Threatened and Endangered animal species in the watershed, amounting to 15 or 62.5% of the total listed species. Since the current water quality impairment due to low pH is a limiting factor for host fish species required to complete the mussels' life cycle, it is assumed that restoration of warm water fisheries will be eventually followed by re-establishment of freshwater mussel populations. With the return of effluent and instream pH to acceptable values, a major water quality limiting factor to completion of the mussel life cycle will be removed, i.e. solubility of iron, aluminum and manganese will be reduced, and will not threaten the survival of the juvenile mussel stage, the most vulnerable free-living stage where the organism is establishing itself in the stream sediments.

Water Quality: Most of the surface water quality data was obtained from the large quantity of water quality samples taken by DMME and the COE over the past ten years. Additional data was obtained from the TMDL Report on the Straight Creek Watershed. For project sites located in headwater streams with no water quality sampling sites, interpretations from sites with known data were used to estimate the water quality impacts from the project sites.

Indicators of water quality impairments in the watershed included pH, iron, aluminum, manganese, Total Dissolved Solids, and Total Suspended Solids. Dissolved Oxygen is another impairment that was considered but there were only a few locations where this impairment was observed. Since soluble metal concentrations are a function of the pH of the water, pH was used as the primary measure of water quality in the streams and at the project sites.

Stream reaches were categorized as pH-Impaired if any of the pH samples were less than 6.0, pH-Recovering if the pH was between 6.0 and 6.9, and pH-Acceptable (not impaired) if the pH was 7.0 to 9.0. There were so few samples with pH values greater than 9.0 that the potential for alkaline pH impairment was disregarded. The effects of critical erosion on the stream system were estimated based on their location in the watershed and the corresponding extent of their detrimental effects.

The AMD Treat program, created by the Federal Office of Surface Mining, Reclamation and Enforcement, was used to design a treatment for each site with AMD. The goal of the planned treatments is to achieve a pH of 7.0 to 9.0 for the water exiting the site. Post-completion data from the COE projects installed two years ago indicated that pH values were in the range of 6.0 to 6.9, indicating a pH-Recovering condition rather than the anticipated non-impaired condition. This was not seen as a failure of treatment. Rather, it was judged to be an incremental trend toward the non-impaired condition that will occur as the vegetative components of the treatment systems mature.

For this reason, a conservative approach was taken toward the anticipated effects of the other planned treatments. Stream segments that are presently pH-Impaired were projected to achieve a pH-Recovering condition and stream segments that are presently pH-Recovering were projected to achieve a pH-Acceptable (non-impaired) condition. The natural buffering capacity of the streams in this watershed is high. Treating the impairment will eliminate the point source of contamination and allow the natural system to moderate any residual effects.

Soils, Prime Farmland & Wetlands: Soils, including wetland hydric soils, were described using the Lee County Published Soil Surveys of 1953 and 2006. Existing wetland delineations were described from the COE “Feasibility Study for Ecosystem Restoration”, August, 2005. There are no prime farmland soils in the watershed.

Wildlife Resources: The “Virginia Comprehensive Wildlife Conservation Strategy”, 2005, VDGIF, and “The Natural Communities of Virginia”, DCR-DNH, were used to draft this section of the plan.

APPENDIX C

IMPAIRED WATERS MAPS

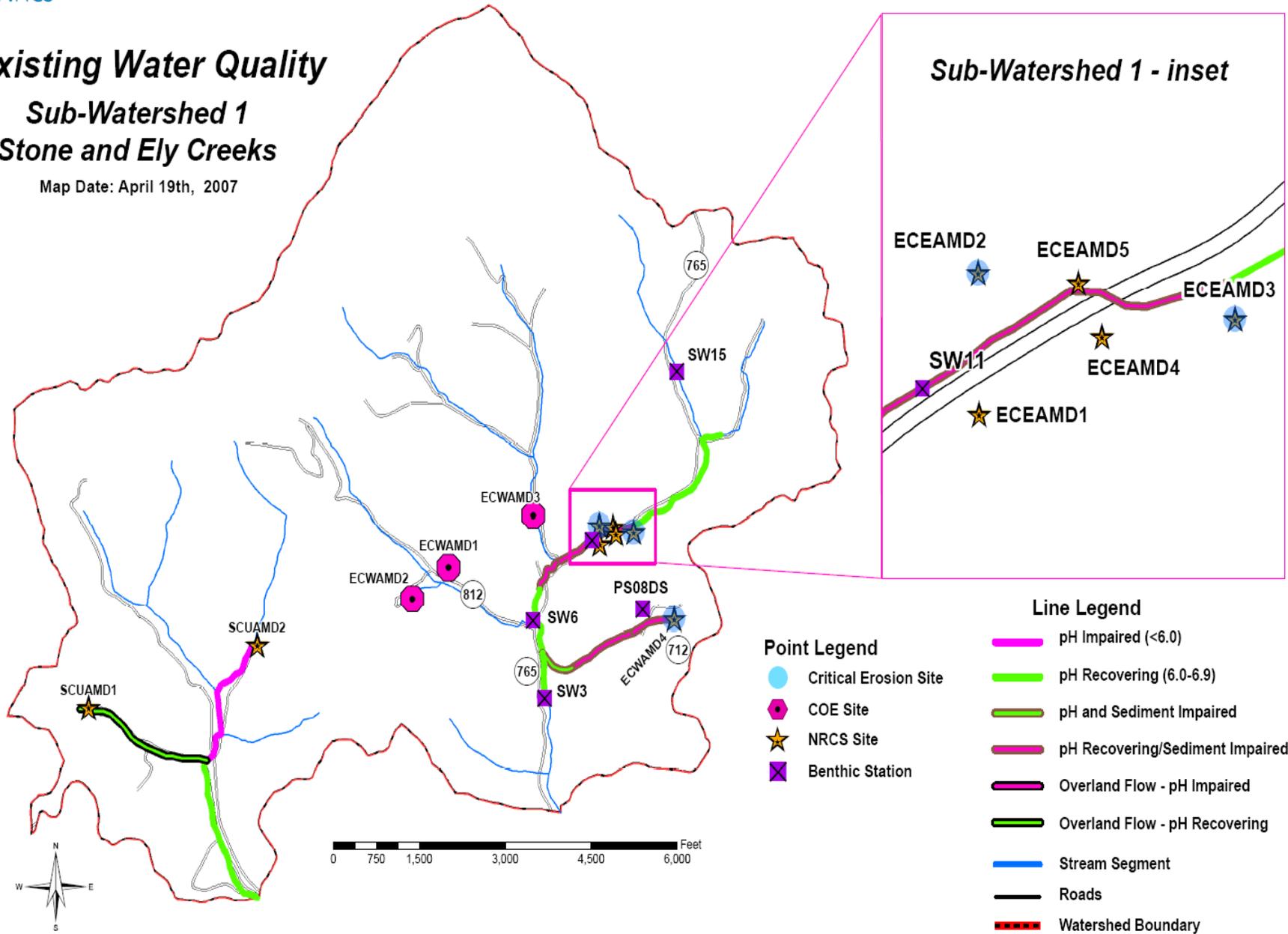
These maps were produced at the Virginia Natural Resources Information Center at the USDA Natural Resources Conservation Service in Harrisonburg, VA, 04/19/07. Some AMD and erosion points were provided by DMME. The NRCS digitized additional AMD and erosion points. The roads and streams were extracted from the DMME and COE CAD overlay. The Hydrologic Units were extracted from the 2006 Virginia 12-Digit Unit. This information was digitized by the DCR-DSWC. The subwatersheds were digitized by the NRCS. The stream segments were edited by the NRCS to produce the thematic layers. This map is projected in Virginia State Plane Coordinate – Zone 4502 with the NAD27 Datum.



