

Hocking River Basin, Ohio Monday Creek Sub-basin Ecosystem Restoration Final Feasibility Study and Environmental Assessment Report Summary

STUDY INFORMATION

Study Authority

Recognizing the concerns of Federal and state agencies, local officials, and individuals, the U.S. House of Representatives Committee on Transportation and Infrastructure adopted a resolution in March 1996, requesting the Secretary of the Army "to review the report of the Chief of Engineers on the Ohio River and Tributaries, published as House Document 306, 74th Congress, First Session, and other pertinent reports, to,

"...determine whether modifications are warranted to solve a variety of water and related resource problems in the Hocking River Basin with priority given to Sunday and Monday Creek sub-basins. Special emphasis shall be given to the need for environmental restoration of lands and waters that have been impacted by resource extraction and other land uses. This study is to be conducted in consultation with the Hocking Conservancy District."

Study Sponsor

This feasibility study was conducted with Ohio Department of Natural Resources (ODNR) as the local non-Federal sponsor on a 50/50 percent cost sharing basis in consultation with the Hocking Conservancy District. In addition, the U.S. Forest Service (USFS), Wayne National Forest (WNF) is participating as a cooperating Federal agency.

Study Purpose and Scope

The Report is an interim response to the Study Authority. The purpose of the Monday Creek Ecosystem Restoration project is to sufficiently restore both the structural and functional components of the Monday Creek watershed ecosystem, currently "dead ecosystem", to a less degraded state downstream of the abandoned mine drainage (AMD) discharges and to minimize water infiltration into existing abandoned mine complexes, minimizing future AMD contaminations. The project would result in revival of fish and macroinvertebrate species quality, density and diversity. The headwater ecosystem would be laterally and longitudinally connected with the rest of the watershed and the Hocking River provides conductivity of the corridor.

Project Location/Congressional District

The Monday Creek Watershed, as shown in Figure 1, is located in the unglaciated portion of the Allegheny Plateau region of southeastern Ohio and is a 116 square mile (74,240 acres) area encompassing Monday Creek and its associated tributaries (HUC 05030204 060). The main stem of Monday Creek flows approximately 27 miles before emptying into the Hocking River southeast of Nelsonville. The watershed drains roughly 10 percent of the Hocking River system, which itself is part of the Greater Ohio River Watershed. Two main tributaries to

mainstem Monday Creek are Little Monday Creek (14.3 mi.) and Snow Fork (10.7 mi.). The watershed lies in the heart of Ohio's Appalachian coal region in Athens, Hocking and Perry counties. Figure 1 displays the extent of the Monday Creek basin.

Congressional interests in the State of Ohio for the project include: Senator George V. Voinovich, Senator Mike DeWine, Honorable Ted Strickland (OH-06), Honorable David Hobson (OH-07) and Honorable Bob Ney (OH-18).

Prior Reports and Existing Water Projects

Several reports regarding the Hocking River and Monday Creek Sub-basin watersheds have been completed in the last twenty years. These include:

- *Expedited Reconnaissance Study, Hocking River Basin...905(b) Report.* Corps of Engineers (1997).
- *Watershed Integrity Analysis for the Wayne National Forest...* U.S. Department of Agriculture (USDA), USFS (2002).
- *Monday Creek Watershed Acid Mine Drainage Abatement and Treatment Plan.* U.S. Office of Surface Mining (OSM), ODNR and Natural Resources Conservation Service (NRCS) (1997).
- *Monday Creek Watershed Acid Mine Drainage Abatement and Treatment Plan II.* U.S. (incomplete) by U.S. OSM, ODNR and NRCS (1999).
- *Biological and Water Quality Study of the Hocking River Mainstem and Selected Tributaries.* Ohio Environmental Protection Agency (OEPA) (1991).
- *Assessment and Treatment of Areas in Ohio Impacted by Abandoned Mines.* USDA Soil Conservation Service (SCS) (1985).
- *Draft Report, Biological and Water Quality Study on Monday and Sunday Creeks, for Total Maximum Daily Loads Program, Field Data.* OEPA (2002).

There are two major Corps of Engineers water projects in Hocking River Watershed: the Athens Local Protection Project (flood damage reduction) in Athens; and the Tom Jenkins Dam-Burr Oak Reservoir (flood damage reduction, water supply and recreation) near Glouster. Neither project significantly impacts or contributes to the degradation of the project area.

