USDA NRCS Natural Resources Conservation Service

Emergency Watershed Protection Program

Draft Programmatic Environmental Impact Statement

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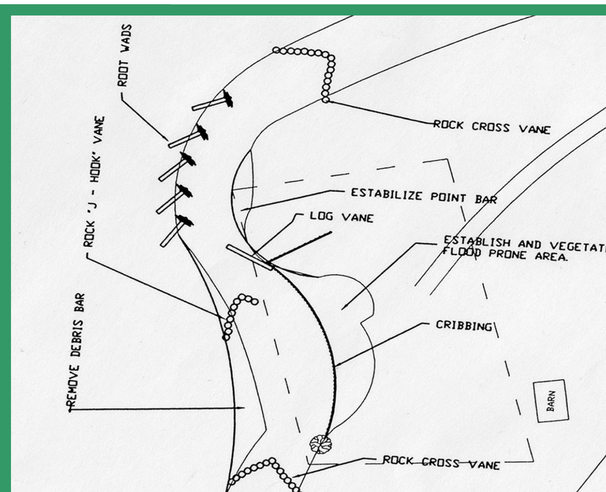

NRCS
Emergency
Watershed
Protection
Program

December 15, 1999

Draft Programmatic Environmental Impact Statement

Emergency Watershed Protection (EWP) Program Improvement and Expansion
Natural Resource Conservation Service
U.S. Department of Agriculture

<u>Abstract</u>

The Emergency Watershed Protection (EWP) Program helps remove threats to life and property that remain in the nation's watersheds in the aftermath of natural disasters such as floods, hurricanes, tornadoes, and wildfires. This Programmatic Environmental Impact Statement analyzes the impacts on the nation's watershed ecosystems and human communities of a comprehensive proposal by NRCS to improve and expand the EWP Program and of alternatives to that proposed action. EWP Program delivery improvements would enable NRCS staff with EWP Program responsibility to provide EWP assistance more effectively and efficiently when and where it is needed. The improvements should allow NRCS to more fully, equitably, and consistently meet the needs of people requiring emergency assistance. Program defensibility improvements would address environmental, economic, and social concerns and values. Program expansion would also address concerns raised about the need for more comprehensive disaster recovery in watershed areas not currently within the Program's purview.

To comment on this draft PEIS, please use one of the following methods:

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Comments must be received by February 15th, 2000.

SUMMARY

S.1 Background and Organization of Summary

The Emergency Watershed Protection (EWP) Program helps remove threats to life and property that remain in the nation's watersheds in the aftermath of natural disasters such as floods, hurricanes, tornadoes, and wildfires. The Program is administered by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), which provides technical and financial assistance to local authorities—Program sponsors—to preserve life and property threatened by erosion and flooding. The Program is authorized by Section 216 of the 1950 Flood Control Act as amended by the 1978 Agricultural Credit Act and the 1996 *Farm Bill* (Federal Agricultural Improvement and Reform Act). NRCS regulations for the EWP program are set forth in 7 CFR 624.

The threats that the EWP Program addresses are termed *watershed impairments*. These include debris-clogged stream channels, undermined and unstable streambanks, jeopardized water control structures and public infrastructure, and damaged upland sites stripped of protective vegetation by fire or drought. Watershed impairments that are not addressed when they pose a serious threat, are likely to cause injury, loss of life, or devastating property damage in a subsequent storm.

This Programmatic Environmental Impact Statement (PEIS) analyzes the impacts on the nation's watershed ecosystems and human communities of a comprehensive proposal by NRCS to improve and expand the EWP Program. It also evaluates the impacts of alternatives to that proposed action.

This Summary presents a synopsis of the PEIS and is organized for ease of reading as follows, with the PEIS source chapters indicated:

- S.2 Purpose and Need for the Action (Chapter 1)
- S.3 Current EWP Program (Chapter 2)
- S.4 Alternatives including the Proposed Action (Chapter 3, Sections 3.1 to 3.3)
- S.5 Affected Environment (Chapter 4)
- S.6 Comparison of Impacts of the EWP Program Alternatives (Chapter 3, Section 3.4 based on the impacts analyzed in Chapter 5)
- S.7 Mitigation (Chapter 3, Section 3.5)

S.2 Purpose and Need for the Action

The NRCS proposed action is **EWP Program Improvement and Expansion.** To implement the proposed action, NRCS would incorporate changes in EWP Program administration, in project execution, and in the design of practices dealing with traditional watershed impairments. NRCS would expand the Program by adding floodplain sediment deposition, upland disaster debris, and damaged structural conservation practices to the list of watershed impairments EWP addresses.

The **purpose and need** for the NRCS proposed action is to improve the delivery and defensibility of the EWP Program and to address concerns about natural disaster-caused threats to life and property that the Program does not now address.

EWP Program delivery improvements would enable NRCS staff with EWP Program responsibility to provide EWP assistance more effectively and efficiently when and where it is needed. The improvements should allow NRCS to more fully, equitably, and consistently meet the needs of people requiring emergency assistance. Program defensibility improvements would address environmental, economic, and social concerns and values. Program expansion would address concerns raised about the need for more comprehensive disaster recovery in watershed areas not currently within the Program's purview.

S.3 The Current EWP Program

NRCS administers the EWP program to respond to life and property-threatening watershed impairments caused by natural disasters. Local sponsors (e.g. counties, conservation districts) who request EWP assistance provide at least 20 percent of funding for EWP watershed repair practices. NRCS provides up to 80 percent of funding and technical assistance for EWP practices that remove disaster debris, repair damaged streambanks, dams, and dikes, protect floodplain structures, and restore critical watershed uplands. Federal funding is through supplemental Congressional appropriations as requested by NRCS.

The major practices currently employed under EWP include stream flow capacity restoration; stream bank restoration and protection; dam, dike, and levee repair; protection of structures in floodplains; and restoration of critical upland portions of watersheds. EWP also currently administers a voluntary program of floodplain easement purchase on agricultural lands.

Restoration of stream channels to allow normal stream flow requires removal and disposal of debris. Damaged streambanks are protected directly by single application or combined use of hard armoring, use of woody structural materials, soil bioengineering, restoration of stream dimension, pattern and profile, vegetative plantings and seedings. Streambanks are indirectly protected by in-stream flow modification. Direct and indirect streambank protection also may be used in combination.

Damaged dams, dikes, and levees are repaired or removed if repair is not feasible or cost-effective. Floodplain diversions are employed to divert flow away from structures such as water treatment plants. Sediment or debris basins trap materials up-gradient before they can damage structures. Repair of critical upland portions of watersheds includes installation of diversions, drains and conveyances, and sediment and debris basins, and revegetating by planting or seeding. The EWP practices generally share common activities: creating access to reach a damage site, use of heavy equipment on bank, in-stream, or on uplands, material disposal, and grading, shaping, and revegetating portions of the site as appropriate.

The EWP Manual documents NRCS policy governing EWP; the National EWP Handbook covers field procedures. NRCS staff administers EWP in the field when sponsors request assistance with disaster damage. NRCS fills out a Disaster Survey Report (DSR) describing the watershed impairments at a particular site, their eligibility for repairs, the cost and benefits of appropriate repair practices, and the environmental and technical soundness of the proposed measures. The NRCS EWP implementing regulations, manual, and handbook (including the DSR) would be revised to reflect any program changes EWP decides to adopt.

The 1996 Farm Bill authorization of floodplain easements provides NRCS with an opportunity to purchase easements on flood prone lands as an alternative to traditional eligible EWP practices. It is not intended to deny any party access to the traditional eligible EWP practices, but rather to provide a more permanent solution to repetitive disaster assistance payments and to achieve greater environmental benefits where the situation warrants and the affected Landowner is woulding to participate in the easement approach. The National Watersheds Manual (NWSM) 390-V, Circular 4 provides the current program guidance for acquisition of floodplain easements. Currently, three categories of easements are eligible for purchase on agricultural lands that are frequently damaged: 1) allows no agricultural uses, 2) allows certain compatible uses such as timbering, haying, and grazing, 3) allows cropping as well as timbering, haying, and grazing.

Exigency (high priority emergency situations) receive immediate attention and priority in funding; non-exigency sites are handled later. NRCS coordinates its work with Federal agencies, principally the U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (USF&WS), FEMA, EPA, and U.S. Forest Service (USFS), and with State agencies, including the relevant State Historic Preservation Office, wildlife resource and water quality offices, tribal governments, and local communities. At issue are important regulatory and environmental requirements, such as protecting Federally-listed endangered or threatened species and preserving unique cultural and historic resources, including those listed on the National Register of Historic Places.

The EWP program is one among a number of Federal and state-level programs dealing with disaster assistance and watershed management. In small, rural watersheds it may be considered one of the most responsive to local needs.

Supplemental appropriations allocated by state for EWP Program activities from 1994 to 1998 are shown in Fig. S.3-1. At present, the EWP Program budget remains zero-based and allocations are made on a year-to-year basis according to need through requests for supplemental appropriations.

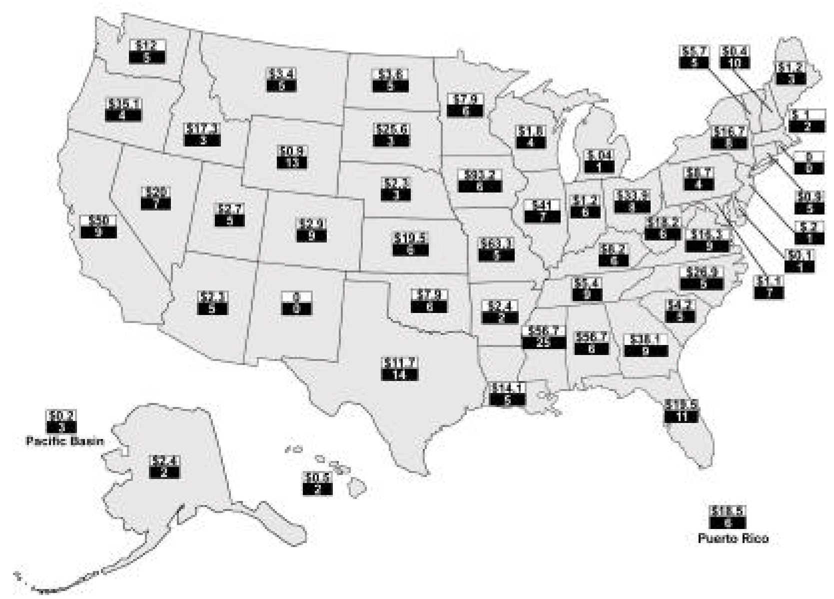

Fig. S.3-1 –Supplemental Appropriations for EWP Program Work by State (1994-1998)— 5-year funding in $ million and number of disaster events

S.4 The EWP Proposed Action and Alternatives

S.4.1 Scoping for the EWP Programmatic EIS

NRCS based its EWP Program proposed action on recommendations of an Oversight and Evaluation team and other NRCS staff. NRCS then conducted formal scoping for the EWP PEIS, meeting with and soliciting input from representatives of other Federal, state, and local agencies, and the general public. Public scoping meetings were held in six cities located centrally to recent EWP project activities. The Federal Register and national newspapers published notices that NRCS was preparing a PEIS and that input was being sought through public scoping meetings, a toll-free phone line, regular mail, and the NRCS website on the Internet. The proposed action and alternatives reflect ideas voiced and recommendations made during that scoping process.

S.4.2 Definition of EWP Program Alternatives

Three Program Alternatives described here were analyzed in detail for environmental impacts:
1. Continue the Current EWP Program—the No Action Alternative.
2. EWP Program Improvement and Expansion
3. Prioritized Watershed Planning and Management

Alternative 1—No Action NRCS would continue to conduct the current EWP Program as it does now with no improvement or expansion.

Alternative 2—EWP Program Improvement and Expansion—the Proposed Action—includes 15 elements to improve the delivery and defensibility of the Program and incorporate new restoration practices.

1. ***Eliminate the terms "exigency" and "non-exigency."*** "Exigency" has been applied too liberally in situations that do not conform to the purpose for which the term was intended.

2. ***Stipulate that "urgent and compelling" situations be addressed immediately upon discovery.*** In a situation that demands immediate action to avoid potential loss of life or property, employees with procurement authority would be permitted to hire a contractor to remedy a watershed impairment immediately after evaluation of the site.

3. ***Set priorities for funding of EWP measures.*** NRCS would set priorities to be applied consistently across the country for funding EWP measures. Urgent and compelling situations would have highest priority.

4. ***Establish a cost-share rate of up to 75 percent for all EWP projects (except for projects in limited-resource areas, where sponsors may receive up to 90 percent).*** This cost-share rate would align the EWP Program with the emergency programs of other agencies while providing extra help to those who otherwise might not be able to afford to participate in the program.