Existing Water Quality

Sub-Watershed 1 Stone and Ely Creeks

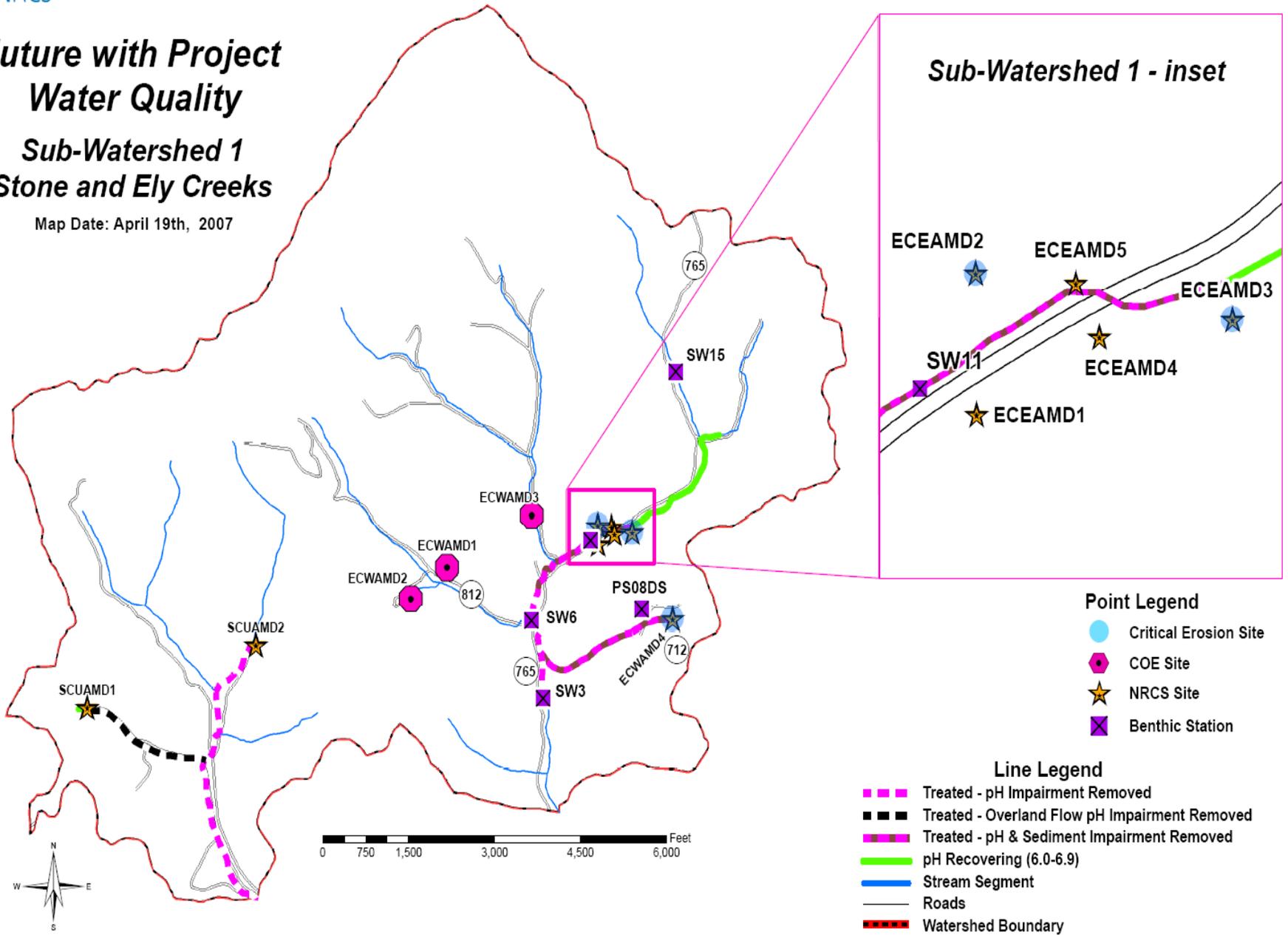
Map Date: April 19th, 2007





Future with Project Water Quality Sub-Watershed 1 Stone and Ely Creeks

Map Date: April 19th, 2007

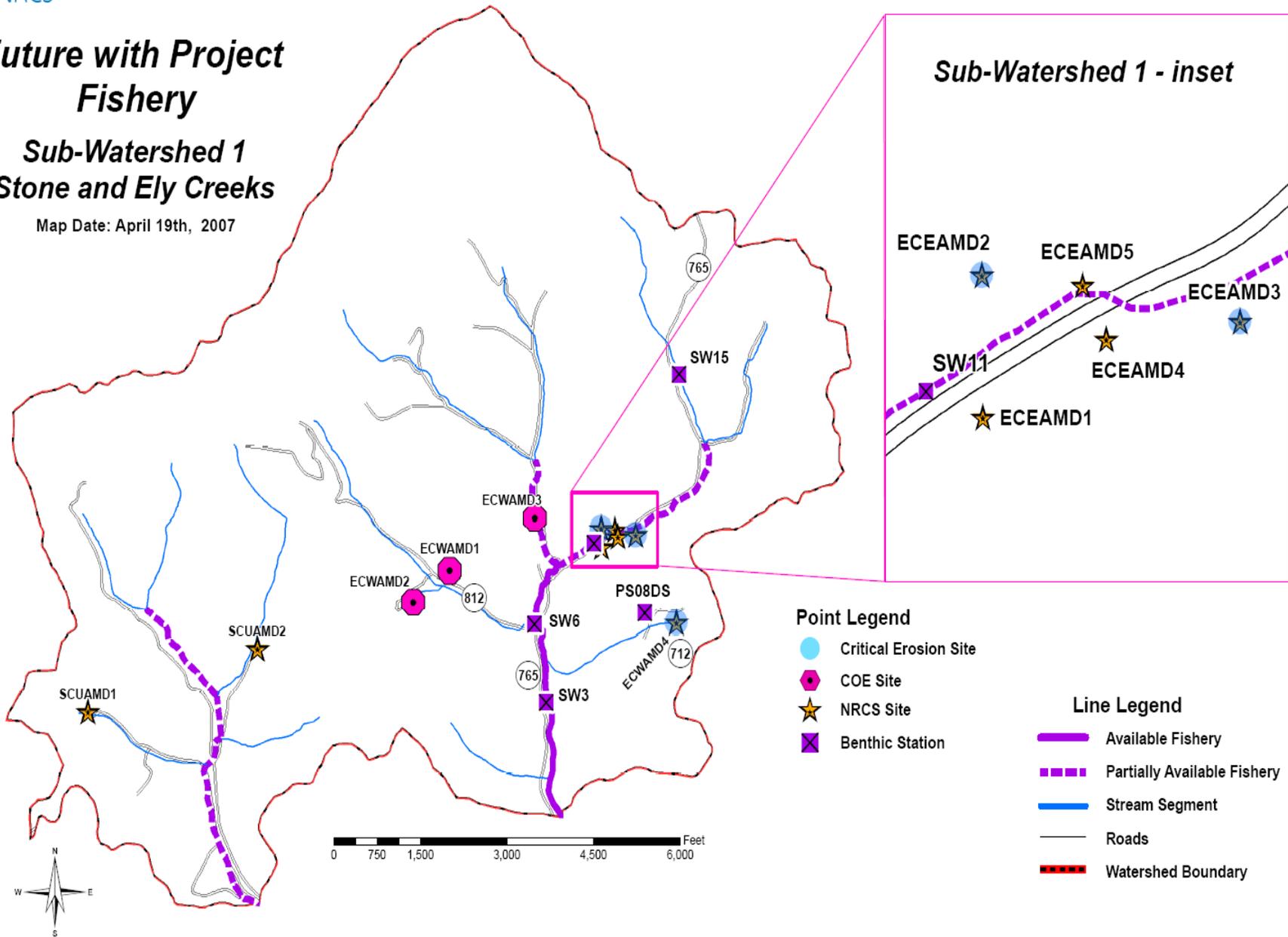




Future with Project Fishery

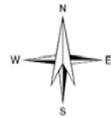
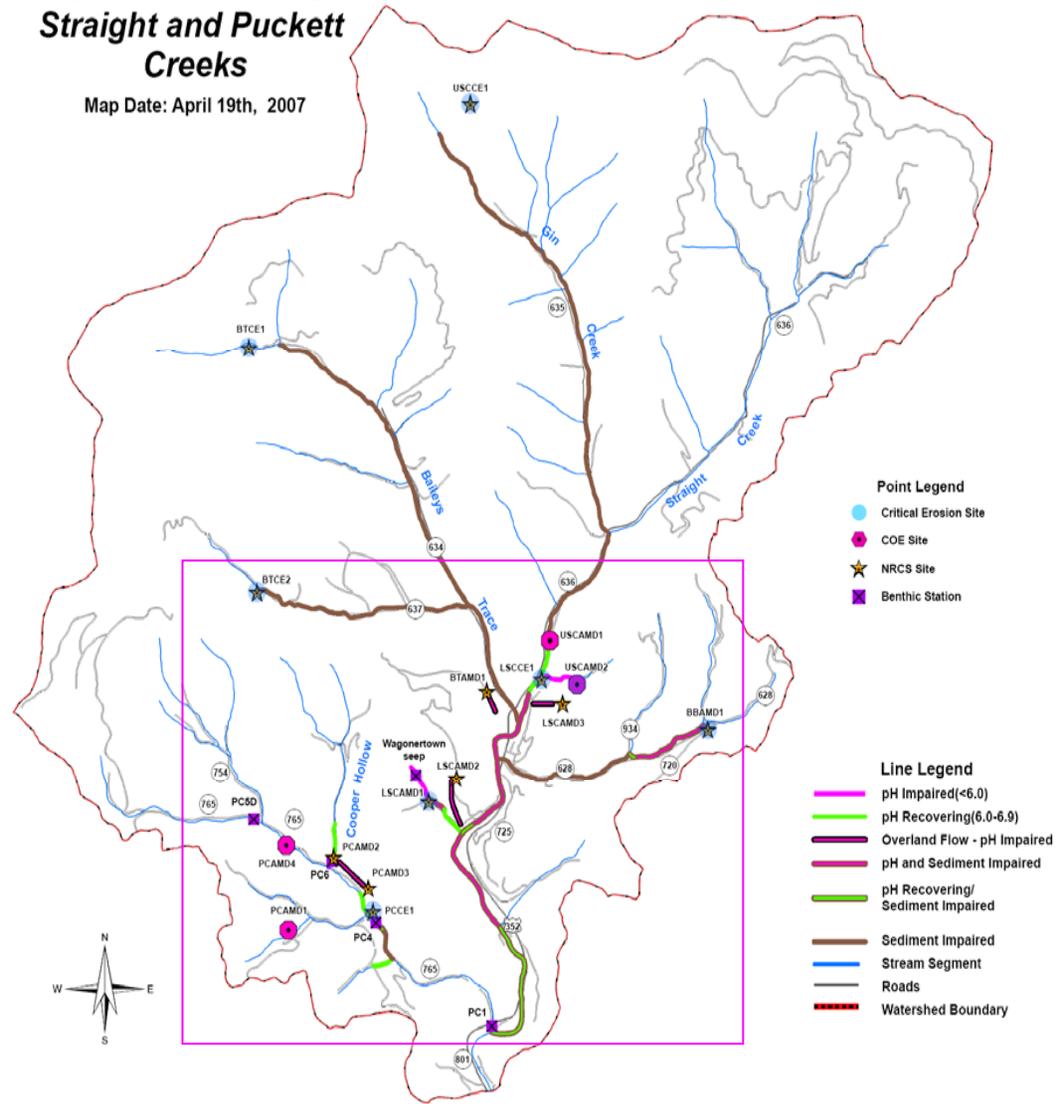
Sub-Watershed 1 Stone and Ely Creeks

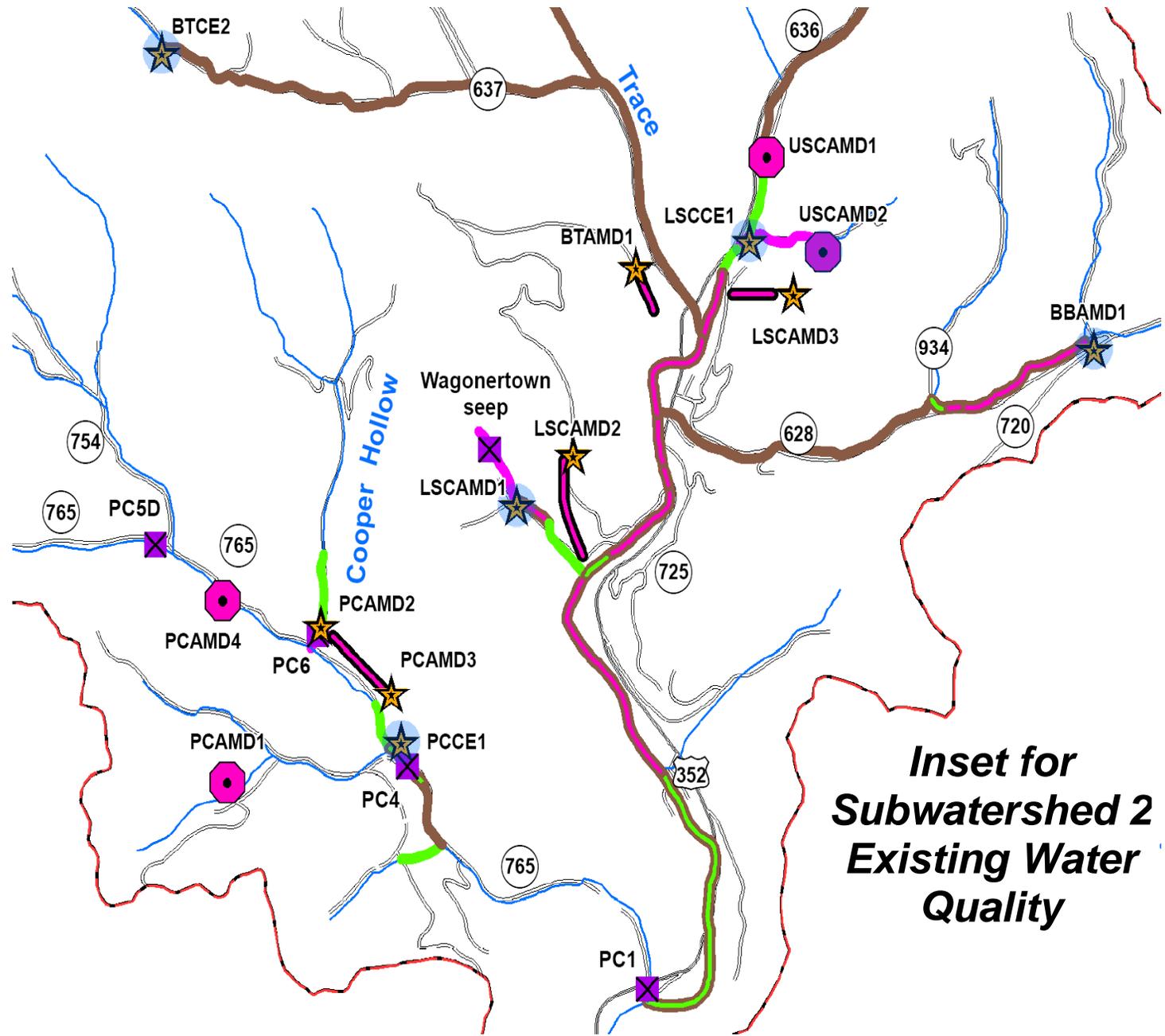
Map Date: April 19th, 2007



EXISTING WATER QUALITY
Sub-Watershed 2
Straight and Puckett
Creeks

Map Date: April 19th, 2007





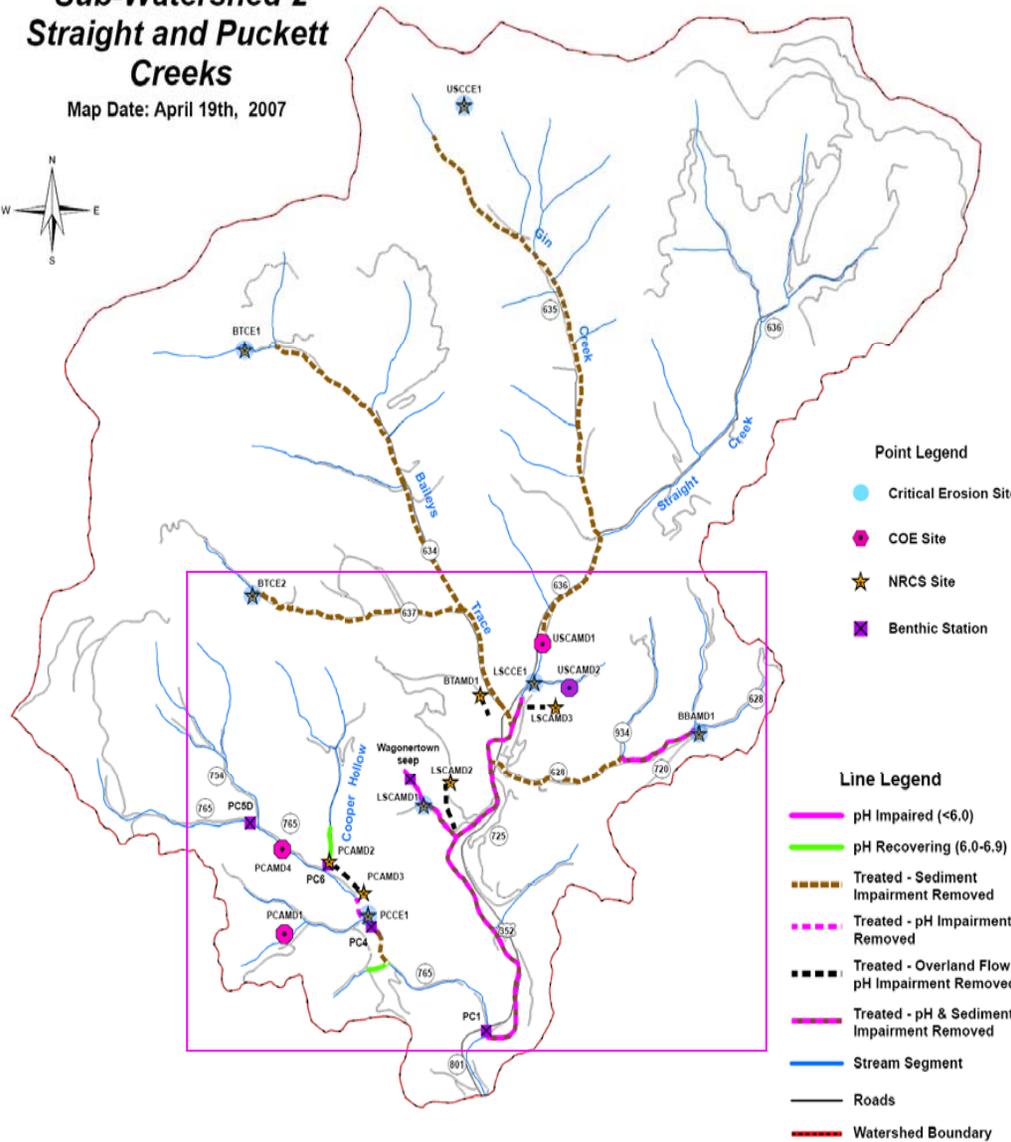
***Inset for
Subwatershed 2
Existing Water
Quality***