Federal Interest

Authorization and funds have been provide through the legislative process through House Document 306, 74th Congress, 1st Session, and subsequent appropriation bills to evaluate and ascertain if there is a Federal interest. The feasibility study identified that implementation of the Monday Creek project would contribute to National Ecosystem Restoration (NER) goals consistent with the Corps policy and guidance by increasing the net habitat quality and quantity of the aquatic ecosystem within the Monday Creek Watershed and southeastern Ohio.

STUDY OBJECTIVES

Problems and Opportunities

Problems identified in the Monday Creek watershed include impacts from coal mining activities on 235 acres of the aquatic ecosystem. Abandoned underground mine workings have

created conditions that produce subsidence features and acid mine drainage (AMD) which adversely affect the flora and fauna of the watershed.

Subsidence features occur when underground mine voids near the surface collapse into the void. This creates depressions and ingress points for surface waters which then flow into mine voids, react with sulfide minerals and generate acid mine drainage decimating the ecosystem relegating the streams to be essentially dead.

The aquatic habitat in the headwaters of mainstem Monday Creek and the majority of Snow Fork are severely degraded by AMD. Species-intolerant pH levels and sediment loads laden with metals, such as aluminum, iron and manganese, adversely affect the density and diversity of aquatic organisms.

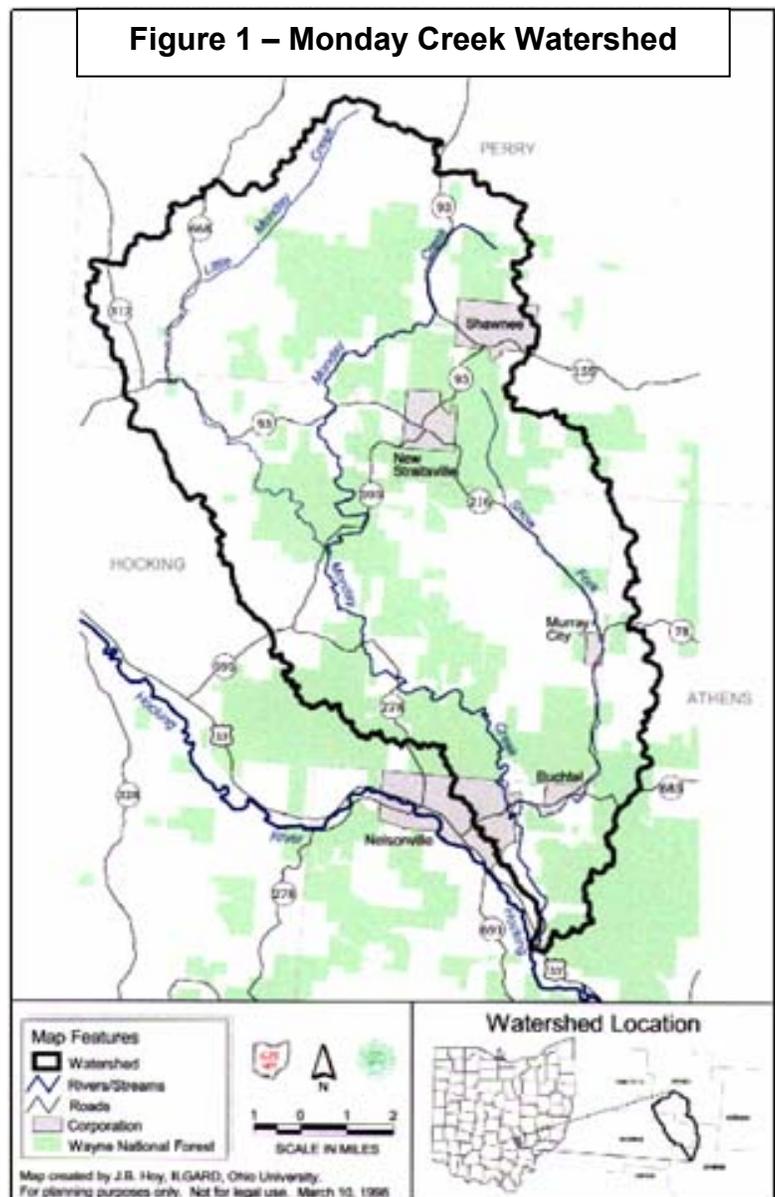
Upper reaches of the watershed, primarily in the Little Monday Creek sub-basin, are not significantly impacted by AMD and have relatively healthy aquatic ecosystems where small pockets of relatively diverse fish and macroinvertebrate populations exist. However, these healthy portions of the ecosystem do not contribute to and are essentially isolated from the Hocking River ecosystem due of the poor habitat of Monday Creek and other tributaries.