5. ***Stipulate that measures be economically, environmentally, and socially defensible and identify the criteria to meet those requirements.*** Project alternatives would be reviewed to

determine their acceptability according to the ideals and background of the community and individuals directly affected by the recovery activity. A combination of all three categories would be used to determine defensibility.

6. ***Improve disaster-recovery readiness through interagency coordination, training, and planning.*** NRCS would employ disaster assistance recovery training (DART) teams to train its employees, evaluate and implement ways to improve coordination between EWP and other emergency programs, and request state conservationists prepare emergency action plans (EAPs) that detail working relationships with other groups on the Federal, state and local levels.

7. ***Allow repair of impairments to agricultural lands using sound engineering alternatives.*** This element would permit sound structural measures to be installed where they are economically, environmentally, and socially defensible.

8. ***Limit repair of sites to twice in a ten-year period.*** Where a site has been restored twice and 10 or fewer years have elapsed since the first disaster event, the options remaining available under the EWP Program would be to acquire a floodplain easement or take no action at all.

9. ***Eliminate the requirement that multiple beneficiaries (property owners) be threatened before a site would be eligible for EWP Program repairs.*** NRCS recognized that in almost every instance benefits accrue to someone downstream of the impairment area.

10. ***Apply the principles of natural stream dynamics and bioengineering to the design of EWP measures where they make up the least-cost practical solution.*** DART teams would incorporate these design principles into disaster-readiness training of NRCS staff and provide more intensive training to NRCS staff responsible for EWP practice design and review.

11. ***Simplify purchase of agricultural easements.*** NRCS would establish a single agricultural easement category and would specify compatible landowner uses.

12. ***Repair enduring (structural or long-life) conservation practices.*** Conservation practices such as waterways, terraces, diversions, irrigation systems, and animal waste systems that are damaged during a disaster event would be eligible for EWP Program cost-share assistance.

13. ***Fund part of improved solutions.*** This element would allow the EWP Program to help fund work that would be eligible for disaster recovery as part of a more extensive solution.

14. ***Allow disaster-recovery work in floodplains away from streams and in upland areas.*** The expansion of the EWP Program to include areas not directly adjacent to streams would allow the removal of sediment deposits from cropland and pastures and other debris (generally wind-blown material) from land and environmentally sensitive areas.

15. ***Purchase easements on non-agricultural lands.*** Under this change, easements would be purchased on both unimproved and improved lands. For improved land, NRCS would provide 100 percent of the cost of an easement that conveys all interests and rights. Any structures would be demolished or relocated outside the 100-year floodplain at no additional cost to the government.

Alternative 3—Prioritized Watershed Planning and Management would allow NRCS to focus EWP Program efforts proactively on disaster-prone watersheds and integrate those efforts with other USDA programs dealing with watershed issues. Prioritized watershed planning would combine the elements of alternative 2, the proposed action, with focused, program-neutral, disaster-readiness and mitigation planning for selected high-priority watersheds.

The EWP Program elements implemented under Alternative 3 would include:

a. *Continuing to deliver EWP project funding and technical assistance to address immediate threats to life and property as required by law.* This would continue to be the highest, but not sole, priority in the EWP Program. EWP funding and technical assistance would be applied, post-disaster, when and where it is needed.

b. *Instituting the program improvements and expansion of the Proposed Action.* The 15 items under the Proposed Action would be instituted.

c. *Facilitating a locally led pre-disaster planning effort.* This locally-led effort initiated and coordinated by NRCS would address concerns about recurrent application of EWP repair measures in watersheds that have a history of frequent disasters and to integrate EWP activities in those watersheds with NRCS programs dealing with other watershed issues.
d. *Funding of priority watersheds in each State for pre-disaster planning and management.* High priority watersheds and, as funding permits, medium priority watersheds would undergo pre-disaster planning and management providing there is a local sponsor (state, county, tribal organization or other eligible entity) who agrees to sponsor the pre-disaster planning.

e. *Coordinating pre-disaster planning and management efforts with Federal, state, and local agencies and interested stakeholders.* This would include:
   - establishing an overall watershed management plan
   - integrating other program authorities and practices available to NRCS
   - purchasing floodplain easements on a stepwise, proactive, risk-reduction basis
   - combining EWP with other program authorities to enhance watershed values

This alternative is a comprehensive approach that would most fully address the impacts of the broad variety of activities occurring or planned in a watershed, the natural processes at work in shaping the watershed, and the risk of threats to life and property from floods or other disaster events. It would provide a sound basis for ongoing NEPA-based analyses and documentation of cumulative watershed effects. Environmental evaluation and review of each EWP project, and of other NRCS projects in the watershed, would be best accomplished within the specific priority watershed context.

S.4.3 Comparison of Implementation Aspects Likely to Affect Impacts

Major aspects of the EWP Program would be different under the proposed action and alternative 3 that have implications in terms of effects on watershed ecosystems and human communities. Gmajor changes are summarized in Table S.4-1, specific changes in Table S.4-2.

Table S.4-1 EWP Program Changes with Important Implications for Impacts Analysis

Major EWP Program Aspect	No Action	Proposed Action	Prioritized Watershed Planning and Management
Use of Floodplain Easements on Ag Land	Retain 3 categories of Agricultural Easements	Categories 1 & 3 dropped	Categories 1 & 3 dropped
Other Uses of Floodplain Easements	None	Improved Lands Easements	Improved Lands Easements + focus on broad purchase in disaster-prone watersheds
Funds Allocated for Easement Purchase	Lowest Amount	Moderate Amount	Highest Amount
Use of “Armoring” versus “Green” practices for recovery	Slow, Steady Shift to Greener Methods	Accelerated Shift to Greener Methods	Accelerated Shift to Greener Methods
Relative number of “armoring practices contracted	Likely to be the Highest of the 3 Alternatives	Reduced due to emphasis on “Greener” methods and increased number of easements purchased	Greatest reduction due to emphasis on “Greener” methods and greatest number of easements purchased

Table S.4-2 Implication for Impacts Analysis of Implementation of Specific EWP Program Changes in Proposed Action

Change under Proposed Action	Would Affect Implementation of		Implications for Environmental Impacts Analysis
	Practices	Easements	
1. Eliminate the terms “exigency” and “non-exigency.”	✓		Would allow more time for site environmental review for normal emergencies
2. Stipulate that "urgent and compelling" situations be addressed immediately	✓		Would reduce time-to-repair and time for initial environmental review and coordination in high risk situations
3. Set priorities for funding of EWP measures	✓		Would require review and repair of sites with T&E, cultural resource, and other sensitive sites sooner than other normal emergency sites
4. Establish cost-share of up to 75%; up to 90% in limited-resource areas	✓		Potential to have more EWP practices funded across nation
5. Stipulate that measures be economically, environmentally, and socially defensible	✓	✓	Depending on local views and understanding community stakeholders might promote more environmentally beneficial measures or might argue for continued hard armoring as the “best protection” of socially valued entities
6. Improve disaster-readiness through interagency coordination, training, and planning.	✓	✓	Would ensure NRCS, agencies, and stakeholders are better prepared to respond to emergencies while factoring in environmental considerations.
7. Allow repair of impairments to agricultural lands using sound engineering alternatives.	✓	✓	Would tend to increase use of structural practices but would emphasize greener solutions. May conflict with the NRCS goal of promoting the use of easements
8. Limit repair of sites to twice in any ten-year period.	✓	✓	Would tend to decrease use of structural practices but would emphasize greener solutions. Consistent with the NRCS goal of promoting the use of easements
9. Eliminate the multiple beneficiaries requirement for site repairs.	✓	✓	Would tend to increase the number of sites where EWP measures are employed. With change 7 would make individual farmers with large landholdings major program benefactors.
10. Apply the principles of fluvial geomorphology and green engineering	✓		Would promote solutions in line with natural stream dynamics
11. Simplify purchase of agricultural easements.	✓	✓	Would tend to promote more uses of the floodplain than Category 1 under Alt 1 but would not allow crops (Category 3)

Table S.4-2 (continued) Implication for Impacts Analysis of Implementation of Specific EWP Program Changes in Proposed Action

Change under Proposed Action	Would Affect Implementation of		Implications for Environmental Impacts Analysis
	Practices	Easements	
12. Repair enduring (structural or long-life) conservation practices.	✓		Would allow EWP Program to employ measures to repair structures that protect water quality and watershed health in watersheds with agriculture
13. Fund part of improved solutions.	✓		Would ensure that NRCS is involved in more projects to provide technical assistance and environmental review
14. Allow disaster-recovery work in floodplains away from streams and in upland areas.	✓		NRCS would become involved in more situations where watershed effects are at issue.
15. Purchase easements on non-agricultural lands.		✓	Would expand the use and number of easements and promote floodplain restoration goals

S.4.4 Alternatives and Program Elements Considered but not Evaluated in Detail

Two other EWP Program alternatives were considered but not evaluated in detail because NRCS judged that they would not improve Program delivery and defensibility.

Reduced Federal role. Under this alternative, NRCS would have continued to administer the EWP Program provided technical assistance but shifted project evaluation and monitoring responsibility and authority to the states. NRCS would have relied on the efforts of each state emergency management organization (EMO) to carry out the needed work.

Grant to qualified sponsors. This alternative would have shifted much Program responsibility to qualified sponsors. NRCS would not have continued to administer the EWP Program nor provided technical assistance, but instead would have provided EWP Program grant funds directly to qualified sponsors in each state.

Additional elements suggested for the proposed action alternative—allowing non-governmental organizations to sponsor floodplain easements, repairing lakeshore damage, and repairing roads—were not considered in detail.

S.5 Affected Environment

The environment affected by the EWP Program consists of the portions of the watersheds of the U.S. and territories that are associated with human uses and communities where watershed impairments resulting from natural disasters may threaten life or property. Potentially affected watersheds include those of the 50 States and territories, except coastal areas and Federal lands not managed by the U.S. Forest Service. Although EWP work can be done in virtually any watershed location, EWP restoration work typically is done in relatively small watersheds, often in the upper reaches of a watershed, and usually in rural areas or the rural outskirts of urban areas. There are exceptions to this general rule, as in the case of the 1993 Upper Mississippi floods, when EWP assisted in the recovery effort by repairing mainstem river levees.

The PEIS environmental impacts analysis addresses the effects of the EWP Program on watershed aquatic, floodplain, wetland, and riparian ecosystems and, for certain practices such as critical area treatment and upland debris removal, the impacts on watershed upland ecosystems. The analysis is based on the potential for adverse and beneficial changes in the condition of watershed ecosystems. The analysis is based on a general representation of the condition of these ecosystems before and in the aftermath of a disaster event and as affected subsequently by an installed EWP practice or a floodplain easement. It covers current EWP restoration measures and easements as well as proposed practices and easements. The condition of aquatic habitats (Table S.5-1) is the basis for consideration of EWP impacts. Characterization of condition is based on EPA's rapid bio-assessment protocols according to aspects of in-stream habitat and channel morphology. Water quality and pollutants are also addressed in considering habitat conditions ranging from poor to excellent in terms of supporting aquatic communities, including T&E species.

Table S.5-1 Aquatic Habitat Condition Classification Applied to Affected Environment

General Feature	Specific Aspects or Components
In-stream habitat	Bottom substrate, embeddedness, velocity at low flow
Channel morphology	Channel alteration, bottom scouring and deposition, pool/riffle ratio
Water quality parameters	Dissolved O2, turbidity, temperature
Pollutants	Nutrients, contaminants
Biota	Macro-invertebrates, fish, plants, algae, T&E species

Similar general condition classifications (Table S.5-2) were used to characterize the before-disaster, after-disaster, and after-EWP condition of riparian, floodplain, wetland, and upland watershed ecosystems. The general evaluation of impacts incorporates analyses of the environmental effects of EWP practices at example project sites that typify application of the EWP practices.

Table S.5-2 Condition Classification Applied to Affected Environment

Ecosystem	Components Considered
Riparian Areas	Bank stability/erosion, bank vegetative stability, streamside cover, vegetative zone width, wildlife & habitat, T&E Species
Floodplains	Land-use/development, hydrology, vegetation/habitat, wildlife, T&E Species
Wetlands	Hydrology, wetland management, vegetation/habitat, wildlife, T&E Species
Watershed Uplands	Slope/stream gradient, soil erosion potential, land use/development, vegetation, wildlife, T&E Species

Threatened and endangered (T&E) species are Federally-protected and site-specific in occurrence. They are addressed before implementation of every EWP project and protected, as appropriate, on a case-by-case basis. They are not characterized nor evaluated species-by-species in the general programmatic impacts analysis. However, they are described as protected components of the affected environment for each of the example EWP sites and are discussed as sensitive biotic components of the affected ecosystems.

Aspects of the human communities potentially affected by the EWP Program include economic, social, cultural, recreational and related resources. A general characterization of these potentially affected elements is done for rural communities nationwide, then for selected example communities where substantial EWP work has recently been done. These rural outskirts, small towns, and rural agricultural locations typify the range of human communities where EWP is called in to deal with threats to life and property. The cumulative impacts of EWP projects and other watershed activities are addressed using selected example small watersheds and major watersheds (8-digit USGS hydrologic units).