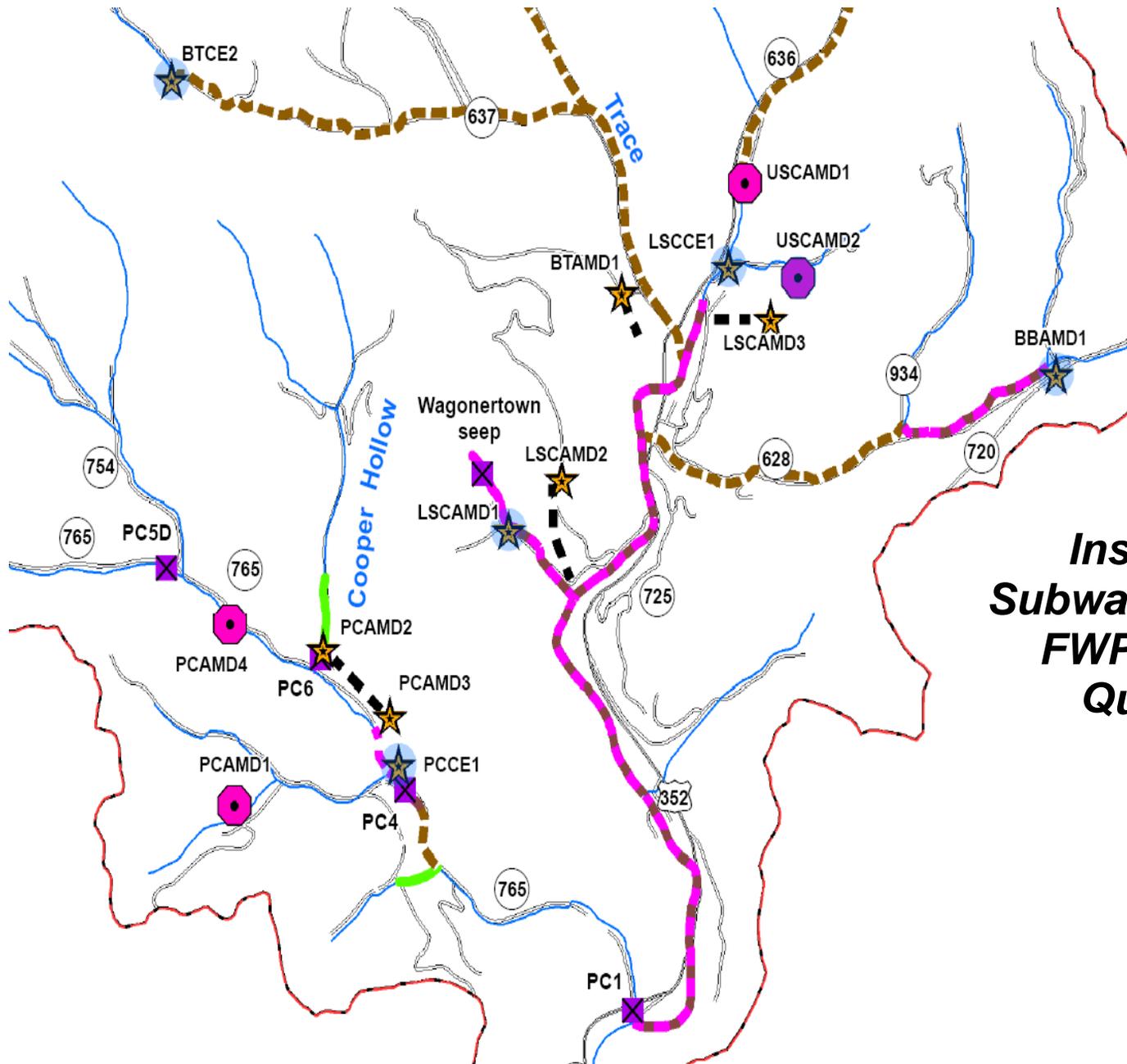
FUTURE WITH PROJECT WATER QUALITY



Sub-Watershed 2 Straight and Puckett Creeks

Map Date: April 19th, 2007





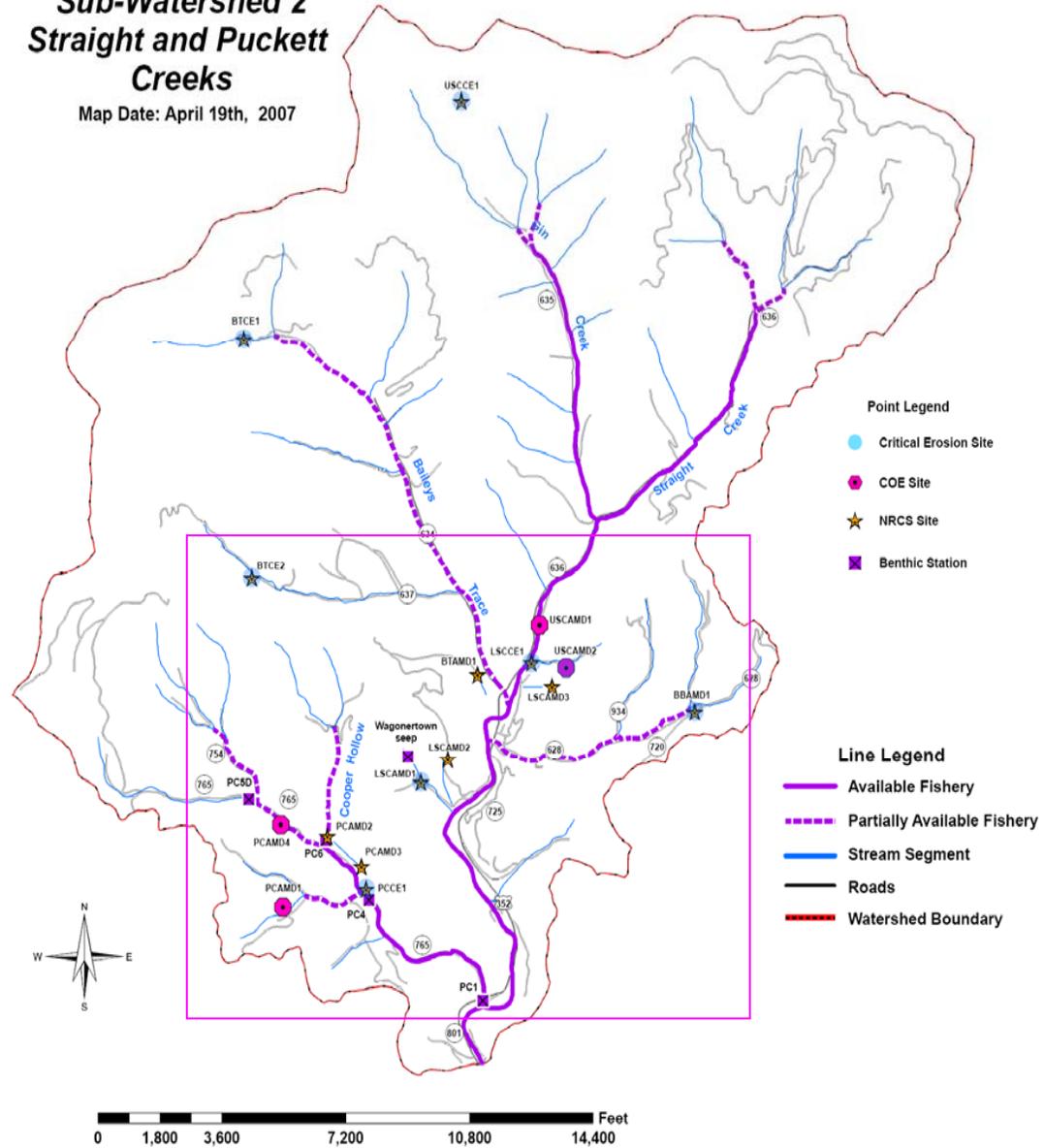
***Inset for
Subwatershed 2
FWP Water
Quality***