Planning Objectives

The object of this project is to develop a implementable plan to, 1) sufficiently restore the structural and functional components of the ecosystem to a less degraded state downstream of acid mine drainage-related impacts; and 2) minimize the amount of surface water entering existing abandoned mine complexes to prevent, where practical, additional seeps into the surface waters. The restoration objective is to restore the Monday Creek ecosystem to self-sustaining conditions generally consistent with a functioning ecosystem designated as Warm Water Habitat by the Ohio Environmental Protection Agency.

Planning Constraints

The planning constraints for the project include the size of the



watershed (110 miles²) and the sheer number (over 3,000) of acid mine drainage sources and related physical components that restrict the natural improvement of the ecosystem.

Another constraint is the limited window of opportunity to address AMD constituents through the physical construction of restoration alternatives. The complexity of the interactions of the chemical constituents of acidity, pH, iron and aluminum, in addition to flow, limit the types of restoration alternatives that would be effective in achieving restoration of macroinvertebrates and fish populations to a sustainable level.

ALTERNATIVES

Plan Formulation Rationale

A plan formulation rationale to determine the best measures to utilize in the watershed was performed by the study team. The chemical interactions between iron, pH, acidity, aluminum, stream flow and dissolved oxygen are complex and concentrations vary from site to site. These constituents are the critical factors in choosing a suitable restoration method at a site. Table 1 displays the limiting factors that must be considered when developing alternatives.

Table 1. Limiting Factors in Acid Mine Drainage Remediation Techniques

| Acid Mine Drainage Constituents of Concern | Site Constraints |
|---|--|
| Flow Rate | Total iron (Fe) concentration |
| Dissolved oxygen | Insufficient area to construct project |
| Alkalinity | Ferric (Fe ⁺³) concentration |
| pH | Acidity (H ⁺) |
| | Gradient too steep |
| | Gradient too gentle |
| | Aluminum (Al) concentration |
| | Manganese (Mn) concentration |
| | Sulfate (SO ₄) concentration |

The development of the Monday Creek Total Acid Mine Drainage Loading (TAMDLD) model was a cooperative effort between the U.S. Army Corps of Engineers (USACE), Huntington District and West Virginia University (WVU). This model was used to simulate the required load reductions of metals and acidity from each of the Monday Creek and Snow Fork subwatersheds necessary to satisfy fish and macroinvertebrates species survival requirements. Design of alternative restoration plans for each locale were developed and simulated in the TAMDLD model. The plans were then adjusted until pH, aluminum and iron remediation thresholds were met. Peer review and technical competency of the model was performed by Ohio University and Ohio Environmental Projection Agency prior to implementation of EC 1105-2-407, *Planning Models Improvement Program: Model Certification*. It is believed that this effort would meet the spirit and intent of the referenced guidance.

Subsidence alternatives were developed for four areas identified in the field reconnaissance survey and selections were based on the physical characteristics of the subsided areas. The ultimate goal was to minimize the volume of water entering the underground mine workings, thus reducing a key source of acid mine drainage in the watershed.

Management Measures and Alternative Plans

During intermediate screening, 202 potential sites were identified for restoration of the aquatic habitat in eight subwatersheds of the Monday Creek watershed. Some sites were eliminated through the Cost Effectiveness/Incremental Cost Analysis (CE/ICA) process.

Corps policy requires that all feasible and reasonable alternatives be evaluated. During the formulation process, the team recognized that four subwatersheds had in excess of twenty remediation sites. It was determined that strategically-located dosers, or limestone dispensers, were best suited to treat the multiple AMD sources at these locations. The doser method was subsequently added to the final array of alternative plans at the mouths of Lost Run, Monkey Hollow, Snake Hollow and a tributary of Snow Fork (Brush Fork). These additional alternatives increased the number of the alternative plans to twelve.