Cultural resources are site-specific and community-specific resources that are addressed before implementation of every EWP project and protected, as appropriate, on a case-by-case basis. They are not characterized programmatically nor evaluated in the general programmatic impacts analysis. However, they are described as protected components of the affected environment for each of the example EWP sites.

Twenty-three individuals practice or easement sites were selected in 14 watersheds (Table S.5-3) to represent typical impairment types and EWP practices. Of the locations (Fig. S.5-1), six were chosen to represent the range of affected human communities and three were selected as cumulative effects locations, where the activities throughout the watershed were factored into the analysis.

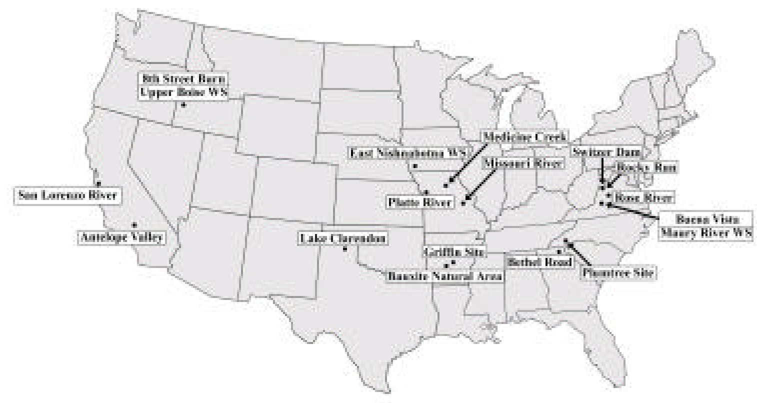

Fig. S.5-1. Locations of EWP example site, human community, and watershed locations.

Table S.5-3 Watersheds and EWP sites where impacts were addressed in the PEIS analysis

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities	Cumulative Impacts Affected Area
Lower Boise (17050114)	8th Street Burn, Boise Foothills north of Boise, ID	Critical Area Treatment of Major Burn Area in outskirts of Boise	Rural area in a metropolitan county	Lower Boise River Watershed, Ada Co., Region
Maury River (02080202)	Buena Vista, VA (small city on the Maury River)	Debris removal in 4 streams flowing through city	Independent city of Buena Vista in predominantly rural region	Buena Vista and Maury River Watersheds, Rockbridge County
	4 conservation practice locations in watershed, VA	Enduring conservation practices		
East Nishnabotna (10240003)	3 East Nishnabotna restoration sites, IA	Riverton Easement Debris, bank and levee damage on 3 sites on river and tributaries	Incorporated rural community of Shenandoah, IA and nearby farms	E. Nishnabotna Watershed, Fremont Co.

Table S.5-3(continued) Watersheds and EWP sites where impacts were addressed in the PEIS analysis

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities	Cumulative Impacts Affected Area
East Nishnabotna (10240003)	Riverton Easement Site, IA	Floodplain easement near Riverton		E. Nishnabotna Watershed, Fremont Co.
Upper Chattahoochee River (03130001)	Bethel Road site, Hall Co., GA	Tornado debris in stream	Two small independent farms in a rural area	
South Fork Shenandoah (02070005)	Rocky Run Site, Rockingham Co., VA	Streambank Repair, Hypothetical Improved Lands Easement	Residential cluster community of Rocky Run	
	Switzer Dam Site, Dry River, Rockingham Co., VA	Switzer Dam, Spillway damaged by Hurricane Fran		
Rapidan-Upper Rappahannock (02080103)	Rose River site, Criglersville, Madison Co., VA	Streambank Repair Site	Independent farm near small rural community	
Upper Saline (08040203)	Bauxite Natural Areas, AR	Tornado downed trees in sensitive habitat		
	Griffin site, Alexander, AR	Household and woody debris from tornado		
Antelope-Freemont Valleys (18090206)	Antelope Valley, CA	Drought with life-threatening sandstorms		
San Lorenzo-Soquel (18060001)	San Lorenzo River - Santa Cruz Co., CA	Soil-Bioengineering to protect streambanks		
Nolichucky River (06010108)	Plumtree, NC	Natural stream dynamics and bioengineering practices pilot project		
Upper Salt Fork Red (11120201)	Lake Clarendon Clarendon, TX	Sewage Treatment Plant on Floodplain		
Lower Missouri River (10300200)	Missouri River floodplain site, MO	Floodplain deposition site		
Lower Grand (10380103)	Medicine Creek site, MO	Floodplain easement with setback levee, Water control		
Platte River (10240012)	Platte River, MO	Floodplain easement, water control		

S.6 Comparison of the Impacts of the EWP Program Alternatives

An overview of the environmental impacts of the proposed action and other EWP Program alternatives on watershed ecosystems and human communities and the cumulative impacts of the Program alternatives is presented in Table S.6-1. More detailed discussions of these general findings follow.

Table S.6-1 General Comparison of Impacts of EWP Alternatives

Impact	No Action Continue the Current EWP Program	Proposed Action EWP Program Improvement and Expansion	Prioritized Watershed Planning & Management
Impacts on Aquatic, Wetland, Floodplains & Riparian Ecosystems	Greatest Likelihood for Local and Downstream Adverse Effects due to Continued Use of “Hard” Engineering Practices and Limited Use of Easements	Reduced Likelihood of Adverse Impacts due to Emphasis on “Greener” Practices and Broader Use of Easements	Highest Likelihood of Reduced Adverse Effects and Increased Beneficial Effects Especially in Well-Managed Priority Watersheds
Impacts on Human Communities	Highest Likelihood of Continuing to Protect All Uses of Floodplain	Use of Non-Ag Easements encourages more restricted uses of floodplain, some older rural communities may be disrupted	Highest Likelihood of encouraging best use of floodplain but highest potential for disruption of older rural communities
Cumulative Impacts	Lowest likelihood of addressing watershed level effects—e.g. water quality	Increased likelihood of addressing watershed level effects—e.g. water quality, fisheries—using green practices and more easements	Greatest likelihood of planning for and addressing watershed level effects—e.g. water quality

S.6.1 Watershed Ecosystem Impacts Under the EWP Alternatives

Changes to the Program in the Proposed Action would substantively affect how future EWP projects are selected, prioritized, and implemented. The impacts to the natural environment would vary across the alternatives accordingly.

Effects of Specific Proposed Action Changes on Program Environmental Impacts

To best describe the specific changes in the Program that would come about under the Proposed Action, these fifteen changes (as described in Chapter 3) were evaluated in four groups: Execution of Practices, Easements, Environmental Review, and General Administration. *Execution of Practices* refers to changes made in the way an existing practice is planned or conducted, or the addition of a new practice. *Easements* changes are those that involve easement purchases of all types and changes to easement management. *Environmental Review* refers to activities that help to characterize a particular site or the process of evaluating a given site. *General Administration* changes are simply procedural in nature and have no environmental impacts.

Eliminating the use of 'exigency' would likely have environmental benefits, as only extremely critical situations would be considered under the "urgent and compelling" designation. Previously, many sites were listed as "exigent" that would not qualify under the proposed changes. This may have resulted in restoration work being completed hastily and without full coordination with other agencies, possibly resulting in less than optimal consideration of environmental resources. Allowing more extensive planning and coordination would likely result in greater environmental benefits.

The *"urgent and compelling"* designation would be added to focus on critical repair work. This could affect debris removal, streambank restoration, or other structural repairs. It would improve EWP emergency response and better protect life and property.

Establishing cost share rates would likely have positive environmental impacts, as EWP can complete work for sponsors that may not have been able to afford their portion under the previous costshare arrangement. Depending on site-specific information and the type of practices used, benefits may be generated by the restoration.

By *improving disaster readiness*, adverse environmental impacts may be reduced. Training would increase staff awareness to problem areas with the implementation of the various practices. Pre-disaster planning and coordination would prepare staff for what impacts to expect and allow for proactive solutions to situations that are likely to be encountered. Disaster response protocols can be established to prepare for the possible interactions with T&E species or cultural resources, and plans can be made to preserve those resources while still responding to the urgent need for repairs. It is also possible that NRCS staff could be made aware of areas where these resources are known to exist or how to recognize new occurrences, and rapid response consultations with outside agencies could be facilitated. Pre-disaster planning and training would also inform staff about disaster effects that may be considered beneficial, such as certain amounts of woody debris in-stream or periodic small floods in wetted areas.

Repairs to agricultural lands may yield environmental benefits, as these repairs would employ streambank restoration practices, which carry some benefits and some consequences, depending on site-specific characteristics and the type of practice implemented. By repairing or restoring previously untreated land, stream degradation due to disaster impairments would decrease. Also, more environmentally beneficial methods would be available for the work, which increases the likelihood of positive impacts. If repairs are made, the land would likely continue in agricultural use and may contribute to poor water quality and habitat. If repairs were not made to the site, erosion would increase resulting in increased sedimentation.

Limiting repairs to twice per decade would lead to greater long-term environmental benefits, as compared to repeated repairs. Instead of repairing sites with frequent damage and incurring the financial and environmental costs of disaster impacts and construction costs, these sites could be purchased as easements. If an easement is not purchased, benefits may not be realized. The landowner or others may do repair work on their own without proper training and guidance on providing for environmental considerations. If the site is not purchased by EWP or repaired privately, it may serve as the equivalent of a floodplain easement until repaired or sold.

Use of *natural stream dynamics* may be help locally to return to a closer approximation to natural stream function. Other benefits such as improved habitat and reduced erosion also would be realized.

Repair of enduring conservation practices would likely benefit the environment. Repairing damaged or undersized conservation structures would minimize further environmental degradation of downstream habitat. These practices are installed for the purposes of environmental protection, such as the containment of agricultural runoff, erosion control, or animal waste management. Additionally, by requiring that these practices meet current NRCS standards, older or undersized practices would be replaced with more effective ones.

Funding improved alternative solutions could improve water quality or habitat. Substitution of one practice for another could also give rise to significant benefits, especially in cases where the sponsor wishes to employ more natural restoration methods.

Disaster recovery work away from streams can help restore floodplain and upland areas and the areas they affect wetlands, riparian zones and aquatic communities can realize benefits in water quality and habitat, but repairing these sites may discourage easements or other more natural land uses since a landowner can continue to farm the restored land.

Effects of Proposed Changes on Easements

Improved disaster readiness as described above under *Execution of Practices*, may provide additional environmental benefits. In addition to the positive impacts listed, disaster-readiness training, coordination, and planning may encourage further identification of problem areas within the watershed and subsequent easement purchases. This change would offer broader solutions and provide for better coordination of easement purchases.

Limiting repairs to twice per decade would likely encourage easement purchase.

Simplification of agricultural easement purchase would provide some benefits and some detrimental effects. Elimination of Category 1 removes the most restrictive easements in terms of allowable compatible uses, which under the No Action alternative would maximize floodplain function and natural restoration. By eliminating Category 3, the least desirable easement from an environmental standpoint, the consequences of continued cropping on easement lands are removed. The remaining Category 2 easements provide positive environmental impacts but not to the degree of the former Category 1 (by allowing some compatible uses), so floodplain restoration may take longer.

Non-agricultural easements may provide significant environmental benefits. By removing developed land uses, the easement tract would be returned to a more natural state and should improve floodplain function.

Effects of Proposed Changes on Environmental Review

Prioritization of funding would likely yield some environmental benefits, because sites would be funded and restored first if they Federally-protected resources. The source of impairment would be removed more quickly and the length of the disturbance minimized.

Defensibility review adding social considerations would ensure that social requirements are also met in determining site eligibility. Additional projects may become eligible for restoration due to some socially compelling reason. These socially compelling projects may have accompanying ecological benefits. Social values may influence the restoration decision, because a community may request more environmentally beneficial restoration practices or may be unsure of such practices and request armored structures. The former would likely result in environmental benefits, the latter some adverse effects.

EWP Program Alternative Impacts on Watershed Ecosystems

Comparisons of the impacts of the EWP Program alternatives on aquatic ecosystems are presented in Table S.6-2. Impacts on other watershed ecosystems are tabulated in Chapter 3.

Impacts of No Action Alternative

Under Alternative 1, aquatic ecosystems may be adversely affected by the continued reliance on armoring, removal of in-stream debris, and a lesser emphasis on easement purchase. Generally, armoring practices, as well as repairs to levees, provide inferior habitat for aquatic life, limit vegetation establishment, and channel stream energy by redirecting flow and potentially transferring damage to downstream locations. Armoring practices also restrict natural floodplain function, which leads to increased flow velocities and increased turbidity. Debris removal under the current program can lead to complete removal of all in-stream debris, which adversely affects aquatic communities by removing habitat, nutrients and streamflow regulation.