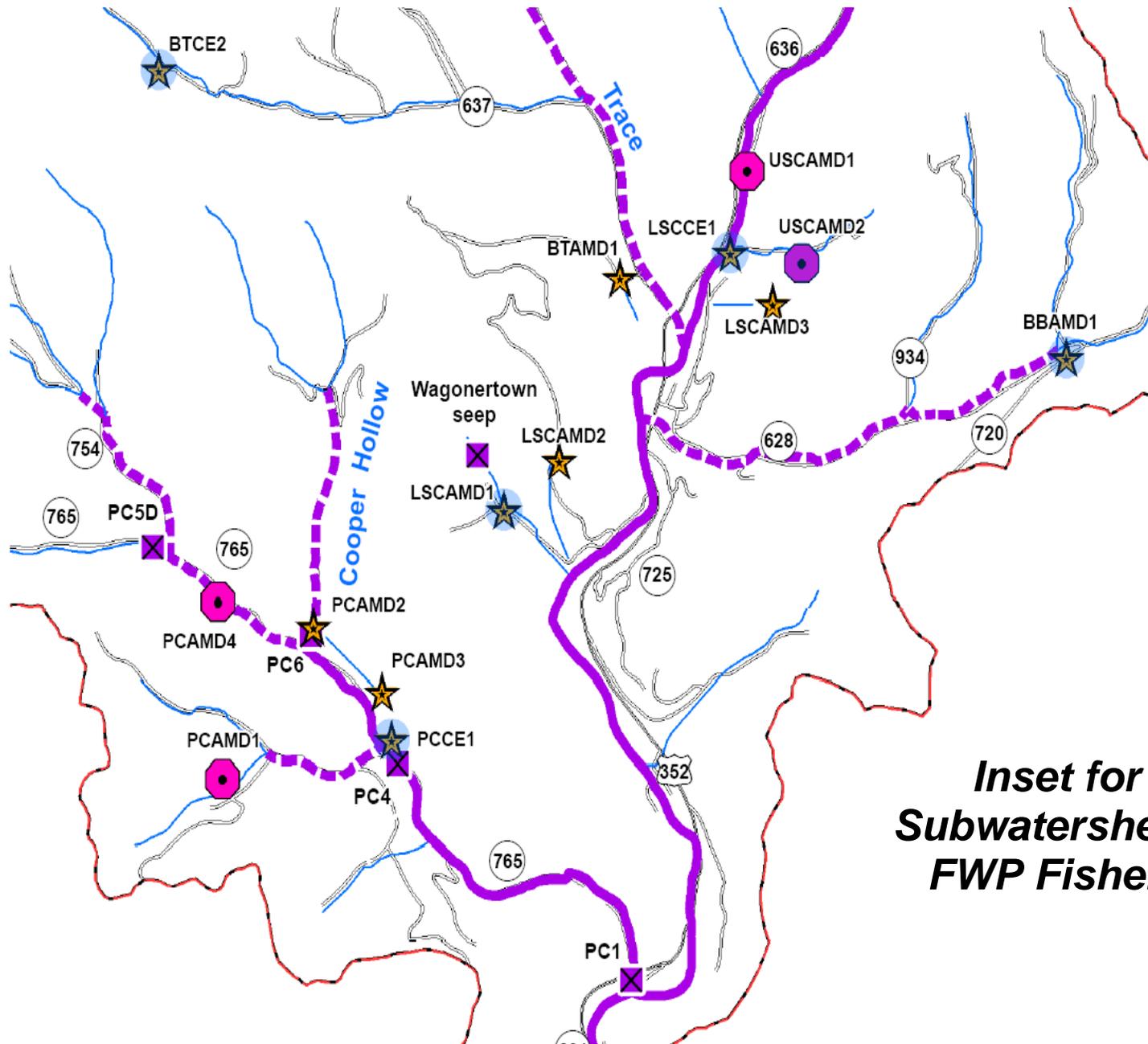
FUTURE WITH PROJECT FISHERY



Sub-Watershed 2 Straight and Puckett Creeks

Map Date: April 19th, 2007



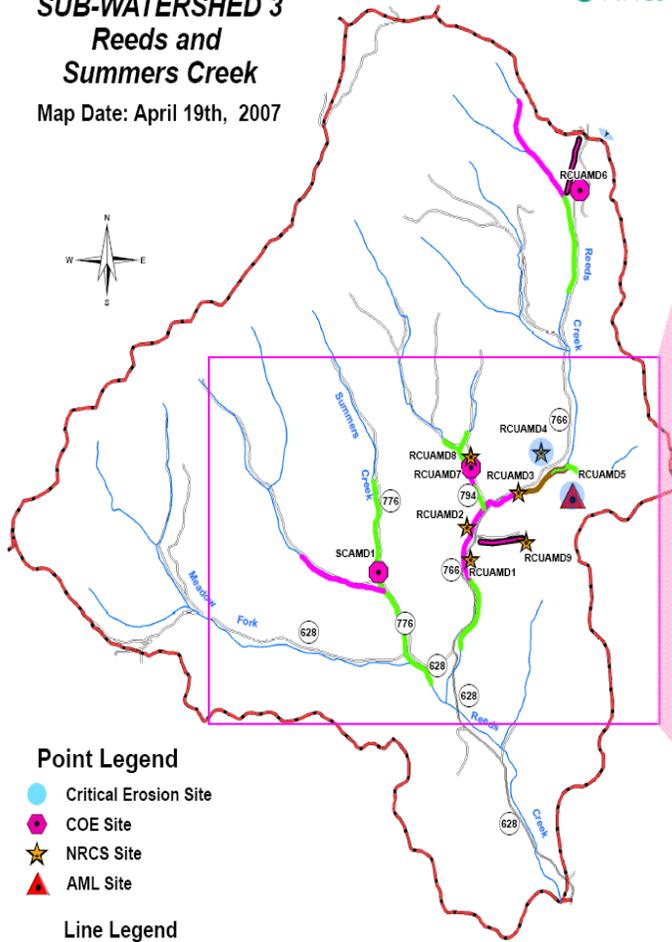


***Inset for
Subwatershed 2
FWP Fishery***

Existing Water Quality

SUB-WATERSHED 3
Reeds and Summers Creek

Map Date: April 19th, 2007

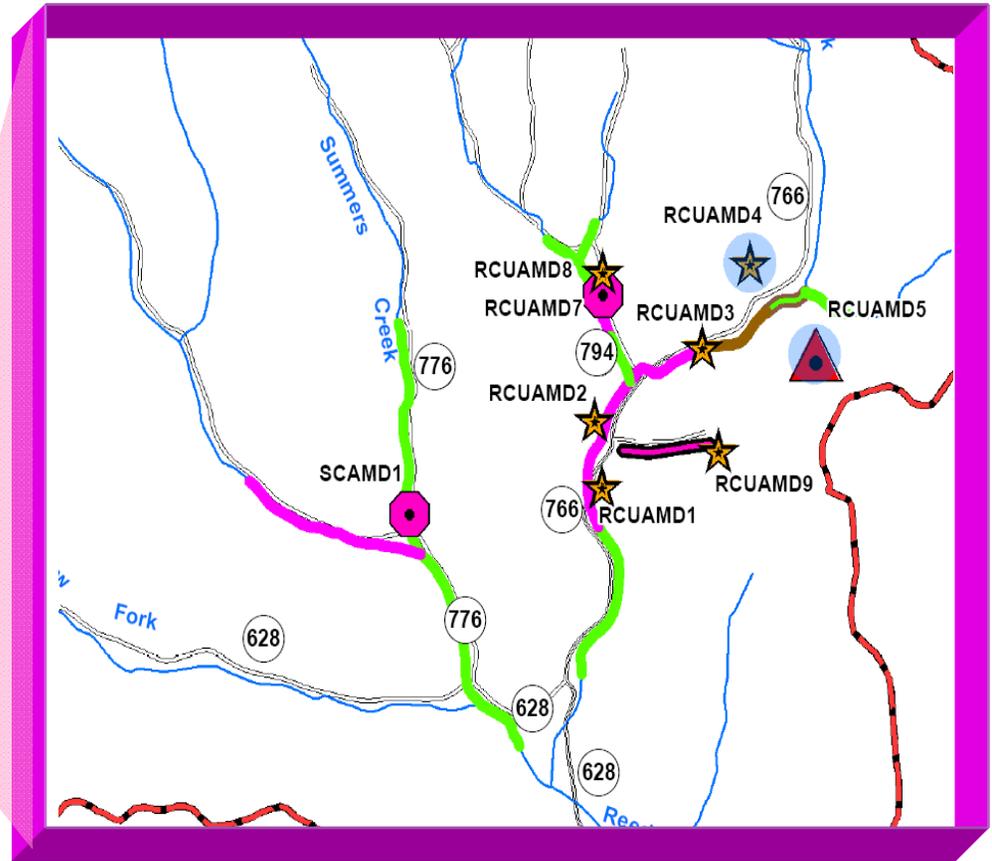


Point Legend

- Critical Erosion Site
- COE Site
- ★ NRCS Site
- ▲ AML Site

Line Legend

- pH Impaired(<6.0)
- pH Recovering(6.0-6.9)
- Overland Flow - pH Impaired
- Sediment Impaired
- pH Recovering/Sediment Impaired
- Stream Segment
- Roads
- - - Watershed Boundary

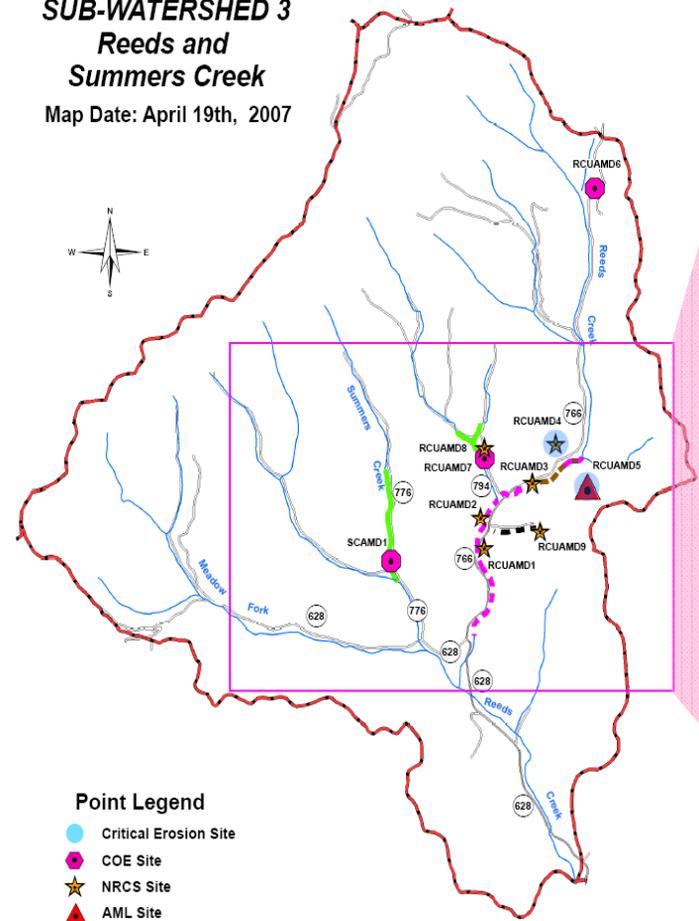


Future with Project Water Quality



SUB-WATERSHED 3 Reeds and Summers Creek

Map Date: April 19th, 2007

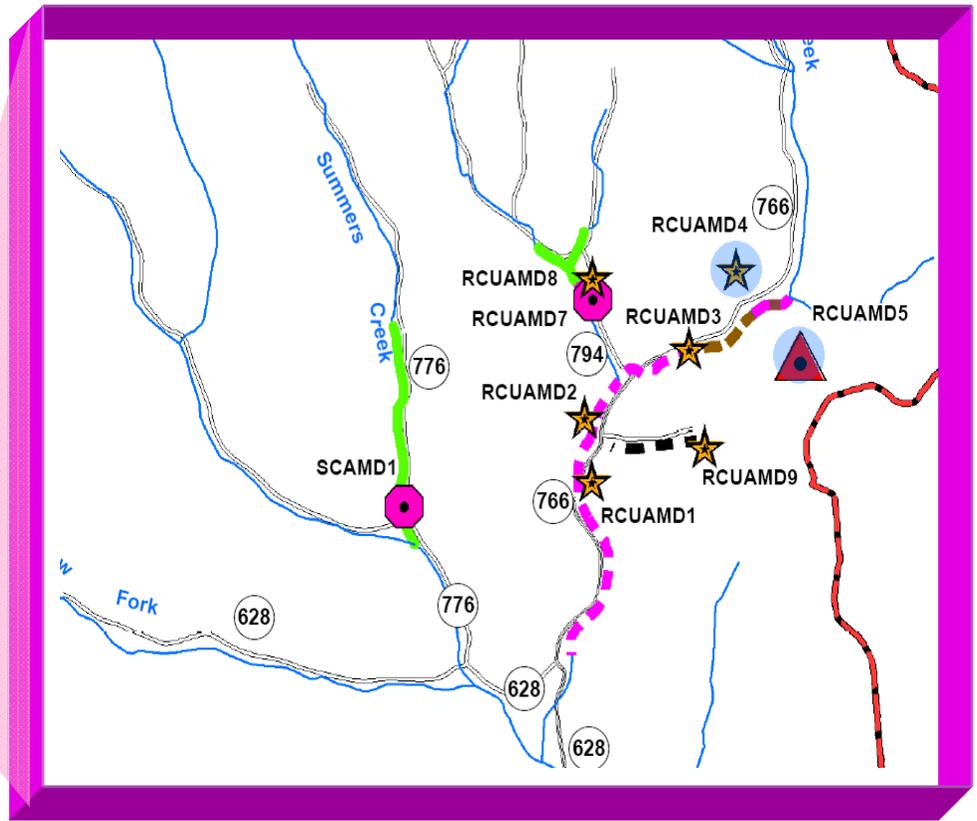
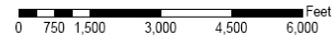


Point Legend

- Critical Erosion Site
- COE Site
- ★ NRCS Site
- ▲ AML Site

Line Legend

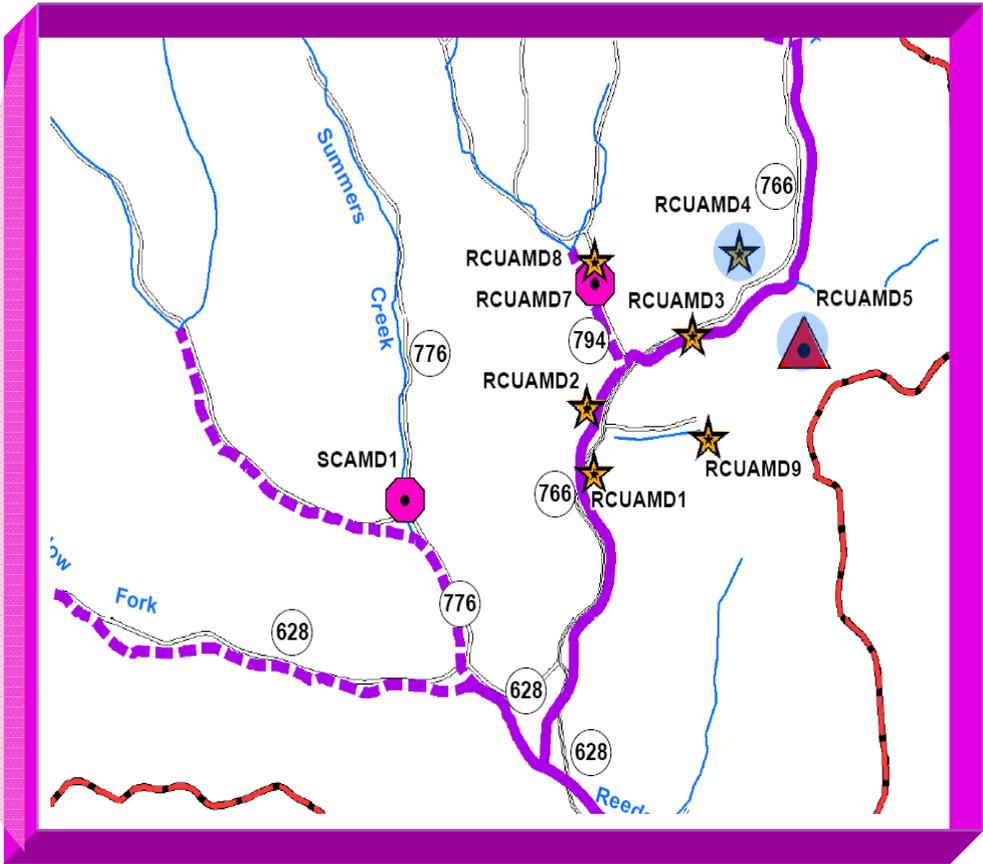
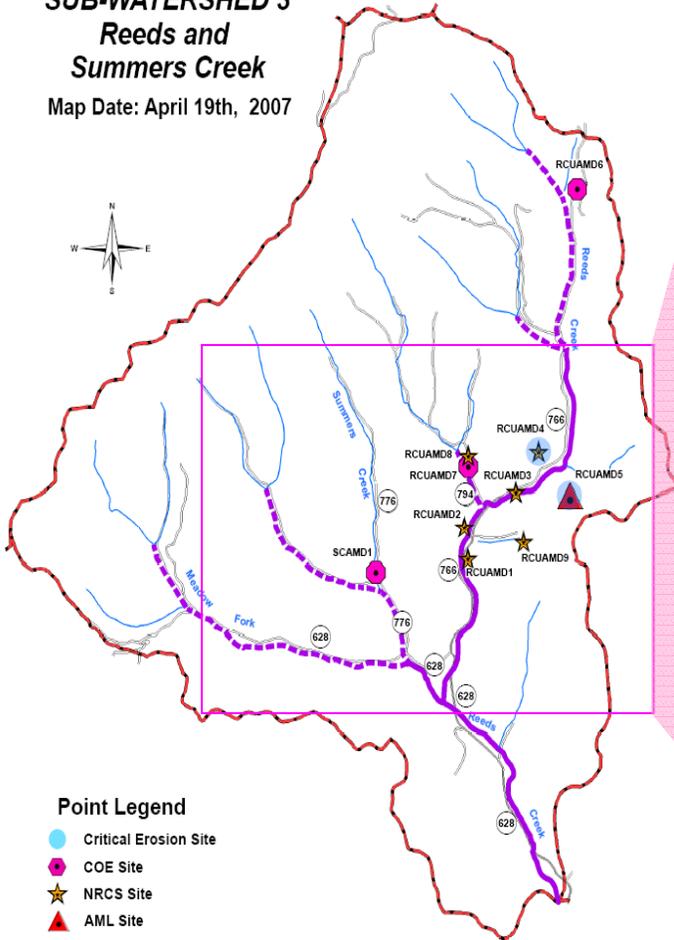
- pH Recovering (6.0-6.9)
- - - Treated - pH Impairment Removed
- - - Treated - Overland Flow pH Impairment Removed
- - - Treated - pH & Sediment Impairment Removed
- - - Treated - Sediment Impairment Removed
- Stream Segment
- Roads
- - - Watershed Boundary