Table 2. Description of Alternative Plans Evaluated

| <u>Plan</u> | <u>Location</u> | <u>Description</u> |
|--------------------|------------------------|---|
| A | Jobs Hollow | 1 doser, 3 SLB* and 1 OLC* |
| B | Dixie Run | 1 SLB, 2 OLC and 1 LLB* |
| C | Rock Run | 3 LHD* and 1 wetland |
| D | Lost Run | 30 + 16 spoil blocks and 12 subsidences |
| E | Lost Run w/ Doser | 1 doser + 16 spoil blocks and 12 subsidences |
| F | Monkey Hollow | 25 + 9 spoil blocks and 6 subsidences |
| G | Monkey Hollow w/ Doser | 1 doser and 9 spoil blocks and 6 subsidences |
| H | Snake Hollow | 1 SLB, 4 OLC and 4 LLB |
| I | Snake Hollow w/ Doser | 1 doser |
| J | Snow Fork | 6 SLB, 19 OLC, 20 LLB, 8 dissipating streams, 9 spoil blocks, 7 subsidences, and 2 wetlands |
| K | Snow Fork w/ Doser | 1 doser, 3 SLB, 5 OLC, 6 LLB, 8 dissipating streams, 9 spoil blocks, 7 subsidences and 2 wetlands |
| L | Coe Hollow | 2 SLB, 1 OLC, 4 LLB, 3 dissipating streams and 1 subsidence |
| M | FWOPC | No Action, Future Without Project Conditions |

*SLB – slag leach bed; LLB – limestone leach bed; OLC open limestone channel; LHD – low head dam

Final Array of Alternatives

Final alternatives analysis consisted of developing 12 plans plus the Future Without Project Conditions (FWOPC), or No-Action Plan. The team used the IWR-Plan Decision Support Software (IWR-Plan) developed by the Institute for Water Resources (IWR) as a tool to assess subwatershed combinations and evaluate the incremental cost analysis and cost effectiveness of alternative plans.

Seven plan combinations were identified as Final Array Plans, as shown in Figure 2 and Table 3. Of the 19 cost effective plans, 7 plans were found to be cost-effective plans and are the most efficient in output production. The Final Array Plans also have the greatest increases in sustainability units for the least increase in costs and have the lowest incremental costs per sustainability unit output.

Table 3. Alternative Plan Descriptions

| Plan Comb. No. | Plan Combination Components | Incremental Cost (dollars) | Incremental Output (Habitat Units) |
|-----------------------|---|-----------------------------------|---|
| 1 | M (No Action or FWOPC) | 0.00 | 0.00 |
| 2 | A (Jobs) + B (Dixie) + C (Rock) + E (Lost w/ Doser) | 7.21 | 51,428 |
| 3 | A (Jobs) + B (Dixie) + C (Rock) + E (Lost w/ Doser) + G (Monkey w/ Doser) | 9.16 | 65,385 |
| 4 | A (Jobs) + B (Dixie) + C (Rock) + D E (Lost w/ Doser) + G (Monkey w/ Doser) + H (Snake) + JK (Snow Fork w/ Doser) + L (Coe) | 17.36 | 105,564 |
| 5 | A (Jobs) + B (Dixie) + C (Rock) + E D (Lost) + G (Monkey w/ Doser) + H (Snake) + J K (Snow Fork w/ Doser) + L (Coe) | 17.83 | 129,593 |
| 6 | A (Jobs) + B (Dixie) + C (Rock) + D (Lost) + F G (Monkey w/ Doser) + H (Snake) + J (Snow Fork) + L (Coe) | 24.04 | 138,821 |
| | | ↑ breakpoint | |
| 7 | A (Jobs) + B (Dixie) + C (Rock) + D (Lost) + F (Monkey) + H (Snake) + J (Snow Fork) + L (Coe) | 64.40 | 143,365 |