Riparian communities would experience some adverse effects due to armoring and continued levee repairs. While these measures do stabilize streambanks, the structures limit riparian vegetation, reduce the quality of habitat for aquatic and terrestrial species, redirect streamflow energy downstream where other damages may occur, and restrict natural floodplain function. Use of woody structures such as root wads and revetments may mitigate these impacts.

Table S.6-2 Comparison of EWP Program Impacts to Aquatic Ecosystems

	No Action	Proposed Action	Prioritized Watershed Planning & Management
Impacts on Habitat Structure[1]			
Impacts of Restoration Practices	Adverse effects would likely continue to occur from almost complete removal of in-stream debris, as this removes habitat and nutrients. Armoring would continue to limit re-vegetation and redirect flows downstream to other banks. Levee repairs would continue to limit natural floodplain function. There would be no provision to structurally protect agricultural lands, which would limit use of armoring.	Adverse effects would be reduced by retaining more in-stream debris and using restoration design based on the principles of natural stream dynamics. Benefits would accrue from increased use of easements, as floodplain functions return and habitat is created or improved. Agricultural lands could be protected with structural practices if economically defensible.	Coordinated planning would incorporate natural resources in the management strategy, resulting in increased usage of natural stream dynamics and other long-term approaches that create additional quality habitat. Agricultural lands could be protected with structural practices if economically defensible.
Impacts of Floodplain Easements	Continuing to use 3 easement categories would result in some easement lands serving as natural floodplains, while others would support intensive agriculture. Benefits and adverse effects would vary accordingly.	Using only Category 2 easements would eliminate the most restrictive of compatible uses, while also eliminating the least restrictive. Floodplain and riparian habitats would improve using Category 2 but not as quickly as under Category 1.	Coordinated easement purchases would help create contiguous restored floodplain areas.
Impacts on Water Quality[2]			
Impacts of Restoration Practices	Removal of in-stream debris may increase velocity and increase turbidity. Repair of levees continues the channelization of stream and leads to increases in turbidity. Short-term decrease in water quality during construction with increases in turbidity and risk of pollutants.	Retention of some in-stream debris may reduce turbidity. Natural stream dynamics should reduce flow velocity and increase sinuosity, decreasing turbidity.	Coordinated planning may incorporate natural resources in the management strategy, resulting in increased usage of natural stream dynamics and other long-term approaches that improve water quality.
Impacts of Floodplain Easements	Varied effects, depending on category of easement. Category 1 easements increase filtration, improve vegetation and increase flood storage. Category 3 may lead to agricultural runoff and declines in water quality.	Improvements in water quality, as easement purchases are increased. Category 2 easements would likely provide benefits in water quality, though not to the degree of Category 1. Purchase of agricultural and improved land easements would reduce urban and agricultural runoff.	Coordinated easement purchases may create contiguous floodplain areas, improving water quality on a large scale.
Impacts on Biota[3]			
Impacts of Restoration Practices	Armoring may provide habitat for invertebrates and small fish but limits vegetative cover for larger biota. Structures may also redirect flows to other reaches and damage habitat there. Use of woody structures (root wads, revetments, etc) may mitigate these effects. Removal of debris may remove habitat.	Substantive improvements over current program, as habitat and channel structure increase in quality under natural stream dynamics.	Coordinated planning may result in contiguous habitat areas and allow for permanent establishment of biotic populations.
Impacts of Floodplain Easements	Category 1 easements may provide high quality habitat, whereas Category 3 would likely lead to poor habitat. In general, easements would lead to increased vegetation and improved habitat features such as pools.	Elimination of Category 1 reduces quality of habitat, whereas removing Category 3 may yield higher quality habitat following easement purchase. Increased easement purchases offer improvements in habitat and channel structure.	Coordinated easement purchase may create contiguous floodplain areas, improving habitat and benefiting biotic resources.

[1] Habitat structure includes habitat quality, sedimentation and channel structure
[2] Water quality includes turbidity, temperature, dissolved oxygen, and pollutants
[3] Biota includes plant and animal species

Armoring practices and levee repairs restrict flows to the stream channel and protect the lands behind them, discouraging floodplain development and limiting the water available for wetland functions. Filtration, flood retention, groundwater recharge and wetland habitat functions would likely continue to be adversely affected.

Easements are eligible under each of the three categories and offer a range of benefits and adverse effects. Under Alternative 2, natural stream dynamics and a focus on easement purchase may lead to improvements in wetland communities. By restoring a more natural hydrology, wetlands may develop in areas with appropriate soils. Easements would also likely restore wetlands and wetland functions, as periodic flooding would promote wetland growth and development. The three easement categories would continue to have a wide range of environmental impacts, from restoring more natural floodplains (1) to continuation of intensive agriculture (3).

Impacts of EWP Program Improvement and Expansion

Under Alternative 2, the use of stream restoration design based on the principles of natural stream dynamics, increased purchase of agricultural floodplain easements, and purchase of improved lands easements would provide substantive benefits and reduce the severity of impacts likely under Alternative 1. Improved stream restoration techniques would use natural materials to restore sinuosity, regulate streamflow, establish aquatic and riparian habitat, and improve water quality. In combination with an increased focus on floodplain easements, natural streamflow conditions may be closely approximated.

A single category of easements would remain, which may include some portion in compatible uses such as grazing, haying or timber. While the most restrictive category of easement would be removed, the least restrictive also would be removed from the easement program. However, streamside buffers would be required on all easements. Increased purchase of agricultural easements and purchase of improved lands easements under this alternative would help restore declining aquatic, riparian, floodplain, and wetland habitats.

Impacts of Prioritized Watershed Planning and Management Alternative

Under Alternative 3, planning and coordination at the local level would act to focus restoration efforts on high priority watersheds. Through watershed scale management, the benefits realized with restoration design based on natural stream dynamics and with easements can be amplified, as contiguous habitat areas and naturally flowing streams can be restored. Under Alternative 3, coordination and planning may lead to the establishment of contiguous segments of high quality riparian habitat, as easements and natural stream dynamics promote naturally flowing streams and the development of riparian habitat, and floodplain systems. Watersheds may be managed for natural streamflows, which may serve to establish and promote wetlands. This may also result in contiguous segments of wetland, which would augment the quality of habitat and filtration capacity.

Effects of Other EWP Program Changes

Protection of floodplain structures would be done as required under all the EWP Alternatives regardless of which alternative is selected. However, the locally-led process under alternative 3 would provide the best forum for discussion and decisionmaking at the local level about placement or removal of infrastructure elements in the floodplain. Critical area treatment, too, would remain the same under all alternatives, but increased use of easements in alternatives 2 and 3 would tend to reduce the level of concern in some flood prone watersheds for the effects of damage to such critical areas. Overburden removal and repair of damaged conservation practices, some of which is done under FSA programs, would be done under EWP in alternatives 2 and 3 and would benefit from the technical oversight of NRCS. Overburden removal may conflict somewhat with the goals of the EWP floodplain easement program by returning lands that would be likely candidates for easement purchase to agricultural use. Funding of improved alternative solutions would ensure that NRCS participates in design and environmental review of practice installations that under the current program would likely have been done without NRCS knowledge or oversight.

S.6.2 Impacts of the EWP Alternatives on Human Communities

Comparisons of human community impacts of the EWP Program alternatives for selected aspects of the socioeconomic environment are presented in Table S.6-3. All aspects are discussed in Chapter 3.

Human Community Impacts of the No Action Alternative

Continuation of the current program would be expected to have an essentially minimal impact to the local economy of affected communities. Most of the proposed projects are relatively small in scope and, despite the smaller rural characteristics of most of the communities involved, the total dollar expenditures would not contribute substantially to the local economy.

Impacts to land use from implementation of the EWP program would depend on the type of EWP practice installed and the speed with which the installation can be completed. The overall impact of practices that do not include the exercise of a floodplain easement would most likely be minimal. Where an easement is purchased, the previous use of the land would be altered and the value of any associated agricultural production from the affected acreage would be lost.

The structural practices used in the EWP program are designed to restore the pre-disaster land use. The effect of the installed practices under this alternative would represent a benefit by restoring or protecting economically productive or residential properties that represent an asset to the community. EWP installed practices may result in the repair and protection of the land thereby restoring its previous value. However, this does not necessarily eliminate the need for further repair in the future. With respect to infrastructure and social resources and services, the effect of the Program is generally beneficial. Installed practices restore the previously existing condition and provide a measure of protection for important structures and resources. In some cases, visual impairment from installed practices may diminish the aesthetic quality or recreational experience associated with some properties, but in general the Program would not likely have a major adverse effect.

Table S.6-3 Impacts of the EWP Program Alternatives on Selected Aspects of Affected Human Communities

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Prioritized Watershed Planning and Management
Local Economy	Some potential for income associated with continuing disaster payments. Benefit from restoration of previous productive use. Purchase of floodplain easements could result in a loss of employment and income from agricultural land but would reduce demand for services and disaster assistance.	General effect would be similar to the No Action alternative, however, expansion of floodplain easements to improved land may have a greater impact on employment and income from affected properties A correspondingly greater reduction in demand for services and disaster assistance could result.	More efficient use of capital resources and economic potential of watershed resources would be possible. Easement s may reduce income from productive lands and facilities but the highest corresponding reduction in demand for services and disaster assistance could result.
Value of Natural Resources	Repair and protection of land restores previous value, but may induce additional development in flood prone areas increasing risk from future natural disaster Purchase of easement on agricultural land potentially withdraws acreage from production, but may increase value of neighboring properties	Purchase of easement on improved and unimproved land potentially withdraws productive property from community use, but may increase value of neighboring properties. Community tax base may be affected.	Purchase of easement withdraws land from production and decreases its value, but may increase value of neighboring properties
Property	Short-term benefits from protecting structures, no long term benefits from moving structures out of harm's way with easements. Emphasis on protecting existing property, but resources may be inefficiently used	Short-term benefits from protecting structures, long term benefits from moving structures out of harm's way with easements. Requirement that practices be defensible may affect some structures. Easement purchases may result in the loss of business, commercial, or residential structures	Short-term benefits from protecting structures. Best strategy for long-term benefits from moving structures out of harm's way with easements in disaster-prone watersheds. Easements may result in community loss of business, commercial, or residential structures.
Public Health and Safety & Community Resources	Short-term benefit from protecting public H&S directly and indirectly by protecting emergency services. Long-term PH&S would be better served by easements. Would not substantially alter existing community resources, but may result in some visual impairment.	Short-term benefit from protecting public H&S directly and indirectly. Improved lands easements help long-term PH&S considerations. Improved cost share for communities with limited resources; alternative uses of easement properties represent additional benefit	Short-term benefit from protecting public H&S directly and indirectly. Watershed mgmt best long-term solution to protect PH&S. Some loss of existing resources is possible, but may increase availability of watershed related recreational, educational and other uses
Land Uses	Would maintain existing uses of the land, but may increase habitation and use of flood prone acreage increasing cost of future protection except where agricultural easements are purchased.	Floodplain easements could alter previous land uses on subject and neighboring properties	Easements could alter previous land uses on subject and neighboring properties
Social Patterns	Some temporary disruption during project construction may result, but no permanent disruption to local community.	Improved lands easements may result in the breakup of existing residential networks or neighborhoods	Improved lands easements may result in the breakup of existing residential networks or neighborhoods

The primary direct effect would be beneficial in protecting life and property, and in providing for the recovery of previously existing levels of service. Purchase of an agricultural easement in some cases may provide the additional benefit of protecting open space and improving the visual or recreational quality of an area. Provision of the sponsor's share of project cost may represent a serious adverse impact on some smaller, independent communities where support from county or state jurisdictions is absent. A corresponding strain on local resources may be evident, with the indirect effect of under-funding other important social efforts within the community. Because project defensibility under this alternative is based primarily on environmental and economic justification, some concern does exist from an environmental justice perspective. In socioeconomically disadvantaged areas, some property owners may be denied assistance because the cost of protecting the property is greater than the value of the property itself. However, the same project at the same cost may be justifiable in another area because property values are higher. This leads to a potential for disproportionately greater access to the benefits of the program for more affluent communities and may be especially important in socioeconomically distressed or minority communities.

Human Community Impacts of Program Improvement and Expansion

In general, the elements of the proposed action would be generally beneficial to affected human communities. The potential impact of the installation of engineered solutions at individual project sites does not substantially differ from that under the no-action alternative. Expansion of the floodplain easement option to include non-agricultural and improved land would likely increase the potential for disruption of local communities or neighborhoods by the displacement of residents, but it also represents an opportunity for the community to reduce the impact of natural disasters and the associated recovery cost, especially on improved properties.

Expansion of the defensibility criteria for the project would substantially increase access to potentially beneficial effects of the project for socially disadvantaged or minority persons who may have been previously excluded. Similarly, the provision for funding up to 90% of the cost of EWP projects in limited resource communities also decreases the potential burden on these communities and has the effect of increasing potential access to program benefits.