Future with Project Fishery

SUB-WATERSHED 3
Reeds and Summers Creek

Map Date: April 19th, 2007



Point Legend

- Critical Erosion Site
- COE Site
- ★ NRCS Site
- ▲ AML Site

Line Legend

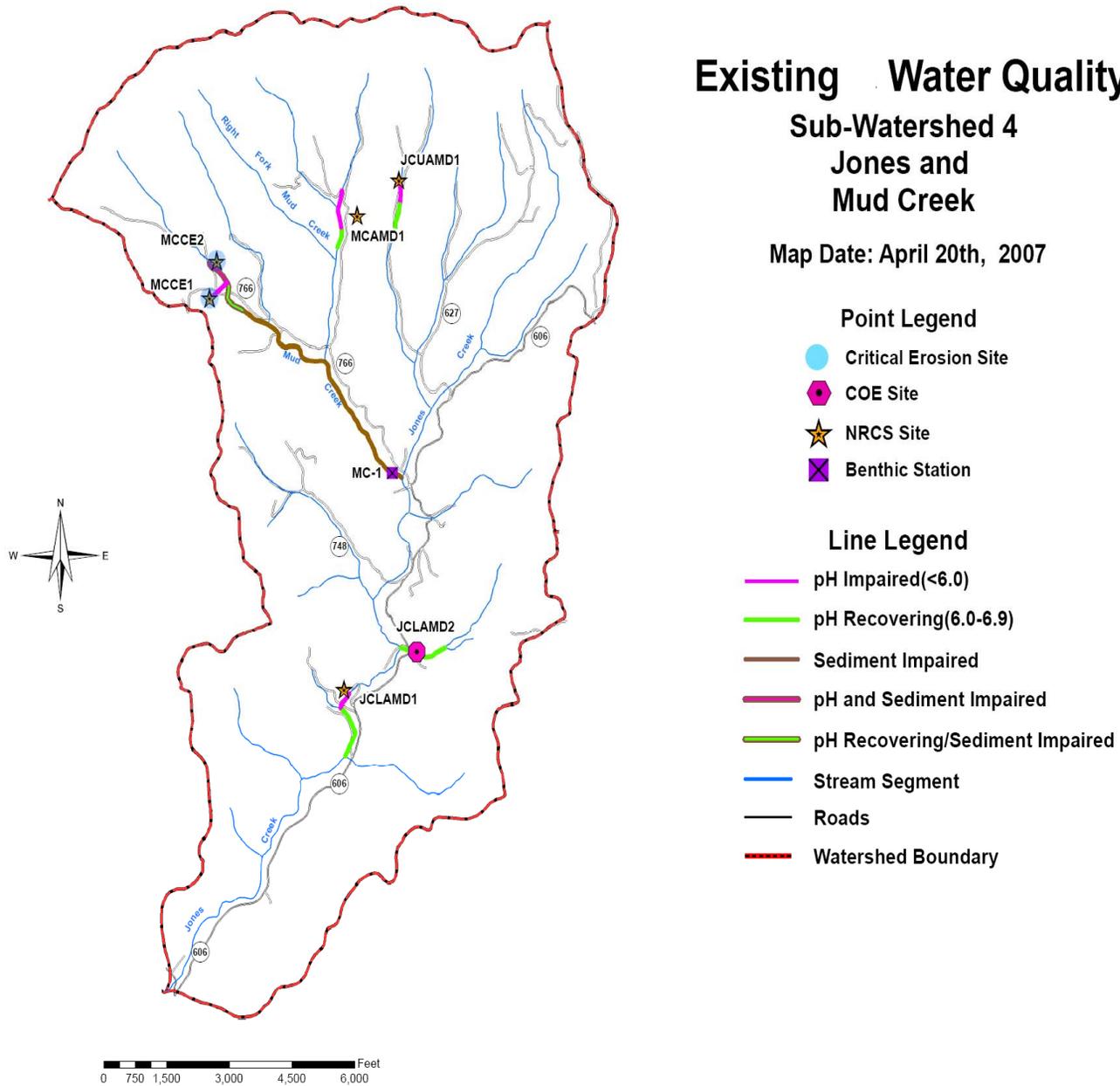
- Available Fishery
- - - Partially Available Fishery
- Stream Segment
- Roads
- - - Watershed Boundary



Existing Water Quality

Sub-Watershed 4 Jones and Mud Creek

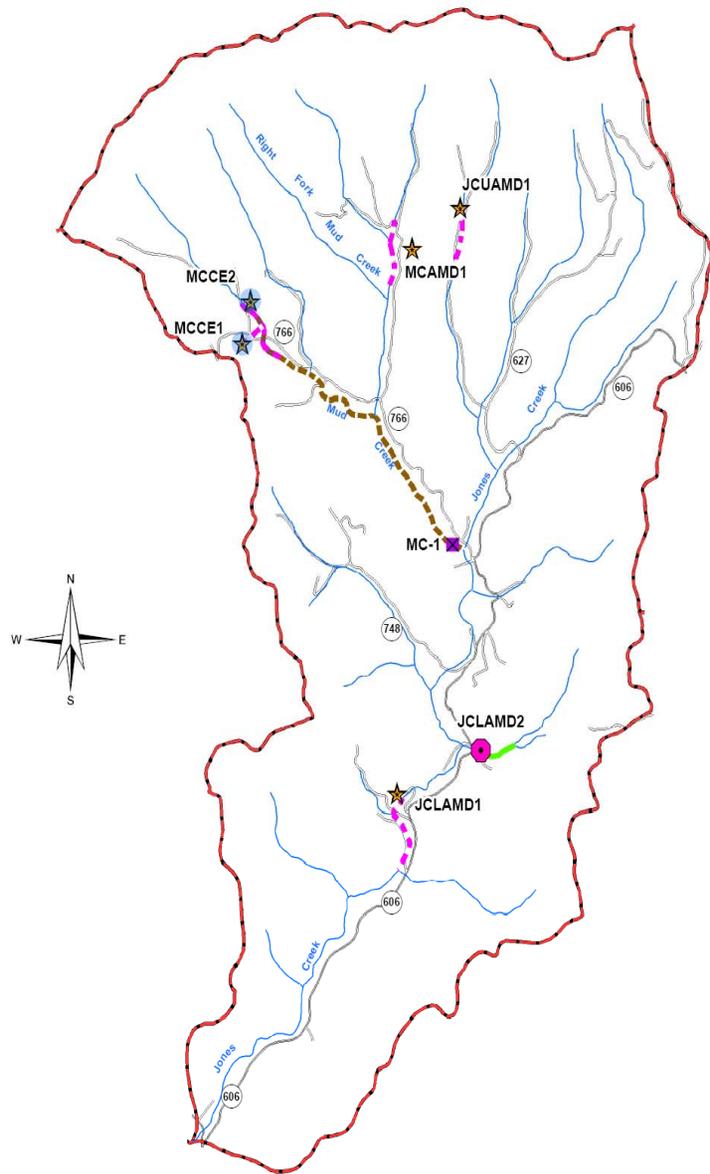
Map Date: April 20th, 2007



Future with Project Water Quality

Sub-Watershed 4 Jones and Mud Creek

Map Date: April 20th, 2007



Point Legend

- Critical Erosion Site
- ◆ COE Site
- ★ NRCS Site
- ✕ Benthic Station

Line Legend

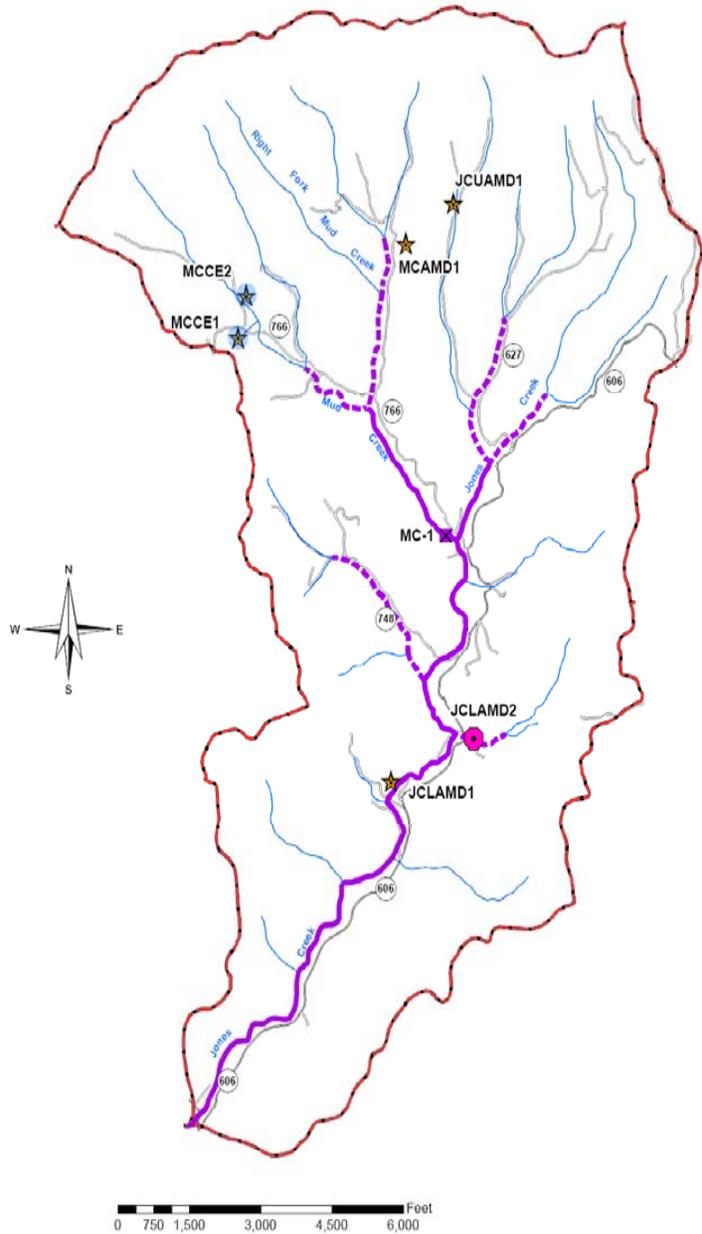
- pH Recovering (6.0-6.9)
- - - Treated - pH Impairment Removed
- - - Treated - Overland Flow pH Impairment Removed
- - - Treated - pH & Sediment Impairment Removed
- - - Treated - Sediment Impairment Removed
- Stream Segment
- Roads
- - - Watershed Boundary

0 750 1,500 3,000 4,500 6,000 Feet

Future with Project Fishery

Sub-Watershed 4 Jones and Mud Creek

Map Date: April 20th, 2007



Point Legend

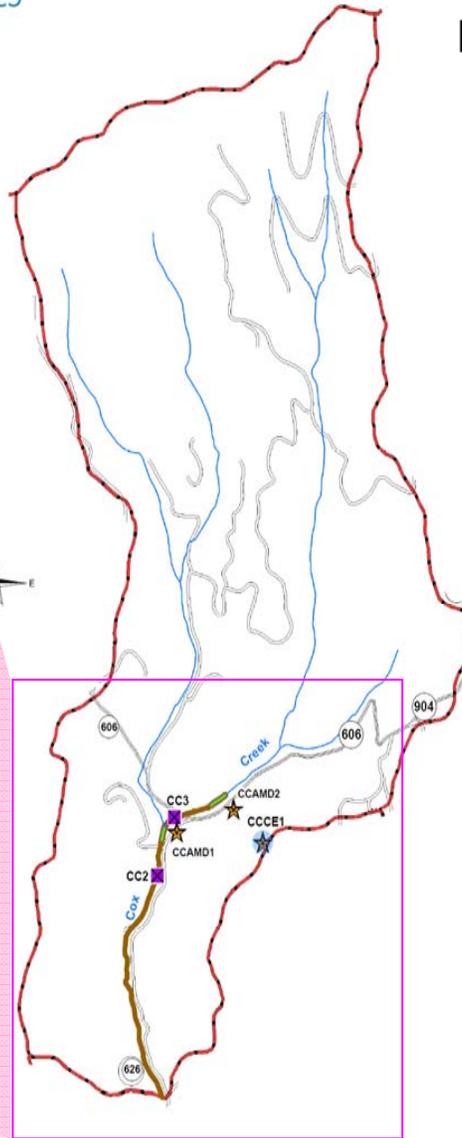
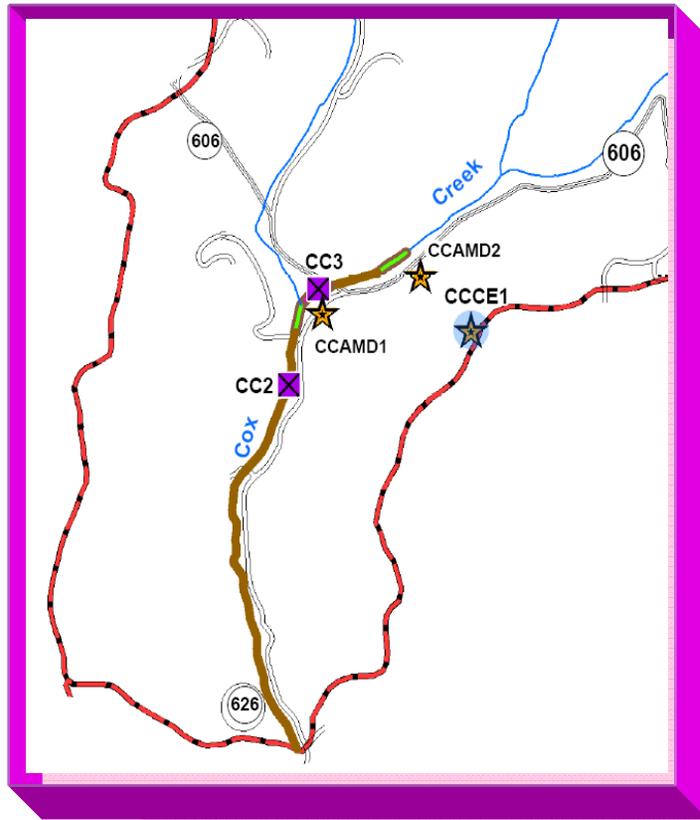
- Critical Erosion Site
- ⬢ COE Site
- ★ NRCS Site
- ✕ Benthic Station