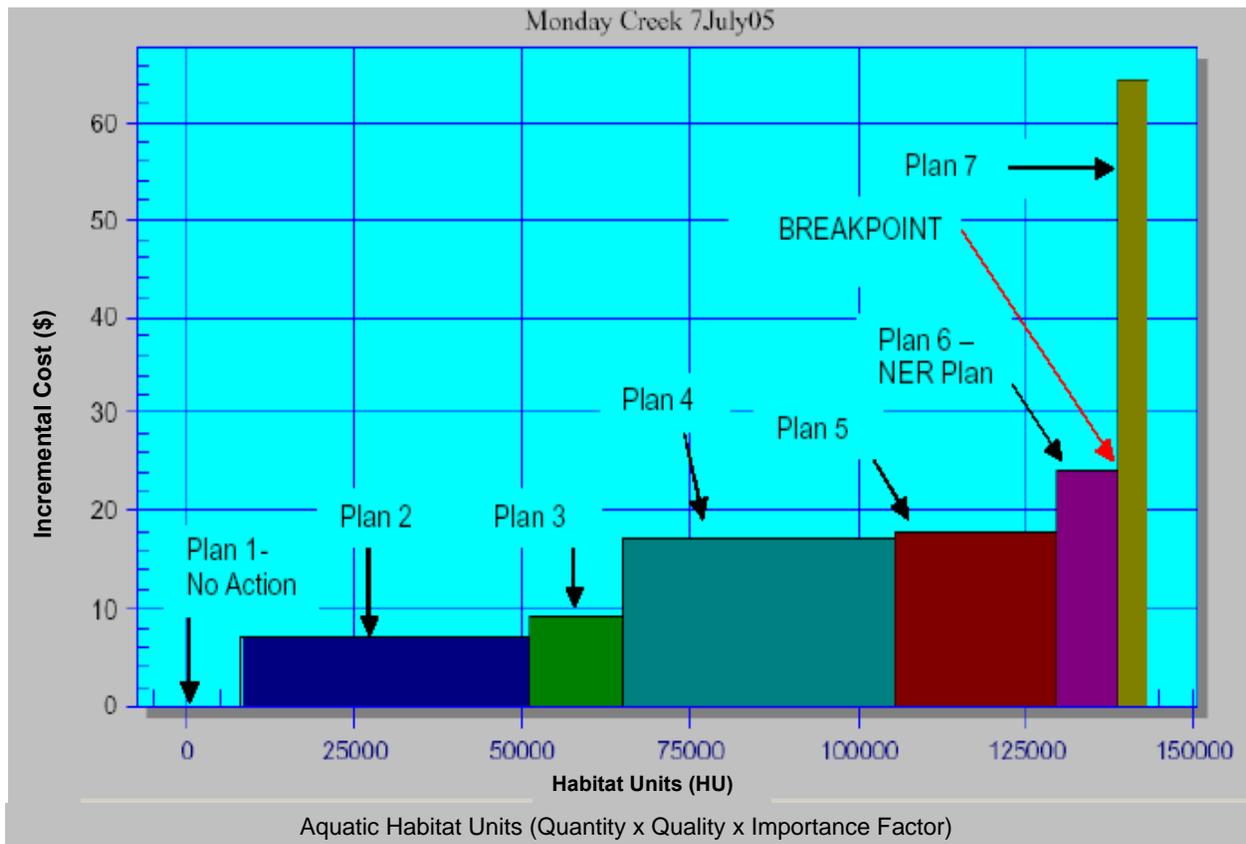
Comparison of Alternatives

Seven plan combinations were identified as Final Array Plans. Plan Combination (PC) 1 is the FWOPC or existing conditions plan and was evaluated during the NEPA analysis. PC 6 is the plan with the greatest increase in habitat units (HU) for the least increase in cost. PC's 2, 3, 4 and 5 were less cost-effective than PC 6 and were eliminated from further consideration. Only Plan Combinations 1 and 6 were retained for further consideration.

Plan Combination 6 has the greatest increase in output for the least increase in cost and is considered the National Ecosystem Restoration Plan (NER) Plan. It is also the locally-preferred plan (LPP). Plan Combination 7 is also a cost efficient plan, but costs significantly more per habitat unit than PC 6. Plan Combination 7 identifies little gain in habitat units versus investment costs and was therefore eliminated from further consideration.