However, several proposed changes under this alternative would influence the overall impact of the Program on the human social environment and may alter the proposed solutions or the manner of participation for affected communities. Program modifications in funding, priorities, and easement purchase would create the potential for change. Additionally, the proposed action allows for greater opportunities for cooperation with local land use plans. Where easements are purchased, there is some possibility that the easements could become part of an area's comprehensive plan for growth, by meeting a portion of the need for functional open space for the community.

Elimination of the exigency designation and the installation of a new priority ranking system would be expected to have some influence on this capability. Implementation of the priority ranking system could result in the delay or denial of protection to certain properties that may have been otherwise protected under the old system. However, the provision to provide additional financial support to areas designated as "limited resource" would have the effect of encouraging EWP participation by communities that might not otherwise have access to the program. As an environmental justice issue, this provision reduces the potential for disproportionate access to program benefits for socio-economically disadvantaged communities that may have previously failed to repair damage because the provision of the sponsor's share of the project cost represented too great a burden on available public funds. Inclusion of criteria for social defensibility, in addition to the economic and environmental defensibility criteria that are part of the current Program, also has implications for the consideration of environmental justice. By establishing a social rationale based on the utility of the property to the landowner, the proposed action includes a category of participant who might otherwise have been left out of the current program, especially in circumstances where the economic value of a property may be low or difficult to calculate.

Human Community Impacts of Prioritized Watershed Planning and Management

The primary effect of the proposed watershed planning and management approach proposed under this alternative is the proactive benefit of allowing watershed planning on a macro scale. Where this alternative would continue to provide funding and technical assistance similar to that proposed under the Proposed Action Alternative, similar impacts would be anticipated. However, the incorporation of pre-disaster planning and management of the watershed on a macro scale provides a greater understanding of a land use vision for the community. The integration of watershed planning into the process enables environmental concerns to be addressed as part of the community's long-term growth strategies. An integrated approach to program management allows for more efficient use of capital resources and the economic potential of the watershed, while minimizing adverse environmental effects. Some potential for loss of existing community resources may be possible, but this is offset by the increased availability of watershed related recreational, educational, or other uses. An important beneficial effect associated with this approach concerns the involvement of multiple program authorities, local and State agencies, and stakeholders in the process.

Proactive use of easements in a planned approach would minimize potential problems associated with reliance on a project-by-project approach, especially where neighboring or adjoining properties are volunteered for the program at different times and under differing circumstances. Where easements are purchased, there is the potential that open spaces can be planned as integral components of the area landscape. Similar to the Proposed Action alternative, purchase of improved lands easements could alter the composition or structure of the community by displacing current residents. Easements could also alter the existing land uses or may result in the breakup of residential networks. These potentially adverse effects may be offset, however, by the more effective use of easement purchases as a part of a longer-term flood management and watershed planning approach and could reduce Federal funding outlays in the long term.

S.6.3 Cumulative Impacts of the EWP Alternatives

The contribution of the effects of EWP practices to cumulative impacts on watershed ecosystems, based on the analysis of the example watersheds, were minimal under all three EWP Program alternatives. However, in the East Nishnabotna River watershed, where wetlands are already highly stressed according to EPA, the overall cumulative impacts were found likely to be significant. Therefore, EWP environmental evaluations should pay particular attention to watershed health indicators in order to limit potential cumulative impacts to acceptable levels. Comparisons of the cumulative impacts of the EWP Program alternatives are presented in Table S.6-4.

Because the requirements for protection of Federally-protected resources in watersheds are for the most part site specific, EWP restoration work may be one of the best ways to protect those resources that would otherwise be threatened. This is particularly true of cultural resources, where EWP work might not only remove threats to the property directly but also protect the environmental setting where the property is located. In the case of T&E species as well, EWP work may be a necessary part of habitat maintenance as a species recovers, although in the long term, not desirable as a necessity to survival. In some instances, easements might provide a better solution for ensuring habitats are available that are conducive to a species recovery.

Cumulative Impacts of the No Action Alternative

Alternative 1 would not change cumulative impacts from their present levels. For aquatic resources, there would continue to be minor turbidity, sedimentation, and flow altering effects from restoration practices. These effects would add in the long term to the slow decline of watershed health in some watersheds and to more rapid decline in others. For wetlands, riparian areas, and floodplains, minor effects from restoration practices would continue to occur and would add to the habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline.

Human communities like the City of Buena Vista, VA would continue to benefit from protection of their homes and businesses and would continue to derive income from performing EWP restoration practices although minor community disruptions may occur. Major floodwork by the USACE and NRCS at Buena Vista have combined to help sustain the viability of the community in the face of repeated recent flood damage, a community that has seen a marked industry decline because of the floods and other factors. The viability of agricultural communities such as that along the East Nishnabotna and of rural fringe communities such as Boise Hills, depend in large measure on damage restoration and preventative measures. In the long term, however, the cumulative drain on local, state, and Federal resources to maintain any such communities that are repeatedly threatened may lead to sufficient impetus to seek longer-term solutions. Agricultural easements that are part of the current program are likely to be major parts of this solution.

Cumulative Impacts of the Proposed Action

Under this alternative, NRCS would emphasize more environmentally sensitive implementation of EWP practices and would expand the types of watershed impairments to activities away from streams, upland debris sites, enduring conservation practices, and others. Fifteen specific program changes would improve the EWP program and incorporate new restoration practices. For aquatic resources, there would be a reduction in minor turbidity, sedimentation, and flow altering effects from restoration practices. This would diminish the degree to which any of these adverse effects would add in the long term to decline of watershed health. In some watersheds these improved practices may even slow or reverse some of the decline. For wetlands, riparian areas, and floodplains, there would be some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the EWP work may reverse such a trend. Better coordination with other federal, state, and local agencies and additional projects approved should result in less overall habitat destruction.

Table S.6-4 Cumulative Impacts of the EWP Program Alternatives

Environmental Resource	Alternative 1 Continue the Current Program	Alternative 2 The Proposed Action	Alternative 3 Prioritized Watershed Planning and Management
Impacts to Aquatic Resources	Minor effects from restoration practices would continue to add to long-term declines in quality of aquatic habitat. These effects may be important in watersheds stressed by other factors such as development. Easements should help slow declines in some cases.	Upgrade in restoration practices would diminish any adverse effects and may slow long-term declines in quality of aquatic habitat. Expanded easement program would also help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality of aquatic habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Wetlands, Riparian and Floodplains Resources	Minor effects from restoration practices would continue to occur and would add to habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline. Agricultural easements may mitigate these effects in some watersheds.	Some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the better designed EWP work may reverse such a trend. Expanded easement program would help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality and acreage of wetland, riparian, and floodplain habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Socioeconomic and Other Human Resources	Life and property would continue to be protected but longer term solutions to repeated damage would not be a major consideration. Minor income would be derived from performing restoration practices, but resources may be inefficiently used.	Life and property would continue to be protected but longer term solutions to repeated damage would begin to be a major consideration, especially with use of improved lands easements. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.	Life and property would continue to be protected but better organized and funded longer term solutions to repeated damage would be the major consideration. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.

Human communities would continue to be protected in the short term but a greater emphasis on agricultural easements and introduction of improved lands easements should provide better long-term solutions than repetitive repair work where repeated damages occur. Shifts in program emphasis may result in slightly different mix between agriculture and other uses as easement lands increase.

Alternative 3 would tend to minimize EWP program impacts because it would be the most proactive and integrative EWP approach to disaster recovery and damage avoidance. It would allow maximized use of more environmentally beneficial EWP practices by focusing the resources of NRCS and other entities in disaster-prone watersheds. Here, restoration design based on the principles of natural stream dynamics and bioengineering would likely cause the most marked reductions in degradation of stream hydrology and habitat. When used in conjunction with purchase of floodplain easements in these more highly stressed watersheds, some substantive abatement or reversal of watershed degradation is possible. In less seriously stressed watersheds, use of these practices and easements would help maintain watershed integrity. NRCS and other technically cognizant agencies would need to take adequate steps during the locally-led conduct of the watershed plan to ensure all decisions are well-informed decisions, made with the best available scientific information and soundest technical advice to help avoid decisions made simply because they appear on first inspection to be heading in the right direction.

Cumulative Impacts at the National Program Level

To the extent that the EWP program protects life, health and public and private property, there is a beneficial cumulative effect in terms of the Program's contribution to the overall viability of the community itself. The cumulative socioeconomic benefit from program implementation nationwide could be estimated in terms of the aggregate benefit to communities participating in the program. This benefit could be expressed in terms of the total number of human lives protected and the total value of all property protected as a result of the EWP Program. Without the Program, both would be in jeopardy nationally.

The level of risk to life and property resulting from natural disasters could be estimated. By reducing this potential risk, the EWP program protects the general health and safety of the population both directly, in terms of the immediate residents or users of affected property, and indirectly for the community as a whole through the protection of public health and safety systems. In both cases, the beneficial result is an improved quality of life for local residents through increased public safety and restoration of the economic value and social use of the affected property.

In addition to the direct cost of repairing damaged land and installing protective measures to reduce the risk of future adverse impacts, the public cost of a natural disaster also includes the protection of the public during and immediately after the disaster event. Funding allocated for the operation of emergency services (police, fire, rescue, etc.) and the costs associated with evacuation of the public to safe shelters and the maintenance of support services for the displaced population can cause a significant strain on the fiscal resources of an affected community. Resources consumed for this purpose would have to be taken from other important public services provided by the community for its residents. By providing the necessary funding and technical assistance to the community for the protection and repair of damaged property the EWP program contributes to the general welfare by freeing up assets for other socially important uses.

The aforementioned benefits are relatively short term compared with longer-term consideration of the inherent risks of continuing to live and work in disaster-prone areas, particularly in flood-prone watersheds. The numerous EWP restoration practices executed in the aftermath of disasters in watersheds that are repeatedly affected by major storms arguably simply act cumulatively to restore and maintain an overall short-term solution for the watershed that is not likely to be viable in the long term. In many cases, upgradient changes in these watersheds, particularly by intensive agriculture or development, affect the flow capacity requirements of downstream reaches, which cannot absorb the higher, swifter flows of the markedly changed system and which may be quickly damaged by erosion. These human-induced changes exacerbate the natural tendency of stream courses to vary over time, moving laterally and deepening or becoming shallow over different reach segments. These natural dynamics can pose a threat to agriculture or improved property near the stream even in relatively undisturbed watersheds. In developed watersheds, such threats are likely to appear more often over larger portions of the watershed. Continued reliance on EWP restoration practices in these watersheds simply postpones the time when measures other than restoration, measures that locate crops, homes, and businesses out of harm's way, would be the only viable solution to deal with repeated damages and further threats of damage. The EWP policy of allowing repairs only twice in 10 years at a damage site was proposed in recognition of this problem.

Traditional restoration techniques used in the current EWP Program, that would continue under the No Action alternative, tend to maintain the status quo in flood-prone areas; and may actually result in increased human habitation and use of these areas. Although affording a short-term reduction in the risk to public health and safety and a degree of protection for affected property, these practices have the potential to increase risk over the longer term by allowing increases in the size of potentially affected populations and increasing the value of the land and associated property that may be potentially damaged. Restoration design based on the principles of natural stream dynamics can help restore or approximate as closely as possible the natural hydrology of these systems and can help maintain and protect otherwise non-viable human communities. These communities may not have the room to move their valued property out of harm's way because the majority of useable land is near stream courses. In other cases, however, EWP purchase of floodplain easements in lieu of repairs provides the better long-term alternative strategy. Both agricultural and improved lands easements are available tools for this purpose under the Proposed Action. The management strategy proposed under Alternative 3, emphasizing the use of easements on improved land and local ordinances to restrict future development in these areas applies these tools in an overall strategy, and represents the most comprehensive, organized approach. Although costs and potential cumulative impact to the local community may be higher in the short term, this strategy would be preferable for reducing long-term overall costs to the community, the States, and to Federal taxpayers and for reducing problems associated with public health and safety.

S.7 Mitigation of EWP Program Impacts

NRCS considered the following mitigation procedures for potential EWP Program impacts.

S.7.1 Mitigation of Watershed Ecosystem Impacts

Impacts to aquatic community resources could be mitigated through reducing the dependence of EWP program activities on armoring. Use of restoration designs based on the principles of natural stream dynamics, and bioengineering would help mitigate these impacts. Other governmental programs could help restore armoring sites to a more natural riparian state. Where such natural practices are inappropriate, ensuring that the structural EWP practices are properly maintained would help prevent the need for additional work due to failure of the original structures. NRCS would continue to consult with the U.S. Fish and Wildlife Service in any situation where there is a potential for jeopardy to a T&E aquatic species and would work with USFWS to develop adequate protective measures.