Line Legend

- Available Fishery
- - - Partially Available Fishery
- Stream Segment
- Roads
- Watershed Boundary

Existing Water Quality Sub-Watershed 5 Cox Creek

Map Date: April 20th, 2007

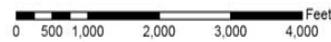


Point Legend

- Critical Erosion Site
- ◆ COE Site
- ★ NRCS Site
- ✕ Benthic Station

Line Legend

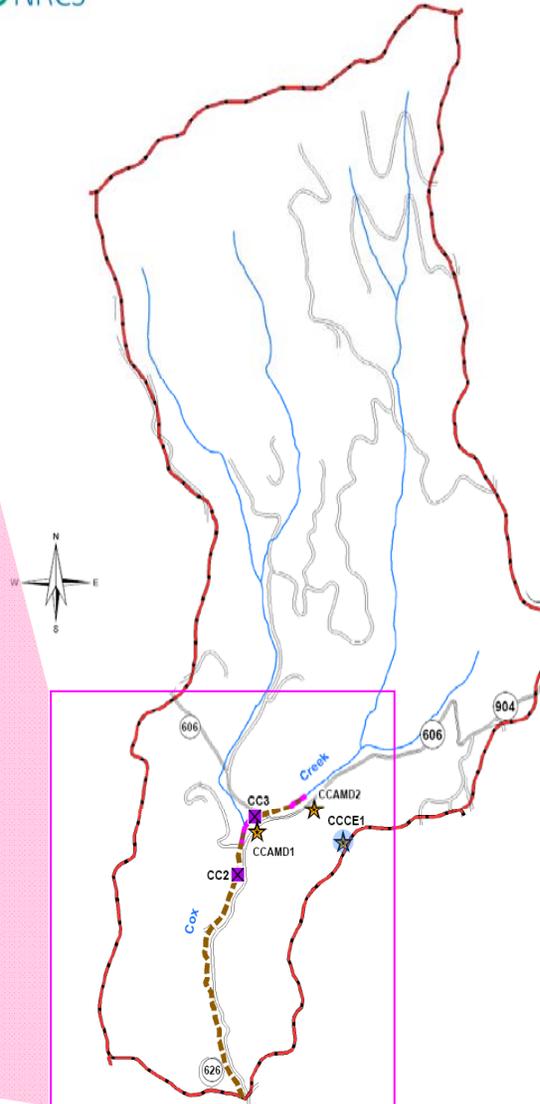
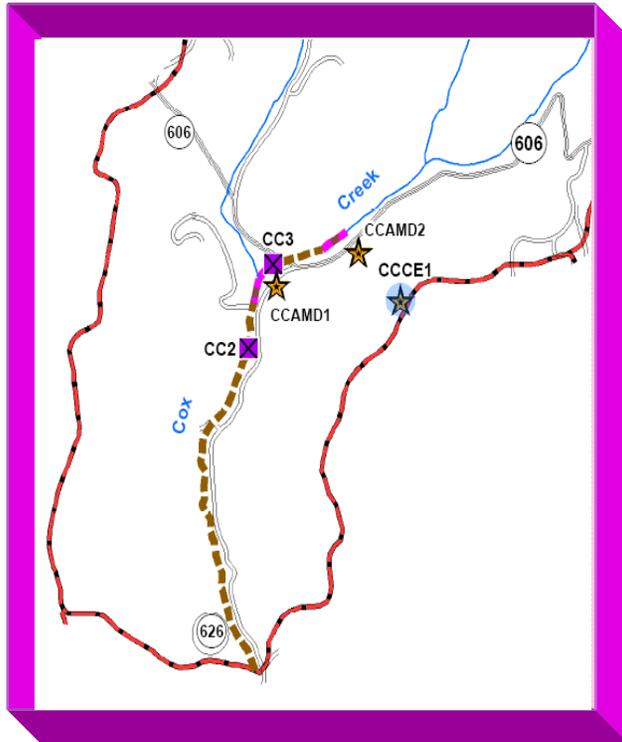
- pH Impaired (<6.0)
- pH Recovering (6.0-6.9)
- Sediment Impaired
- pH and Sediment Impaired
- pH Recovering/Sediment Impaired
- Stream Segment
- Roads
- Watershed Boundary





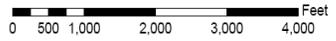
Future With Project Water Quality Sub-Watershed 5 Cox Creek

Map Date: April 20th, 2007



- ### Point Legend
- Critical Erosion Site
 - ◆ COE Site
 - ★ NRCS Site
 - ✕ Benthic Station

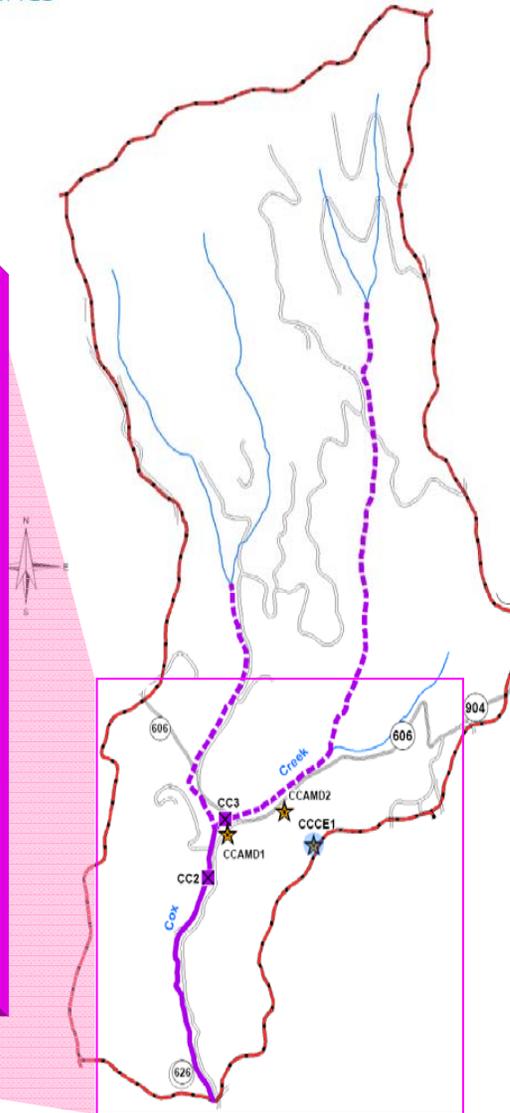
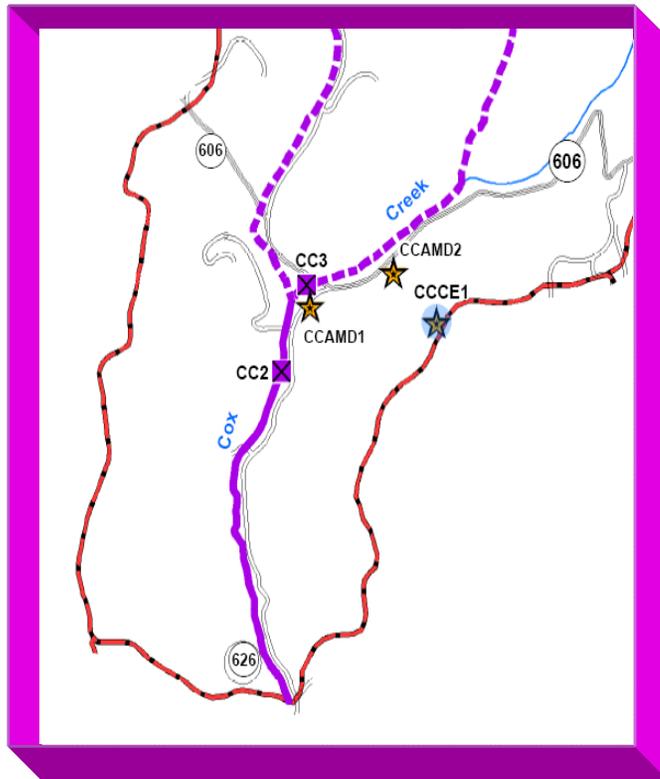
- ### Line Legend
- Treated - Sediment Impairment Removed
 - Treated - pH & Sediment Impairment Removed
 - Stream Segment
 - Roads
 - Watershed Boundary



Future With Project Fishery

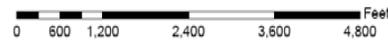
Sub-Watershed 5 Cox Creek

Map Date: April 20th, 2007



- ### Point Legend
- Critical Erosion Site
 - ◆ COE Site
 - ★ NRCS Site
 - ✕ Benthic Station

- ### Line Legend
- Available Fishery
 - - - Partially Available Fishery
 - Stream Segment
 - Roads
 - Watershed Boundary

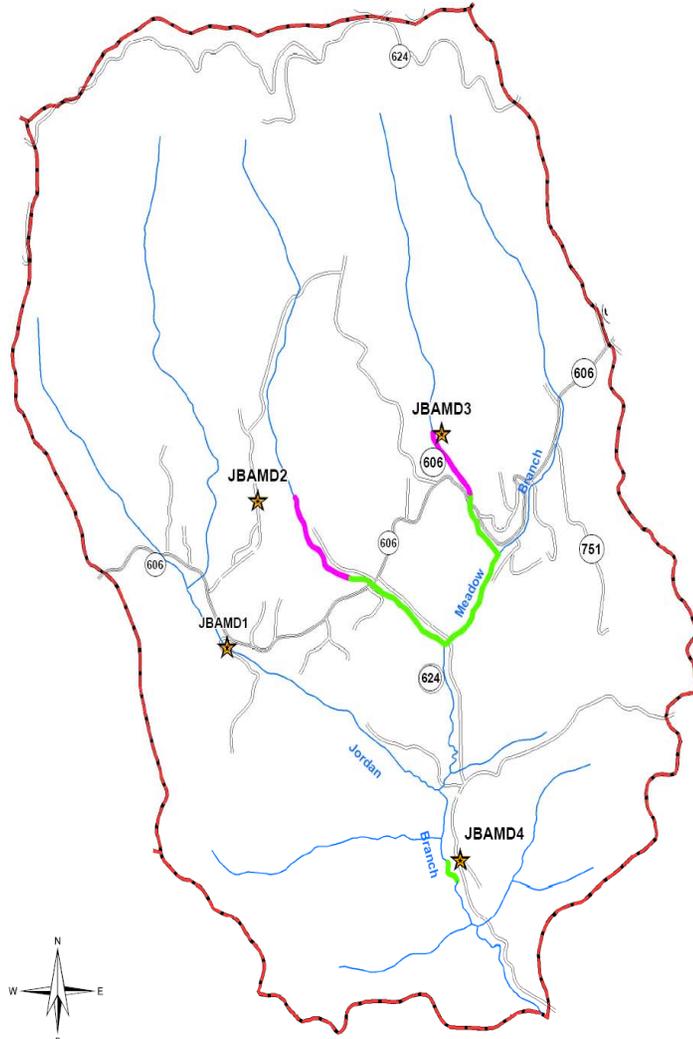




Existing Water Quality

Sub-Watershed 6 Jordan Branch

Map Date: April 19th, 2007



Point Legend

- Critical Erosion Site
- ◆ COE Site
- ★ NRCS Site
- ⊠ Benthic Station

Line Legend

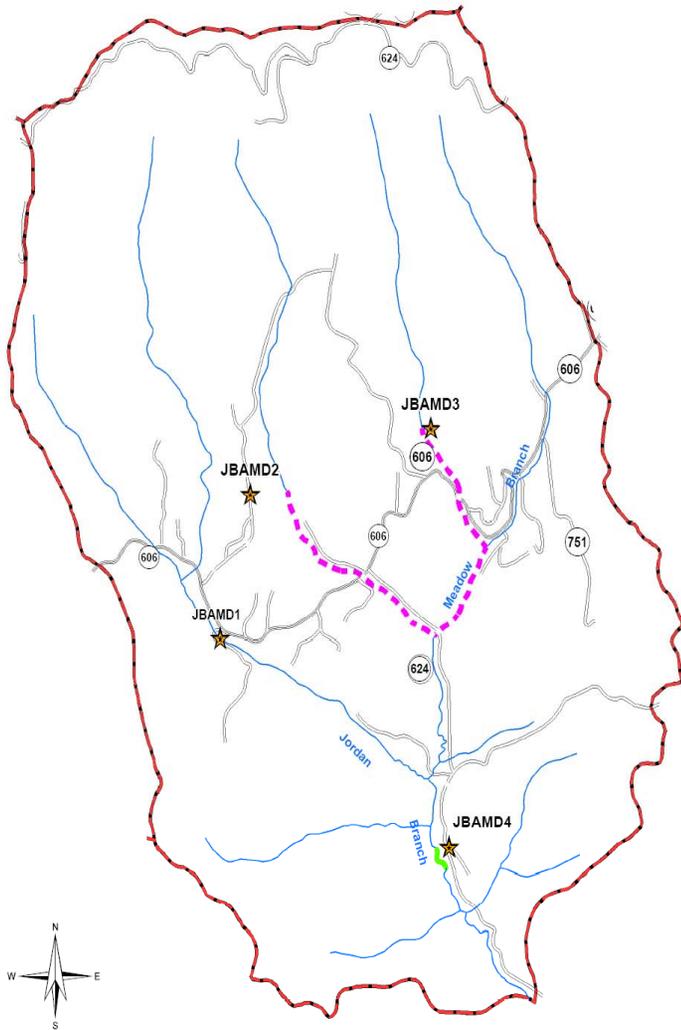
- pH Impaired (<6.0)
- pH Recovering (6.0-6.9)
- Stream Segment
- Roads
- Watershed Boundary