Plan Combination 6 mitigates the acid mine drainage impacts within the Monday Creek watershed and reestablishes connectivity of aquatic resources between the Hocking River and the Monday Creek headwaters. This Recommended Plan successfully reduces the toxic concentrations of iron, aluminum and acidity, and increases pH levels, which meets the water-quality thresholds in the mainstem of Monday Creek allowing the recovery process of the ecosystem to commence. PC 6 provides that the minimum resource requirements considered necessary to support the aquatic ecosystem will exist in 98% of the watershed. Over a period of several years, an environmentally sustainable ecosystem indigenous of the region would re-establish itself through natural means. Descriptions of the major project features associated with implementation of the project, real estate, operation and maintenance, rehabilitation, restoration and replacement requirements are included in the plan.

Figure 2. Final Array Plans for Monday Creek Ecosystem Restoration Project



Key Assumptions

Acid mine drainage related problems have degraded the habitat of the Monday Creek watershed and impaired its aquatic ecosystem functions to the point that the aquatic community is severely stressed. The lack of aquatic species density and diversity has been identified as a critical issue and restoration is of high priority to the Ohio Department of Natural Resources. Pollution-tolerant fish such as carp and macroinvertebrate, such as blood worm populations are dominant in the watershed, primarily in mainstem Monday Creek and Snow Fork. Pollution-sensitive species such as bass and darters, stoneflies and caddisflies, are found only in small areas which are disconnected both laterally and longitudinally from the rest of the watershed. The limited biodiversity severely inhibits the ability of the aquatic and terrestrial habitats to develop into a self-sustaining ecosystem.

Structural degradation of the ecosystem is a result of the high concentrations of dissolved and suspended AMD constituents found in the stream. Toxic concentrations of iron and aluminum pH and acidity levels adversely affect vertebrate and invertebrate life. Suspended sediments deposited on the streambed harden or cover existing coarse substrates, affecting substrate-dependent aquatic species. The functional characteristics of the ecosystem are impaired through removal of most of its biotic components, which affects adjacent riparian and upland areas as well. For example, the lack of fish, macroinvertebrates and vegetation in Monday Creek inhibits the utilization of these adjacent areas by terrestrial species dependent upon aquatic organisms as a food source.

The Recommended Plan

Plan Combination 6 includes the implementation of project features placed in areas affected by acid mine drainage. Restoration activities contribute to the objective to restore the Monday Creek ecosystem by restricting surface water from entering mine voids and ultimately producing AMD. This not only reduces the production of AMD in a subwatershed, but results in diluting other affected surface streams. Existing pockets of healthy fish and macroinvertebrate populations, such as those found in the Little Monday Creek subwatershed, would then repopulate formerly-impacted areas, thus restoring both the structural and functional components of the ecosystem to a less degraded state. The Recommended Plan is expected to result in significant benefits to the aquatic ecosystem from Monday Creek's headwaters to its confluence with the Hocking River.

The Recommended Plan includes the following features:

Table 4. Plan Combination 6

| Plan | Location | Description |
|-------------|-----------------|---|
| A | Jobs Hollow | 1 doser, 3 SLB* and 1 OLC* |
| B | Dixie Run | 1 SLB, 2 OLC and 1 LLB* |
| C | Rock Run | 3 LHD* and 1 wetland |
| D | Lost Run | 30 sites + 16 spoil blocks and 12 subsidences features |
| F | Monkey Hollow | 1 doser + 9 spoil blocks and 6 subsidences features |
| H | Snake Hollow | 1 SLB, 4 OLC and 4 LLB |
| J | Snow Fork | 6 SLB, 19 OLC, 20 LLB, 8 dissipating streams, 9 spoil blocks, 7 subsidences, and 2 wetlands |
| L | Coe Hollow | 2 SLB, 1 OLC, 4 LLB, 3 dissipating streams and 1 subsidence feature |

*SLB – slag leach bed; LLB – limestone leach bed; OLC - open limestone channel; LHD – low head dam

The Recommended Plan consists of 180 restoration measures within the following eight subwatersheds locations: Jobs Hollow, Dixie Hollow, Rock Run, Monkey Hollow, Lost Run, Snake Hollow, Coe Hollow, and Snow Fork (which is comprised of Salem Hollow, Sycamore Hollow, Spencer Hollow, Brush Fork, Long Hollow, Whitmore Cemetery and the Village of Orbiston). The success of the project is dependent on the implementation of all 178 restoration components as they are not separable elements.