Adverse impacts to wetlands, floodplains, and riparian resources could also be mitigated through reducing the dependence of EWP program activities on structural practices that harden stream banks, remove protective riparian vegetation, and generally increase runoff and the consequent delivery of nonpoint source pollution to the stream. Coordination with other federal, state, and local agencies and the landowning public to encourage understanding of the concepts underlying the EPA 404(b)(1) guidelines for wetlands protection in land use activities, and ensuring that the guidelines are followed as a planning practice, as well as for wetlands mitigation, would help mitigate the loss of both wetlands and floodplain resources. NRCS would continue to consult with the U.S. Fish and Wildlife Service in any situation where there is a potential for jeopardy to a T&E wetland, riparian, or floodplain species and would work with USFWS to develop adequate protective measures.

Reducing the dependence of EWP program activities on structural practices would help mitigate damage to terrestrial resources by reducing the use of heavy equipment in surrounding upland areas. Use of more advanced techniques such as helicopter seeding for critical area treatments would reduce heavy equipment impacts on soils.

S.7.2 Mitigation of Impacts to Human Communities

EWP activities may draw heavily on a community's resources for funding, which can be destabilizing – at least in the short run. These impacts can potentially be mitigated by keeping bid packages for EWP work small, so that local contractors with the skills required would have a fair chance to obtain the work, thus returning some portion of the funds to the locality. Where floodplain easements are used in place of structural practices, floodplain usage may be reduced, requiring relocation of people and activities currently in those areas. Attention paid to preserving and protecting neighborhood structure and residential networking can mitigate the effects of this relocation. In rural communities, certain institutional structures, such as churches, schools, and other "special" places, may require special consideration to mitigate adverse effects from such changes.

Where land under easement purchase is removed from economically productive activities, which were contributing to the local economy and tax base, compensation can be encouraged through seeking alternative replacement activities through such vehicles as HUD's urban development block grants and similar public-private measures. However, the community would no longer need to provide the same level of services (power, sewer, road repair) to the easement locality and would no longer have to pay their share of the cost of disaster damage repairs in the future. NRCS would encourage income-producing activities on easement lands that would be compatible with their basic purpose.

S.7.3 Mitigation of Impacts to Cultural Resources

Consultation with the SHPO is a part of the EWP planning and coordination function before a disaster occurs and contact with the SHPO is made before actions at EWP are taken. Because cultural resources are locality specific, mitigation to protect particular cultural resources would be developed if needed at the site level as part of the defensibility review of the EWP practice.

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ACRONYMS AND ABBREVIATIONS

AHCP	Advisory Council on Historic Preservation
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act
CBDG	Community Development Block Grant
CEQ	Council on Environmental Quality
C-E-Q	Cause-Effects-Questions
CFR	Code of Federal Regulations
COCS	Cost of Community Studies
CPOM	Coarse Particulate Organic Matter
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DART	Disaster Assistance Recovery Team
DOI	Department of the Interior
DSR	Damage Survey Report
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMO	Emergency Management Organization
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERS	Economic Research Service
ESA	Endangered Species Act
EWP	Emergency Watershed Protection
FA	Financial Assistance
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FOTG	Field Office Technical Guide
FSA	Farm Service Agency
FR	Federal Register
Fed. Reg.	Federal Register
FWCA	Fish and Wildlife Coordination Act
HUC	Hydrologic Unit Classification
HUD	Department of Housing and Urban Development
IWI	Index of Watershed Indicators
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service (formerly SCS)
O&E	Oversight and Evaluation
O&M	Operation and Maintenance
PA	Programmatic Agreement

PDR	Purchase of Development Rights
PEIS	Programmatic Environmental Impact Statement
POL	Petroleum, Oil and Lubricants
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Officer
SLA	State Level Agreement
STC	State Technical Committee
SWAP	Small Wetlands Acquisition Program
SWAP+H	Soil, Water, Air, Plants plus Humans
TA	Technical Assistance
TDR	Transfer of Development Rights
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VDGIF	Virginia Department of Game and In-Land Fisheries
WRP	Wetlands Reserve Program
WSRA	Wild and Scenic Rivers Act

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Chapter 1

PURPOSE OF AND NEED FOR THE ACTION

Purpose and Need—The [environmental impact] statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives, including the proposed action (40 CFR 1502.13).

1.1 BACKGROUND

The Emergency Watershed Protection (EWP) Program helps remove threats to life and property that remain in the nation's watersheds in the aftermath of natural disasters such as floods, hurricanes, tornadoes, and wildfires. The EWP Program is administered by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), which provides technical and financial assistance to local sponsoring authorities to preserve life and property threatened by disaster-caused erosion and flooding.

Threats that the EWP Program addresses are termed *watershed impairments*. These include debris-clogged stream channels, undermined and unstable streambanks (Fig.1.1-1), jeopardized water control structures and public infrastructure, and damaged upland sites stripped of protective vegetation by fire or drought. If these watershed impairments are not addressed, they would pose a serious threat of injury, loss of life, or devastating property damage should a subsequent storm occur.

Fig. 1.1-1 Failed streambank threatens nearby homes.

1.2 PROPOSED ACTION AND PURPOSE AND NEED SPECIFIED

NRCS's proposed action is **EWP Program Improvement and Expansion.** To implement the proposed action, NRCS would incorporate changes in Program administration and in project execution dealing with traditional watershed impairments. It would expand the Program by adding floodplain sediment deposition, upland disaster debris, and damaged structural conservation practices to the list of watershed impairments EWP currently addresses.

The **purpose and need** for the NRCS proposed action is to improve the delivery and defensibility of the EWP Program and to address concerns about natural disaster-caused threats to life and property that the Program does not now address.

Program delivery improvements are designed to enable NRCS field and state office personnel with EWP Program responsibility to provide EWP assistance more effectively and efficiently when and where it is needed. The improvements would more fully, equitably, and consistently meet the needs of people requiring emergency assistance. Program defensibility improvements are designed to address environmental, economic, and social concerns and values.

Proposed changes were identified, discussed, and refined in an ongoing comprehensive Program review that NRCS initiated. The process identified substantive ways to improve the environmental, economic, social, and technical soundness of Program activities.

The codified EWP regulations, National EWP Manual (policy), and Handbook (procedures) would be revised to reflect the changes that NRCS adopts. The specific changes that comprise the agency's proposal are described in Chapter 3, Section 3.2, under Alternative 2: the Proposed Action. The current EWP Program is described in Chapter 2. This chapter briefly describes the EWP Program's legislative authority and the recommendations NRCS would be addressing in making the changes in the Proposed Action. The changes form the basis for the evaluation and comparison of impacts in this Programmatic Environmental Impact Statement (PEIS), which was prepared in accordance with the:

- National Environmental Policy Act (NEPA) of 1969 as codified in U.S. Code Title 42, Section 4321 and following sections (42 U.S.C. § 4321 *et seq*.)
- Council on Environmental Quality (CEQ) Regulations for implementing NEPA, codified in Title 40 of the Code of Federal Regulations, Parts 1500-1508 (40 CFR 1500-1508)
- NRCS NEPA regulations (7 CFR 650)
- EWP Program regulations (7 CFR 624)

1.3 PROGRAM LEGISLATIVE AUTHORITY

The EWP Program was authorized by Section 216 of the Flood Control Act of 1950 (Public Law 81-516) by amending the Flood Control Act of 1944 (Public Law 78-534). This amendment transferred jurisdiction over certain emergency watershed practices from the Department of the Army to the Secretary of Agriculture. A limit of $300,000 was imposed on the amount of funds that could be spent on the Program during any one fiscal year. In 1975, NRCS prepared a PEIS on the EWP Program, as it was then constituted.

An amendment stating that all EWP work carried out would be "in cooperation with landowners and land users" and adding drought as an eligible impairment was legislated under Section 403 of the Agricultural Credit Act of 1978 (Public Law 95-334).

The EWP Program was amended further to include the purchase of floodplain easements (see text box) by Section 382 of the Federal Agricultural Improvement and Reform Act of 1996 (Public Law 104-127, also known as the 1996 Farm Bill). Public Law 81-516 (as amended) now reads as follows:

> *The Secretary of Agriculture is authorized to undertake emergency measures, including the purchase of floodplain easements, for runoff retardation and soil-erosion prevention, in cooperation with landowners and land users, as the*

> **Floodplain Easements—**A new option on agricultural land, authorized in the 1996 Farm Bill, gives producers the opportunity to offer their land for floodplain easements. To be eligible, flooding must have damaged the land to the extent that the cost of restoring it and associated structures would be greater than the value of the land after restoration or the frequency of flooding is such that it is no longer profitable to farm without government subsidies. The easements permanently restore the natural floodplain hydrology as an alternative to traditional attempts to restore damaged levees, lands, and structures. The easement lands are ineligible for future federal disaster assistance (Public Law 104-127)

Secretary deems necessary to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or any other natural occurrence is causing or has caused a sudden impairment of that watershed.

1.4 Recommendations for EWP Program Changes

NRCS broad program reviews are carried out by agency Oversight and Evaluation (O&E) teams, which periodically evaluate programs for efficiency and effectiveness in delivery. In 1997, at the direction of NRCS leadership, an O&E team of NRCS staff was formed to examine the EWP Program and to review questions and concerns voiced by people involved in important aspects of the Program. One aspect of the O&E team's mission was to determine if these questions and concerns were valid, particularly those concerns about potential adverse environmental impacts of installed EWP practices.

The O&E team identified three major Program review objectives. The team then evaluated EWP activities in 29 randomly selected counties in 10 states, reviewed project documentation for 17 disaster events and 98 project contracts, made 86 site visits, and interviewed 119 NRCS employees, partners, and sponsors as to their impressions of the Program, its outreach, and ways to improve them. Within the broad Program review objectives, the O&E team identified specific goals for improvement and recommendations to meet those goals.

1.4.1. Objective 1: Review Site Eligibility and Exigency Determinations

The first objective was to determine if the EWP projects and sites met EWP Program eligibility criteria and if sites were properly classified as exigent or non-exigent (see text box). The O&E team focused on the apparent lack of consistency in how the Program was administered from state to state. For example, some states were interpreting the policy on exigency loosely, applying it to situations that were not truly urgent simply to obtain funding and commence work quickly. Interpretations of agency policy on EWP appeared to vary widely across the country and thus, more direction on interpreting agency policy appeared necessary.

> An **exigency** situation exists when the near-term probability of damage to life or property is high enough to demand immediate Federal action. An exigency continues to exist as long as the probability of damage continues at such a high level.
>
> A **non-exigency** situation exists when the near-term probability of damage to life or property is high enough to constitute an emergency but not sufficiently high to be considered an exigency. A non-exigency situation continues to exist as long as the probability of damage remains high enough to be considered an emergency. (7 CFR 624.5)

The O&E Team developed the following specific goals and recommendations under Objective 1:

Goal: Ensure more accurate site eligibility determinations

- Provide training to NRCS employees and partners

Goal: Reduce overuse of the exigent classification

- Clarify the exigent and non-exigent classifications. Limit use of the exigent classification to situations where funding is immediately available, near-term probability of damage to life and property is high enough to warrant immediate NRCS action, funds can be obligated within 10 days, and construction can be completed in 30 days

Goal: Reduce the incidence of ineligible road repair work

- Limit assistance at road crossings to instances where the facility is not covered by an Operation and Maintenance (O&M) Agreement with a division of state government or is not under other agency jurisdiction.

1.4.2. Objective 2: Review Regulatory and Defensibility Evaluations

The second review objective was to determine if the EWP threat-reduction practices complied with laws, regulations, and policy, and if economically and environmentally defensible alternatives were considered and evaluated. The O&E team focused on whether or not environmental regulations and alternative practices that might reduce environmental effects received due consideration in EWP decisionmaking. NRCS leadership recognized that the Program is administered inconsistently not just because of differences in natural resource conditions across the country. Differing interpretations of policy, field staff familiarity with certain repair techniques, and a lack of knowledge and understanding of bioengineering principles and green restoration practices in general, also lead to inconsistent Program administration. For example, debris removal and channel reconstruction in one state may involve using a bulldozer in-stream. However, in another state, use of heavy equipment in-stream may be severely restricted and restoration design using the principles of natural stream dynamics and natural materials such as brush mattresses, fascines, and willow stakes may be emphasized.

Specific O&E team goals and recommendations developed under Objective 2 were:

Goal: Recognize the full value of habitat restoration

- Revise policy to emphasize restoration of the ecological functions of a system at an eligible site. Emphasize use of bioengineering, natural stream dynamics, and similar techniques. Require an interdisciplinary team approach for site assessments, alternative selection, and design

Goal: Take advantage of the expertise and financial resources of partner organizations

- Develop new and strengthen existing national, regional, and state partnerships by entering into EWP-specific agreements with agencies and organizations to address coordination, permit issuance, training, outreach, responsibilities, and follow-up to completed work

Goal: Begin limiting EWP funding of recurrently damaged sites

- Record EWP sites geospatially; use these data to locate recurrent EWP activity; then, fund studies to identify more permanent solutions in the watershed

Goal: Institute a program-wide performance review of installed practices

- Provide national guidance to evaluate an appropriate sample of EWP repairs in state quality-assurance plans

1.4.3. Objective 3: Review Equitability and Efficiency of EWP Administration

The third objective was to determine if the Program was being administered equitably and efficiently. The O&E team focused on how the Program could be managed more efficiently and effectively, specifically in funding, sponsorship, and documentation.