Future With Project Water Quality

Sub-Watershed 6 Jordan Branch

Map Date: April 20th, 2007



Point Legend

- Critical Erosion Site
- ◆ COE Site
- ★ NRCS Site
- ⊠ Benthic Station

Line Legend

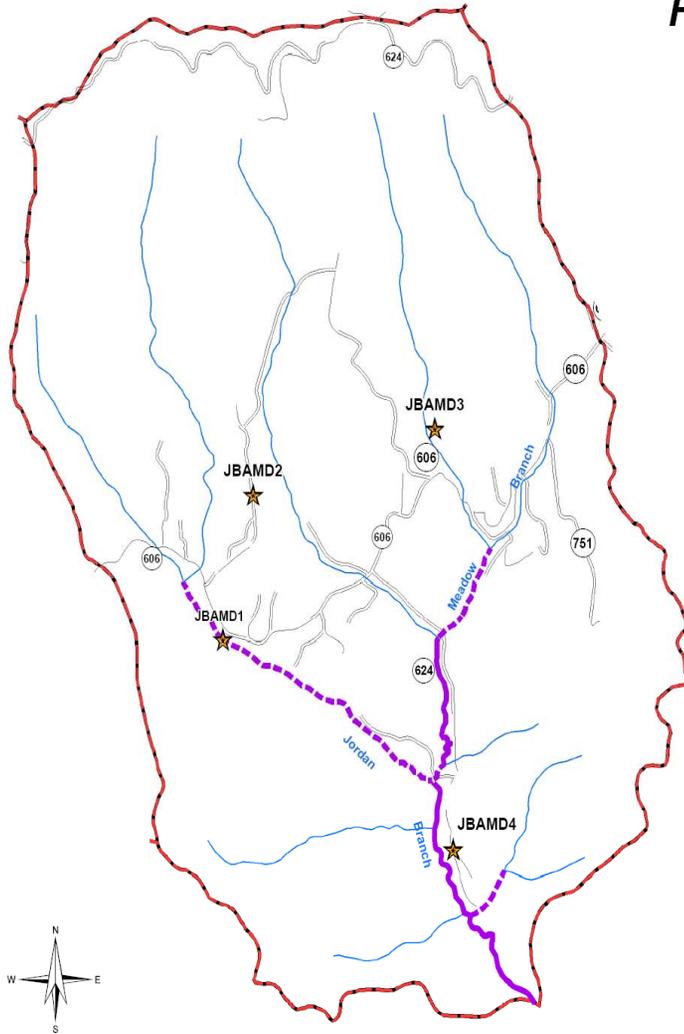
- Treated - pH Impairment Removed
- pH Recovering (6.0-6.9)
- Stream Segment
- Roads
- Watershed Boundary



Future With Project Fishery

Sub-Watershed 6 Jordan Branch

Map Date: April 24th, 2007



Point Legend

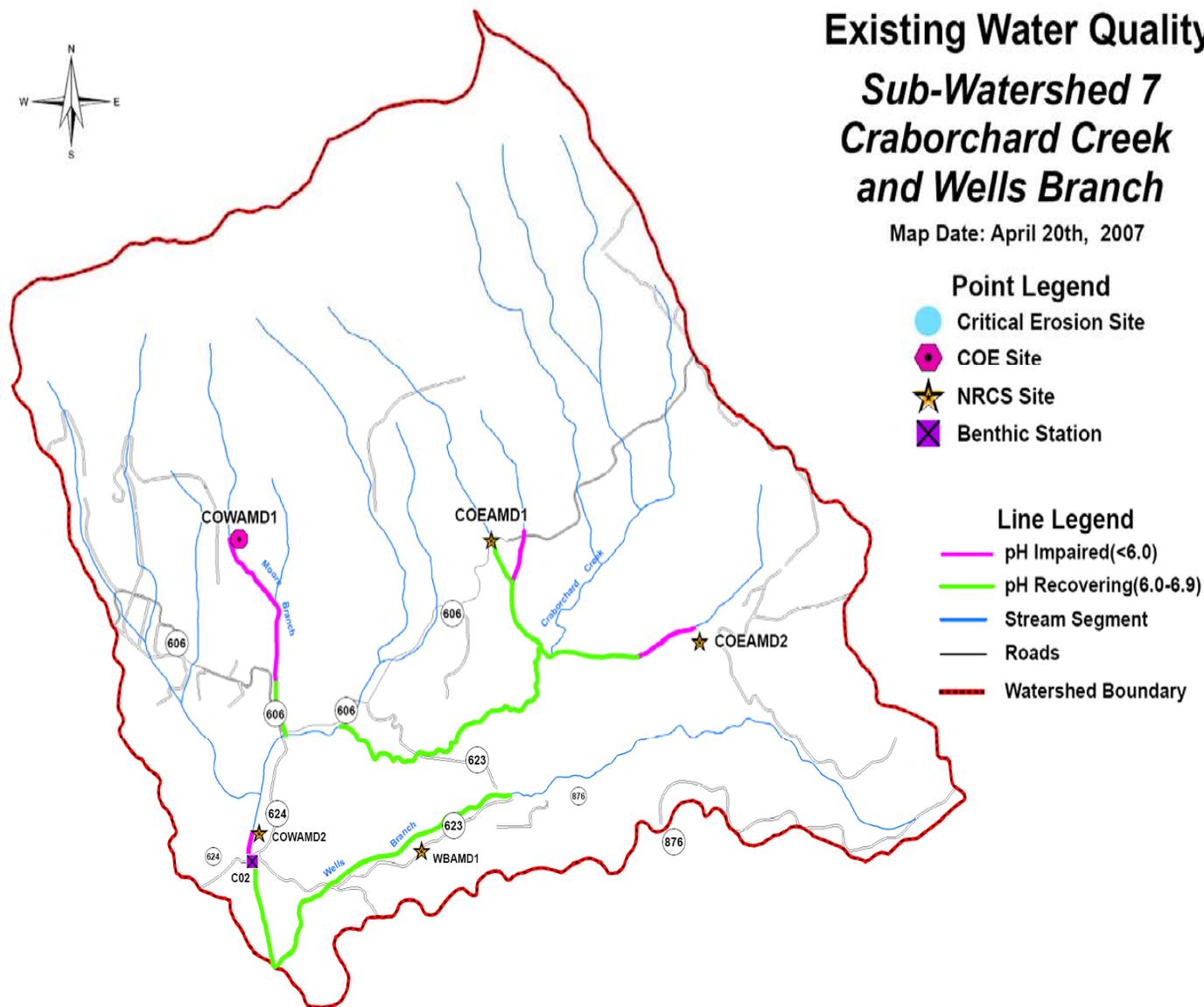
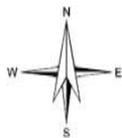
- Critical Erosion Site
- ◆ COE Site
- ★ NRCS Site
- ✕ Benthic Station

Line Legend

- Available Fishery
- - - Partially Available Fishery
- Stream Segment
- Roads
- - - Watershed Boundary

Existing Water Quality Sub-Watershed 7 Craborchard Creek and Wells Branch

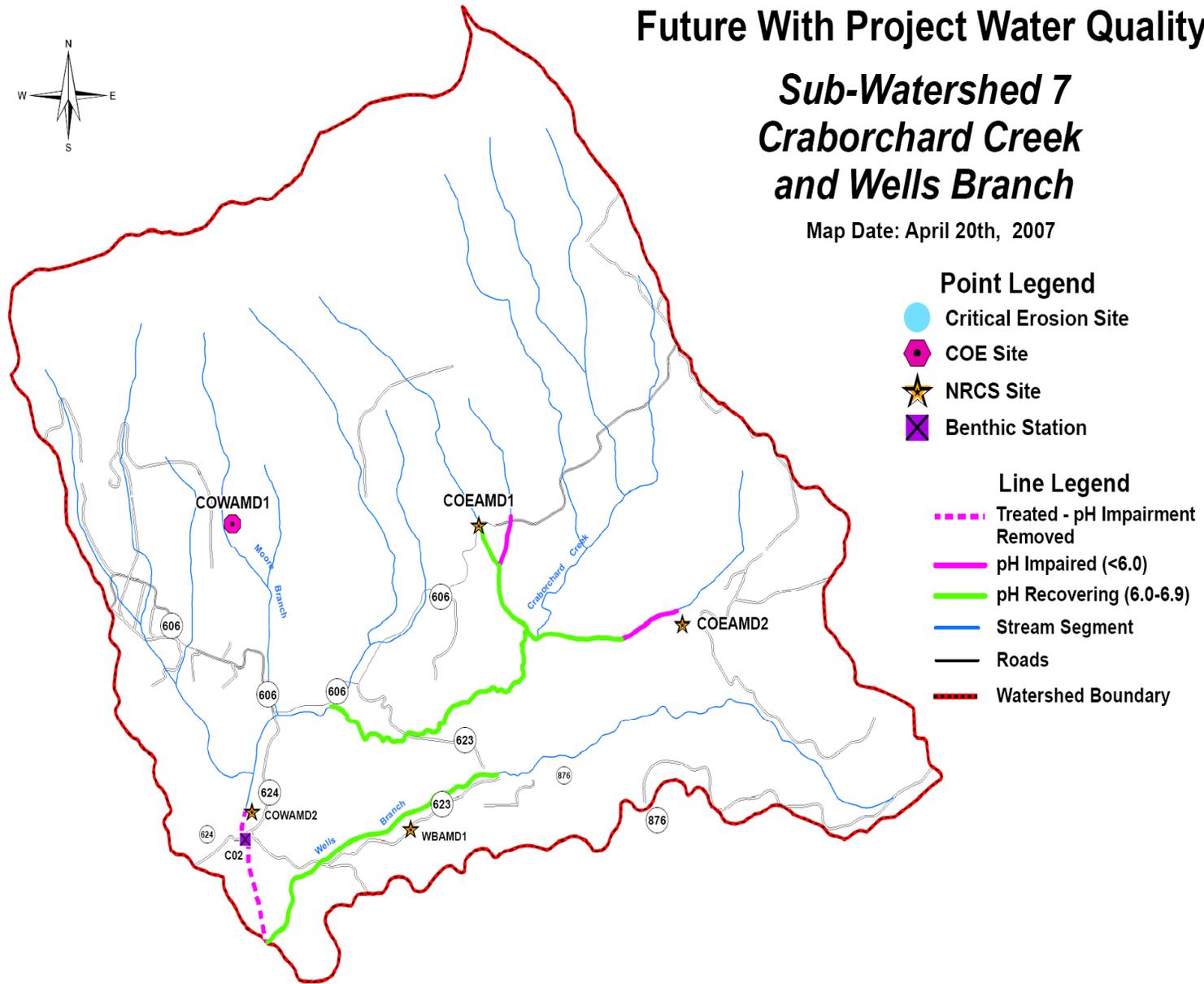
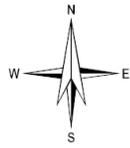
Map Date: April 20th, 2007