AS Table 4 indicates, proposed measures include open limestone channels (OLC), low head dams (LHD), limestone leach beds (LLB), slag leach beds (SLB), aerobic wetlands (W) and dosers. Other activities will close stream-capturing subsidences, reroute dissipating or disappearing streams and breach or remove spoil blocks that block the natural surface drainage patterns.

Systems/Watershed Context

The evaluation of the Recommended Plan considered the Monday Creek aquatic ecosystem and its relationship with the Hocking River watershed as a whole. Many streams and related

ecosystems within the Appalachian coal region of Ohio are heavily impacted by abandoned mine drainage. Reconnecting the restored ecosystem of a 116-square mile watershed that provides 10% of the flow of the Hocking River would greatly benefit regional ecosystem.

The project feasibility study was conducted with the U.S. Army Corps of Engineers as the lead agency and the Ohio DNR as the local sponsor. The U.S. Forest Service participated as a cooperating agency. Additional regional partners included U.S. Fish and Wildlife Service, Ohio Environmental Protection Agency (OEPA), Ohio University (OU), U.S. National Energy and Technology Laboratory (NETL), West Virginia University (WVU) and members of the Monday Creek Restoration Project (MCRP). These agencies participated in an interagency committee which developed the objectives for the proposed restoration work, provided needed data and field studies and contributed technical expertise during plan formulation.

Environmental Operating Principles

The Corps Environmental Operating Principles (EOP) are consistent with NEPA; the Department of the Army's Environmental Strategy with its four pillars of prevention, compliance, restoration and conservation; and other environmental statutes and Water Resources Development Acts (WRDAs) that govern USACE activities. The EOP have guided the plan formulation process and are integrated into all proposed program and project management processes. The Monday Creek plan processes established to achieve the EOP goals are as follows:

- 1. Environmental sustainability...** All remediation measures were designed to restore the aquatic habitat to a more natural condition with minimum operations and maintenance (O&M) requirements. This increases the potential of achieving sustainability of the ecosystem.
- 2. Interdependence of life and the physical environment.** All project components were designed to restore the ecosystem to a less degraded condition that will support aquatic life.
- 3. Seek balance and synergy between human and natural systems.** Coordination with the USFS ensures restriction of ATV riders from restored sites.
- 4. Continue to accept corporate responsibility and accountability...** Continuous coordination with USFWS on the Endangered Species Act concerns was conducted.
- 5. Assess and mitigate cumulative impacts to environment.** Projects were designed to minimize impacts to the environment during design and construction.
- 6. Build and share knowledge.** The Project Delivery Team utilized a multi-partner effort to obtain information for study and arrive at a Recommended Plan. The Feasibility Study is being used by Ohio EPA as the TMDL report for Monday Creek.
- 7. Respect the views of individuals and groups.** Effectively listened to and incorporated views of others through public meetings, bi-monthly team meetings.

Independent Technical Review (ITR)

The Independent Technical Reviews for Plan Formulation and NEPA Compliance were performed by an LRD-designated technical expert from Nashville District. Significant ITR comments addressed and actions taken by Huntington District are listed as follows:

1. **Projects located on another Federal agency property.** The Team looked beyond real estate boundaries to consider the whole watershed. The U.S. Forest Service does not have a mandate or a mission to perform ecosystem restoration.
2. **Lack of description of fish resources.** Information was added to the text concerning fish resources, including population density, population diversity etc.
3. **IWR plan – some of the terms were not defined and needed clarification.** Text was added to clarify the IWR plan’s terms and to explain the CE/ICA process.

EXPECTED PROJECT PERFORMANCE

Project Costs

The Monday Creek Environmental Restoration project cost is \$17,720,000 (based on the October 2004 price level). Project costs summarized by Feature Account are shown in Table 3. The fully funded estimate is \$18,737,000 (including prior expenses) based on construction distribution between FY07 and FY10 with some monitoring costs extending into FY14. The Federal discount rate used was 5.625 percent.