Specific O&E Team goals and recommendations under Objective 3 included:

Goal: Ensure that citizens are notified of the assistance available from NRCS

- Institute outreach procedures during EWP activation in each state

Goal: Take into account the limited resources of unincorporated and low-income communities

- Restructure Operation and Maintenance agreements to accommodate sponsors with limited resources and reduce their responsibilities to a shorter time frame

Goal: Take advantage of the efficiencies and speed of partnerships in contracting, design, and construction inspection

- Revise Part 509 of the National Watershed Manual to encourage use of sponsors or contracting for these activities, and revise the handbook accordingly

Goal: Reduce program inconsistencies and project start-up delays

- Seek an annual allocation to fund exigent situations, maintain a level of preparedness, and fund interdisciplinary EWP response teams

Goal: Ensure consistency in determinations of eligibility and classification across state lines

- Revise national policy to emphasize inter-state uniformity in the application of EWP; regions should establish collectively a process to ensure such uniformity

Goal: Ensure all required information is reported to NRCS Headquarters to receive funding

- Revise policy to streamline data requirements and develop an electronic process to request funds, document partner activities, submit final reports, and record site damages

In addition to the O&E Team recommendations, NRCS considered substantive recommendations made by other NRCS personnel, other agencies, and the public in defining the component changes of the EWP proposed action. Much of this input came during the *scoping* conducted for the EWP PEIS, during which NRCS met with, and solicited input from, representatives of other Federal, state, and local agencies, and the public. NRCS held public scoping meetings in six major U.S. cities and also sought input through a toll-free phone line, regular mail, and the NRCS website on the Internet. The proposed action and alternatives reflect opinions voiced and recommendations made during that scoping process. The other agency and public opinions and recommendations are described in detail in Appendix A. The correspondence between the recommendations made by the O&E Team and others during scoping and the components of the Proposed Action are outlined in Chapter 3, Section 3.2.

1.5 ORGANIZATION OF THE PEIS

This PEIS is organized in accordance with CEQ regulations at 40 CFR 1502.10.

- The cover sheet, summary, and table of contents are as specified by CEQ.
- Chapter 1 is required to explain why NRCS is proposing the action evaluated in this PEIS.
- Chapter 2 *The Current EWP Program* describes how NRCS administers the EWP Program now, including the agencies and programs it coordinates with, how it funds and executes EWP projects, the EWP restoration practices it uses to remedy watershed impairments, and its current use of floodplain easements. These details are the basis of the No Action alternative, which would simply be continuation of the current program.
- Chapter 3 *Alternatives including the Proposed Action* presents the details of the Program improvements and expansion that comprise the NRCS proposal. One other Program

alternative evaluated in detail, and alternatives considered but not evaluated in detail are included. Chapter 3 then compares the environmental impacts of the EWP alternatives.

- Chapter 4 *Affected Environment* describes the aspects of the environment that would be affected by each EWP Program alternative. It includes a general description of the ecosystems and human communities of watersheds of the U.S. and brief descriptions of a variety of typical recent EWP sites which are used as examples in the PEIS to illustrate how EWP practices and easements would potentially cause environmental effects.
- Chapter 5 *Environmental Consequences* presents the analysis of impacts on watershed ecosystems and human communities on which the comparison of alternatives is based.
- Chapter 6 *List of Preparers* identifies the members of the NRCS interdisciplinary team and other contributors to the preparation of the PEIS.
- Chapter 7 provides a list of agencies, organizations, and persons to whom copies of the statement are sent.

The PEIS also provides references for sources referred to in Chapters 1 to 5, a glossary of EWP terms and other technical terms used in the PEIS, and an index.

The five appendices provide:

- A description of the Scoping and Agency Coordination done for the PEIS (Appendix A)
- The impacts analysis methods (Appendix B)
- Relevant EWP documents, including a sample Damage Survey Report (Appendix C)
- Detailed descriptions of the example sites summarized in Chapter 4 (Appendix D)
- Details of the studies in the scientific literature supporting the impacts analysis (Appendix E)

Chapter 2

THE CURRENT EWP PROGRAM

Current Management—Alternatives to the proposed action…shall…include…no action. 40 CFR 1502.14. [In] updating a land management plan, where ongoing programs initiated under existing legislation and regulations will continue even as new plans are developed…"no action" is "no change" from current management direction or level of management intensity. CEQ Memorandum: Questions and Answers About the NEPA Regulations, 46 FR 18026

This chapter summarizes the current EWP Program objectives and constraints, including the types and eligibility of authorized work, coordination with the programs and oversight functions of other agencies, engineering quality assurance, and funding. It describes the procedures used to implement an EWP project in a state in the aftermath of a natural disaster, the different restoration practices currently used to address watershed impairments, and the use of floodplain easements. The EWP Program described here comprises the set of Program activities that constitute the action baseline. The environmental impacts of this action baseline are compared with the impacts of the EWP Program proposed action and Alternative 3 in Chapter 3.

2.1 EWP PROGRAM OBJECTIVES AND CONSTRAINTS

The Emergency Watershed Protection Program was established by Congress to respond to emergencies resulting from natural disasters. The USDA NRCS administers the EWP Program, providing technical and financial assistance to local sponsors who request aid to relieve imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences.

EWP Program work includes removing debris from stream channels, road culverts, and bridges, reshaping and protecting eroded streambanks, repairing levees and flood control structures, and seeding or planting damaged upland areas. All EWP Program work is designed exclusively to reduce threats to life and property while being economically and environmentally defensible and technically sound. EWP Program work is not limited to any one set of prescribed practices. NRCS conducts case-by-case investigations of the needed work, considers various alternatives for alleviating the problem, and recommends a course of action.

Individuals are not eligible for EWP Program assistance (with the exception of floodplain easements) unless represented by a project sponsor (e.g., a state government or a political subdivision of a state, such as a city, county, tribal organization, general improvement district, or a conservation district). Under current provisions, the work can be done through either Federal or local contracts. NRCS may bear up to 80 percent of the construction cost of the emergency practices; the remaining 20 percent must come from local sponsors and can be in the form of cash, in-kind services, or both. Sponsors are responsible for securing the land rights, necessary permits to make repairs, furnishing the local cost share, and operating and maintaining the finished work.

Tribal organization: Any Indian tribe or tribal organization, as defined in section 4 of the Indian Self-Determination and Educational Assistance Act (25 U.S.C. 450b), having authority under Federal, State, or Indian tribal law to carry out and maintain any EWP recovery work installed.

The National EWP Manual documents NRCS policy governing the EWP Program; the National EWP Program Handbook covers field procedures. Installed practices must be implemented in accordance with the Field Office Technical Guide and the National Engineering Manual 210-501.24 (c). Currently, NRCS follows EWP Program guidance (309-V National Watershed Manual, Part 509) issued in December 1992, based on legislative authorities in effect at that time.

2.1.1 EWP Coordination with Other Agencies

The EWP Program is one of a number of Federal and state programs dealing with emergency assistance. In small rural watersheds, it may be one of the most responsive to local needs. The USACE, FEMA, USFS, USDA Farm Service Agency (FSA), and the EPA are the principal agencies that NRCS coordinates with on disaster emergency recovery work. A number of other Federal, state, and local agencies administer programs that deal with natural emergencies as well; they are described in Appendix A.

2.1.1.1 U.S. Army Corps of Engineers (USACE)

Under Public Law 84-99, as amended, the USACE may provide emergency assistance for flood response and post-flood response activities to save lives and protect improved property (i.e., public facilities or services and residential or commercial developments) during or following a flood or coastal storm. The USACE is not permitted to assist individual homeowners, agricultural lands, or businesses.

USACE assistance must be requested immediately and is limited to major flood or coastal storm disasters resulting in life-threatening or property-damaging situations. NRCS does not participate in flood-fighting efforts, but it coordinates with the USACE in Presidentially declared disaster situations when requested for post-flood damage repair and restoration. NRCS and USACE often coordinate in the repair of damaged levees and provide related rehabilitation assistance.

The USACE provides assistance that includes:
- Furnishing technical advice and assistance
- Clearing drainage channels, bridge openings, or structures blocked by debris
- Clearing blockages of critical water supply intakes and sewer outfalls
- Removing debris to reopen vital transportation routes
- Temporarily restoring critical public services or facilities
- Identifying hazard-mitigation opportunities.

The USACE also may rehabilitate publicly sponsored flood control structures and Federally authorized and constructed hurricane and shore protective structures damaged or destroyed by wind, wave, or water action of other than an ordinary nature. Such assistance means repairing or restoring a flood-control structure to pre-disaster condition.

The criteria for USACE flood-control structure rehabilitation assistance include:
- Requests for rehabilitation assistance must be for a publicly sponsored project
- Costs for rehabilitation projects for non-Federal flood control works will be shared at 80

percent Federal and 20 percent from the public sponsor

- The proposed rehabilitation project must have a favorable benefit-cost ratio
- Deficient or deferred project maintenance that remains to be done when the disaster damage occurs will be accomplished by or at the expense of the sponsor, before or concurrent with authorized rehabilitation assistance.

The Clean Water Act of 1996 grants USACE the authority and responsibility for issuing permits for projects that could affect navigable waters of the U.S. Under the act, 42 U.S.C. § 1344, Section 404 prohibits the discharge of dredge or fill material into waters of the United States without a permit from the USACE. The most important wetlands permitting authority from the standpoint of EWP Program activities is the Nationwide 37 permit, which authorizes EWP Program restorative activities in wetlands. A Section 404 permit may allow limited modification of wetlands, and various mitigation techniques may be able to be employed to reduce the damage.

2.1.1.2 Federal Emergency Management Agency (FEMA)

At the discretion of Congress and the Federal Government, states and their political subdivisions are jointly responsible for providing a system of emergency preparedness for the protection of life and property in the United States from hazards. The Federal Government provides oversight, coordination, guidance, and assistance, so that a comprehensive emergency preparedness system exists for all hazards (42 U.S.C. § 5195). These programs are overseen and coordinated by FEMA, which has been managing Federal disaster efforts since its formation in 1979. FEMA's mission is to reduce loss of life and property and protect the nation's critical infrastructure from all hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response, and recovery. The Small Business Administration and USDA's Rural Development Administration also have flood-related disaster-assistance programs.

Before FEMA can become involved, the President must declare an area a major disaster area under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, 42 U.S.C. §§ 5121 *et seq*.). Under presidential declarations, FEMA coordinates emergency assistance and NRCS responds to this assistance. If FEMA transfers this responsibility to the Federal Regional Council during the recovery period, NRCS responds to the Council.

In Presidentially declared disasters, FEMA looks to NRCS to do the following:

- All agricultural work normally covered by the EWP Program
- Major scour and overwash acreages
- Repair of agricultural levees (usually those less than 6 feet high)
- Protection of rural roads, buildings, and homes
- Conduct of some of the above in smaller urban areas.

2.1.1.3 USDA Forest Service (USFS)

NRCS provides overall administrative direction and guidance for the EWP Program and transfers funds to the USDA Forest Service (USFS) at the national level for work done by USFS or its cooperators. Under general program criteria and procedures established by NRCS, USFS is responsible for administering EWP Program practices on national forests and national grasslands. USFS also is responsible for emergency practices on all forested lands or rangelands within the national forests, on adjacent rangelands administered under formal agreement with USFS, and on other forested lands. On these lands, emergency work is carried out by either NRCS or USFS, as mutually agreed. The Burn Area Emergency Rehabilitation (BAER) Program is administered by the USFS to treat critical wildfire-damaged areas and to reduce the risk that rainstorms will trigger major soil loss in runoff and downstream sedimentation in affected watersheds. In carrying out their responsibilities, USFS and NRCS work cooperatively with other Federal, state, and local government agencies (7 CFR 624.4).

2.1.1.4 USDA Farm Service Agency (FSA)

The Farm Service Agency (FSA) administers the Emergency Conservation Program (ECP), which shares with agricultural producers the cost of rehabilitating eligible farmlands damaged by designated natural disasters. ECP also may be available to areas without regard to a presidential or secretarial emergency disaster designation. FSA declares drought emergencies under P.L. 95-334 Sec. 624.5.

County FSA committees determine the eligibility of projects for ECP assistance by conducting individual on-site inspections and determining the type and extent of damage. Cost-share assistance of up to 64 percent is available. NRCS provides technical assistance for ECP. To be eligible for ECP assistance, the applicant must have suffered a natural disaster that created new conservation problems, that, if left untreated, would:

- Impair or endanger the land
- Materially affect the land's productive capacity
- Represent unusual damage which, except for wind erosion, is not the type likely to recur frequently in the same area; or
- Be so costly to repair that Federal assistance is or will be required to return the land to productive agricultural use.