Future With Project Water Quality

Sub-Watershed 7 Craborchard Creek and Wells Branch

Map Date: April 20th, 2007

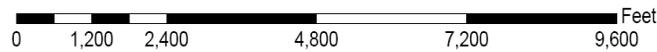


Point Legend

- Critical Erosion Site
- ⬡ COE Site
- ★ NRCS Site
- ⊠ Benthic Station

Line Legend

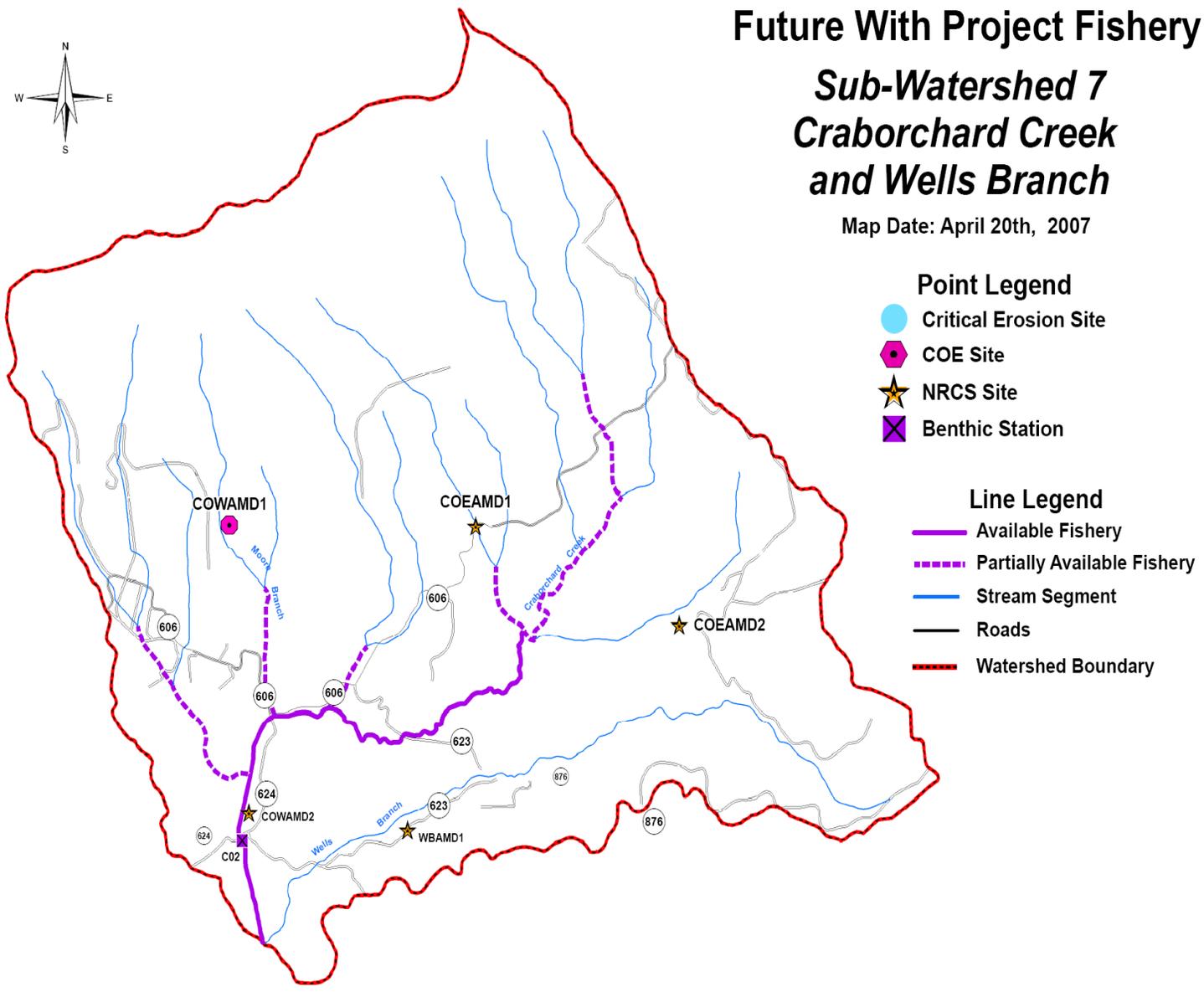
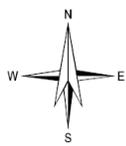
- Treated - pH Impairment Removed
- pH Impaired (<6.0)
- pH Recovering (6.0-6.9)
- Stream Segment
- Roads
- Watershed Boundary



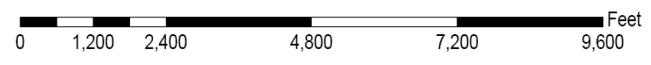
Future With Project Fishery

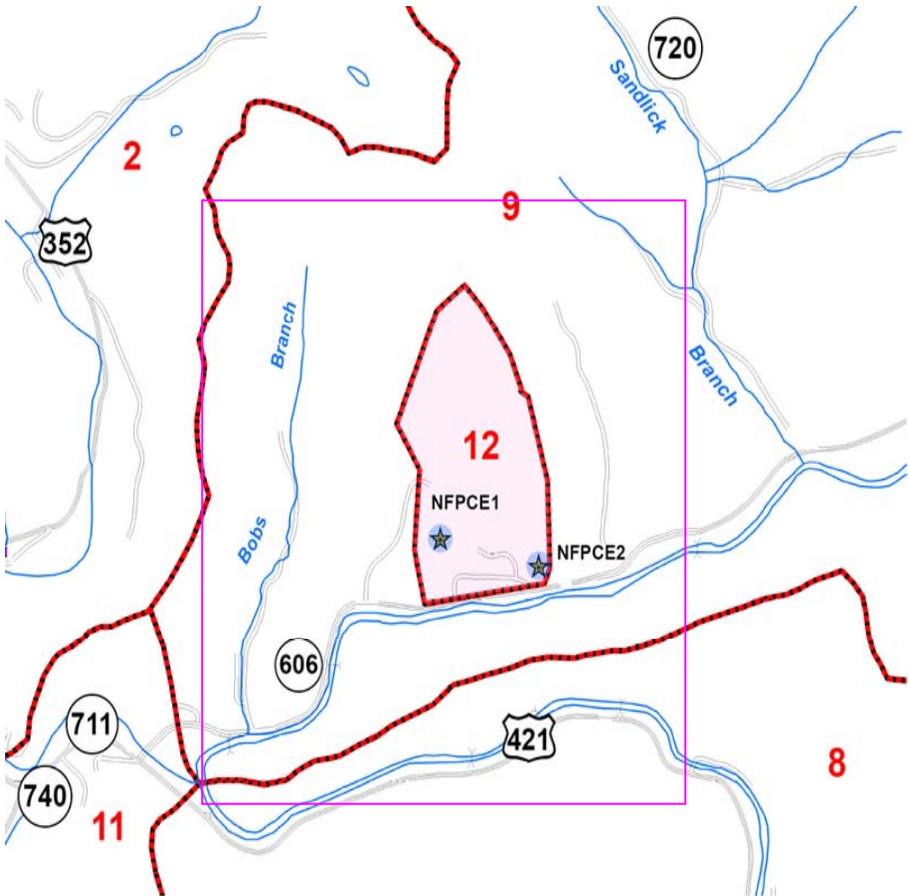
Sub-Watershed 7 Craborchard Creek and Wells Branch

Map Date: April 20th, 2007



- Point Legend**
- Critical Erosion Site
 - ⬠ COE Site
 - ★ NRCS Site
 - ⊠ Benthic Station
- Line Legend**
- Available Fishery
 - - - Partially Available Fishery
 - Stream Segment
 - Roads
 - - - Watershed Boundary

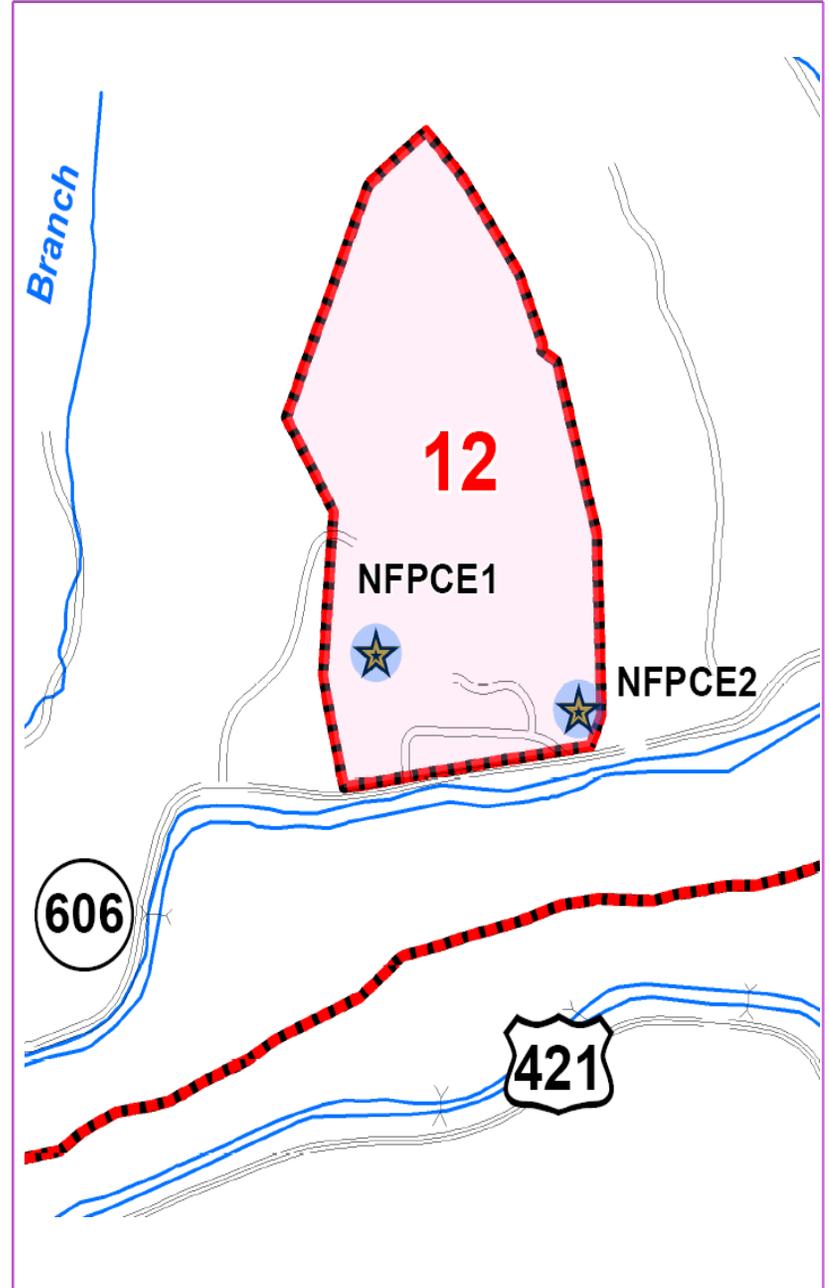




Sub-Watershed 12 Bobs Branch Location Map

Map Date: April 23, 2007

- Legend**
- Point Legend**
 - Critical Erosion Site
 - COE Site
 - ★ NRCS Site
 - 12 Sub-Watershed Number
 - Stream Segment
 - Roads
 - Watershed Boundary



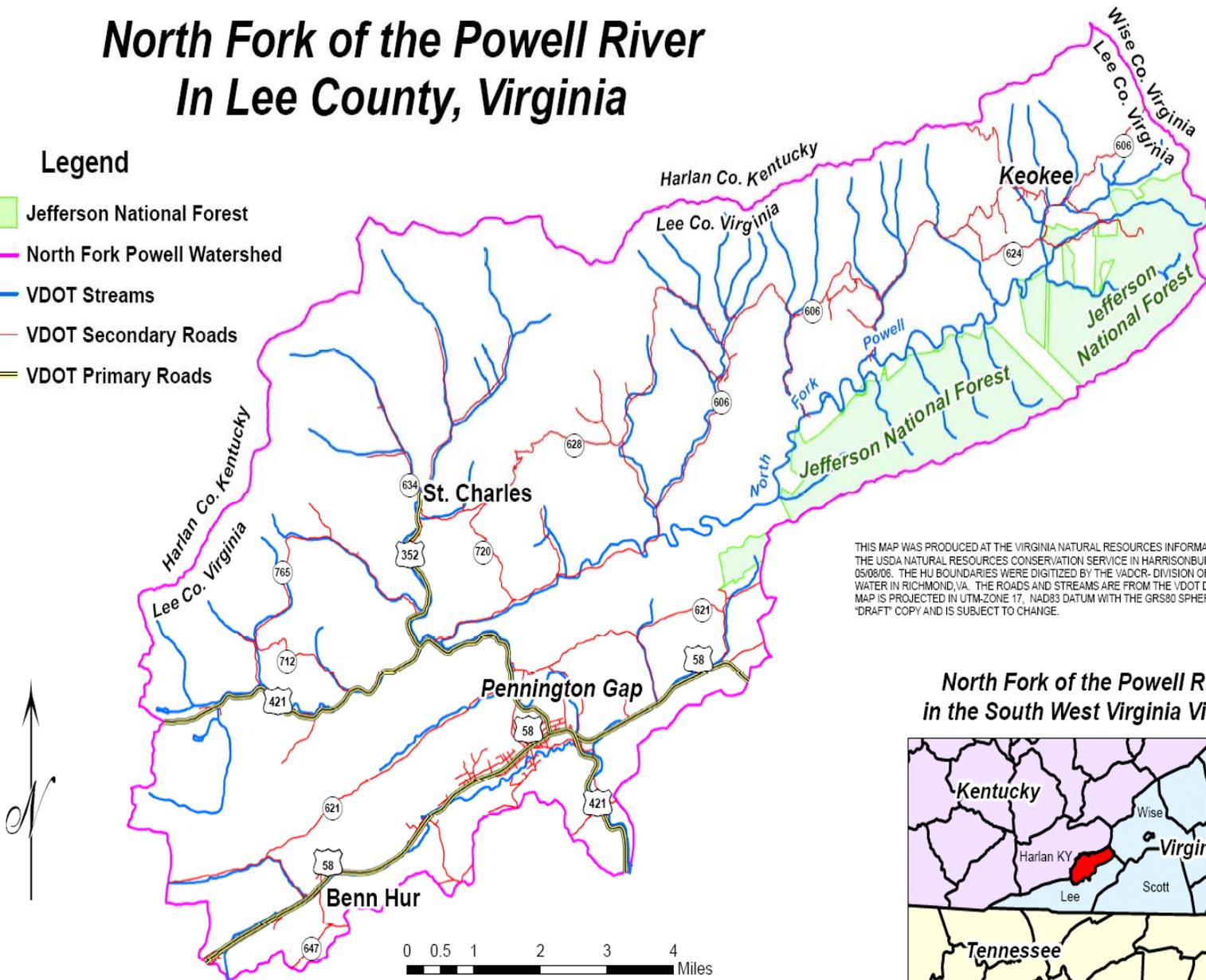
APPENDIX D

WATERSHED PROJECT MAP

North Fork of the Powell River In Lee County, Virginia

Legend

- Jefferson National Forest
- North Fork Powell Watershed
- VDOT Streams
- VDOT Secondary Roads
- VDOT Primary Roads



THIS MAP WAS PRODUCED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER - THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VIRGINIA 05/08/06. THE HU BOUNDARIES WERE DIGITIZED BY THE VADCR, DIVISION OF SOIL AND WATER IN RICHMOND, VA. THE ROADS AND STREAMS ARE FROM THE VDOT DATASET THIS MAP IS PROJECTED IN UTM-ZONE 17, NAD83 DATUM WITH THE GRS80 SPHEROID. THIS IS A "DRAFT" COPY AND IS SUBJECT TO CHANGE.

**North Fork of the Powell River
in the South West Virginia Vicinity**