Table 5. Project Costs by Feature Account

| | Feature Account | Estimated Cost | Contingency | Total (PL 1-OCT03) |
|----------|--------------------------------|---------------------|--------------------|-----------------------|
| 01. | Lands and Damages | \$98,000 | \$0 | \$98,000 |
| 02. | Relocations | \$171,000 | \$26,000 | \$197,000 |
| 09. | Channels and Canals | \$10,862,000 | \$1,548,000 | \$12,410,000 |
| 18. | Cultural Resource Preservation | \$25,000 | \$0 | \$25,000 |
| 19. | RE Office Building | \$17,000 | \$3,000 | \$20,000 |
| 21 & 22. | Prior Expenditures | \$1,305,000 | \$0 | \$1,305,000 |
| 30. | E&D | \$2,126,000 | \$0 | \$2,126,000 |
| 31. | S&A | \$947,000 | \$0 | \$947,000 |
| | TOTAL | \$15,551,000 | \$1,577,000 | \$17,128,000 |

A 10% contingency was assigned using the cost engineer’s judgment based upon the amount of risk and/or uncertainty.

Cost Sharing

In accordance with the Water Resources Development Act of 1996 (WRDA 96), Construction General (CG) ecosystem restoration projects are cost shared 65 percent Federal and 35 percent non-Federal. Included in the 35 percent non-Federal cost is all lands, easements, rights of way, relocations and dredged material disposal areas (LERRD).

Project Implementation

The non-Federal sponsor for this project is Ohio Department of Natural Resources. The non-Federal costs are estimated to be \$6,101,260, including the cost of planning, engineering and design (PED) and credit for LERRD.

The long-term monitoring plan and adaptive management strategy will include water chemistry and biological monitoring at existing sites along the mainstem of Monday Creek and Snow Fork, and the addition of monitoring on tributaries affected by restoration activities.

Table 6. Equivalent Annual Benefits and Costs

**Monday Creek Sub-Basin Ecosystem Restoration Project
Feasibility Study and Environmental Assessment
(October 2004 Price Level, 20-Year Analysis, 5.625 Percent Discount Rate)**

| Item | Ecosystem Allocated Costs |
|------------------------------|------------------------------|
| Investment Cost | |
| First Cost | \$16,220,000 |
| Interest During Construction | \$ 1,500,000 |
| Total | \$17,720,000 |
| Annual Cost | |
| Interest and Amortization | \$124,000 |
| OMRR&R | \$320,000 |
| Subtotal | \$444,000 |
| Annual Benefits | |
| Non-Monetary | 138,821 units |

Operation, Maintenance, Rehabilitation, Repair and Replacement (OMRR&R)

Upon completion of construction, Ohio DNR assumes 100 percent of the costs associated with operation, maintenance, rehabilitation, repair and replacement over the life of the project. Plan Combination 6 identifies a 20-year horizon with minimal operation and maintenance during that time. Only the recommended passive treatments and active dosers will require OMRR&R. Measures to address dissipating streams, spoil blocks and subsidences are not expected to require OMRR&R after initial construction.

The estimated average annual OMRR&R is \$320,000 (2005 levels).

Key Social and Environmental Factors

This project would improve the quality of life for residents and visitors to the area. It would also provide temporary positive economic impacts in the region through construction activities of the restoration measures.

The Recommended Plan will restore 230.20 acres and 58.6 miles of aquatic stream habitat by improving conditions of severe acidity loading and toxic metal concentrations. The Plan also maximized the NER account with a cost efficient plan that restores 98% of the aquatic habitat and provides for a future sustainable ecosystem.

Stakeholder Perspectives and Differences

The non-Federal cost-share partner, the Ohio Department of Natural Resources, fully supports the project. Each agency identified as a study partner also fully supports the project.

The Environmental Assessment for the Monday Creek Feasibility Study is an integrated part of the study. Public Meetings were conducted in June of 2004 in New Straitsville and Nelsonville, Ohio. The meetings were utilized to gather input from interested agencies, organizations and the general public concerning aspects of the study, issues and impacts to be addressed in the report, and alternatives that should be analyzed. To further provide for public input as required by NEPA, the Draft Feasibility Report was circulated to state and Federal resources agencies, interested groups and the general public for comment during April-May 2005. All comments received from state and Federal agencies were positive and indicated support of the project. Updates on activities occurring within the watershed have also been available to the general public by means of a monthly newsletter published by the Monday Creek Restoration Project (MCRP) organization.