ECP funds may be used for debris removal, fence restoration, grading and shaping of farmland, restoring structures, and water conservation practices, including providing water to livestock in periods of severe drought. Other emergency conservation practices may be authorized by county FSA committees with the approval of the state committee and the agency's deputy administrator for farm programs. Conservation problems that existed before the natural disaster are not eligible.

The FSA state executive director implements ECP except in severe drought when the deputy administrator for farm programs may authorize assistance. During severe drought, ECP provides emergency water assistance—both for livestock and for existing irrigation systems for orchards and vineyards.

2.1.1.5 U.S. Environmental Protection Agency (EPA)

The EPA enforces requirements of the Clean Water Act, (42 U.S.C. § 1252 *et seq)*. The Clean Water Act is the common name for the Federal Water Pollution Control Act, as amended over the years, particularly in 1972 and 1977. The act's goal is to restore and maintain the chemical, physical, and biological integrity of the nation's waters, and establish a broad framework of planning, research, financial assistance, and permit systems to achieve that goal. The following are four of the most relevant sections of the act for this study:

Section 303, 42 U.S.C. § 1313 delegates the process of setting water quality standards to the states, provides for the development of basin plans for establishing these standards, defines critical water quality conditions, and provides waste load constraints.

Section 319, 42 U.S.C. § 1329 establishes nonpoint source pollution control programs. States are required to identify waters that cannot maintain applicable water quality standards without nonpoint source pollution control and to develop programs to control those nonpoint sources.

Section 401, 42 U.S.C. § 1342 requires states to certify that any discharge to waters of the United States requiring a Federal permit will comply with all water quality standards and effluent limitations.

Section 402, 42 U.S.C. § 1342 establishes the National Pollutant Discharge Elimination System (NPDES) permit system for point-source discharges into U.S. waters. EPA oversees the program, but it is administered in most cases by the individual states. Point sources relate to defined sources of discharge, such as pipes, but a 1987 amendment to the act also covers storm water runoff from industrial sites, municipal storm water runoff, and runoff from certain types of construction sites.

2.1.2 EWP Program Engineering

Trained and experienced personnel are the foundation of technical quality in NRCS conservation engineering work. NRCS assigns job approval authority at the highest appropriate level to ensure the competence of each individual who provides engineering technical assistance under NRCS supervision. The NRCS State Conservation Engineer, a registered professional engineer, is the authority for all engineering work conducted in each state and delegates this authority to others who have the necessary training, experience, and demonstrated competence. The upper limits of job approval authority are measured by complexity, size, or hazard for each practice that an individual may design or plan. Many conservation practices, including those installed under the EWP Program, are approved by someone with appropriate job approval authority.

State or national NRCS practice standards, or state standards developed or adapted for EWP Program work, offer criteria specific to the design of EWP Program practices. While NRCS directives and standard professional references provide guidance for designing engineering practices, NRCS directives include the National Engineering Handbook and National Engineering Field Handbook (EFH). Chapter 16 of the EFH, "Streambank and Shoreline Protection", is a good reference for EWP Program work. The recently issued interagency document, "Stream Corridor Restoration, Principles, Processes and Practices", provides background useful in integrating knowledge of the principles of natural stream dynamics, ecological principles, and engineering skill to develop EWP Program alternatives that are environmentally, socially, and economically defensible and technically sound.

Some states have prepared state EWP Program handbooks containing standards, construction specifications, drawings, and other applicable materials. These help train new personnel and expedite the preparation of the site-specific construction documents necessary for contracting EWP Program work.

2.1.3 Program Funding

The early EWP Program implemented under the Flood Control Act of 1950 had a base funding of $300,000 per year for emergency practices. Disasters were not predictable; therefore, this was simply an estimate of potential needs. In a year without extensive disaster damage, the funds were available for regular flood prevention work, while in other years, extensive or large-scale disasters resulted in the need for supplemental appropriations. By 1969, all EWP Program work was funded through supplemental appropriations. In that year, $4 million was appropriated for forest fires in California, Nevada, Oregon, and Washington. In 1973, $36.5 million was appropriated to deal with the aftermath of Hurricane Agnes and flooding in the Mississippi River Valley, the Black Hills of South Dakota, and adjacent areas.

Supplemental appropriations allocated by state for EWP Program activities from 1994 to 1998 are shown in Fig. 2.1-1. At present, the EWP Program budget remains zero-based and allocations are made on a year-to-year basis according to need through requests for supplemental appropriations.

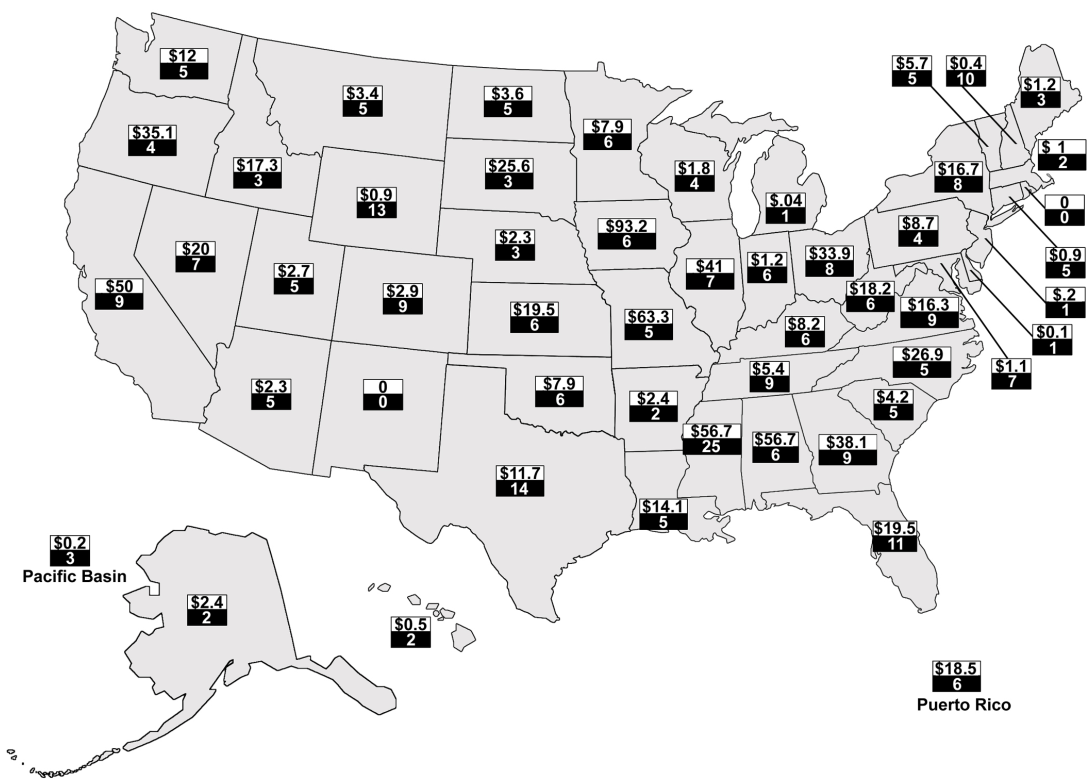


Fig. 2.1-1 –Supplemental Appropriations for EWP Program Work by State (1994-1998)—5-year funding in $ million and number of disaster events

The EWP Program regulations on administration, eligible emergencies, recipients, assistance, eligible practices, limitations on use of emergency funds, environment, application, and investigation and request for funds, are in 7 CFR 624.

2.2 EWP PROJECT ADMINISTRATION, COORDINATION, AND EXECUTION

2.2.1 EWP Project Implementation Criteria

A watershed emergency exists when a single natural occurrence or a short-term combination of occurrences suddenly impairs a watershed (see text box), creating an imminent threat to life or property. Natural occurrences include, but are not limited to, floods, fires, windstorms, earthquakes, volcanic actions, and drought. State conservationists declare such watershed emergencies. Presidentially declared disasters may or may not coincide with the state conservationist-declared disaster emergencies, depending on the nature and location of the disaster, the types of damage left in the aftermath, and the communities affected. Watershed impairments resulting from long-term combinations or series of natural or other occurrences are not considered sudden watershed impairments (7 CFR 624.5).

2.2.1.1 Eligibility Requirements

Emergency watershed protection assistance is available if the state conservationist determines that:

- The EWP Program work would reduce threats to life and property
- The imminent threat to life or property significantly exceeds that which existed before the impairment
- The work would be economically and environmentally defensible, and sound from an engineering standpoint
- The work would represent the least-cost alternative
- The work would yield benefits to more than one person, except in exigency situations
- Public and private landowners would be eligible for assistance, and they are represented by a sponsor (except in the case of floodplain easements, for which sponsors are not required)
- The sponsor is a public agency of state, county, or city government, a government special district, or a tribal organization (NRCS, 1999c).

> What constitutes a "sudden impairment" under the program was defined by virtue of a 1978 legal challenge in *Sierra Club v Bergland*, 451 F Supp. 120 (N.D. Miss., 1978). The court held that the decision to proceed with a proposed channel improvement of a section of the Tippah River Watershed, which was to be funded through appropriations under Section 216 of the Flood Control Act of 1950, was inconsistent with applicable law governing expenditure of such funds. The evidence demonstrated that the sedimentation that triggered the need for the improvement was the gradual result of an earlier channelization project and not caused by flooding or other natural force, which would justify expenditure of Section 216 funds as an emergency measure.

EWP Program work is not limited to any one set of prescribed practices. The NRCS investigates the needed work case by case to determine the appropriate practice(s) for each case.

2.2.1.2 Eligibility Policy Constraints

Statutory authorities allow funding only for activities required to relieve imminent hazards to life and property caused by natural disasters. EWP Program regulations (7 CFR 624.7) prohibits funds from being used to install practices that are not essential to reduce hazards, nor can they be used to solve problems that existed before the disaster. EWP Program funds cannot be used to improve the level of protection above that which existed before the disaster, unless required by current technical standards or required by Federal, state, or local regulating agencies. In addition, the EWP Program cannot fund Operation and Maintenance (O&M) work, repair, rebuild, or maintain private or public transportation facilities or utilities. EWP Program work also cannot be done if it would affect downstream water rights, nor can repair work be performed on practices installed by another Federal agency, except for the USFS. EWP funds can, however, be used to perform work on practices installed by a state or local agency (63 FR 45691).

2.2.1.3 Exigency and Non-Exigency Classification

Procedures for providing emergency assistance are determined by whether the watershed emergency is an exigency or a non-exigency situation. An exigency exists when the near-term probability of damage to life or property is high enough to demand immediate Federal action. An exigency continues to exist as long as the probability of damage continues at a high enough level.

A non-exigency situation exists when the near-term probability of damage to life or property is high enough to constitute an emergency, but not sufficiently high to be considered an exigency. A non-exigency situation continues to exist as long as the probability of damage remains high enough to be considered an emergency (7 CFR 624.5).

2.2.1.4 Project Sponsorship and Cost Sharing

With the exception of floodplain easement, each EWP Program project requires a sponsor who applies for assistance. A sponsor can be any legal subdivision of state or local government, including local officials of city, county, or state governments, Indian tribes, conservation districts, and watershed authorities. The sponsors determine the priorities for emergency assistance while coordinating work with other Federal and local agencies, and provide the legal authority for repair work, obtain necessary permits, contribute funds or in-kind services, and maintain the completed emergency practices (NRCS, 1999a).

NRCS provides up to 80 percent of the funds needed for construction costs to restore the natural function of a watershed. The community or local sponsor of the work pays the remaining 20 percent, which can be provided by cash, in-kind services, or both (NRCS, 1999a).

2.2.2 EWP Program Project Documentation and Coordination

The principal NRCS documentation for an EWP Program project is the DSR, which initiates the process of economic, environmental, and technical review, decision-making, and contracting. Copies of correspondence with other agencies and contract packages are normally attached to the

DSR (documentation includes sketches, photographs, and videos). Appendix C shows a sample DSR with pertinent correspondence.

2.2.2.1 The Damage Survey Report

A DSR is required for each impaired site. As the basis for EWP Program assistance on sponsor-proposed impairment sites, the DSR is the NRCS-specified format for gathering information about the damaged site, evaluating the damage to determine eligibility for assistance, reviewing the environmental and economic defensibility of a proposed solution, and documenting the basis for the decision. Completing the DSR requires an interdisciplinary approach using appropriate expertise to evaluate each site.

The DSR describes:
- Impairments and the threats they pose
- The scope, cost, and nature of the emergency work being proposed
- The potential economic and environmental effects of the impairment.

The DSR provides:
- Support for obligation of funds by project or cooperative agreement(s)
- Information needed for program management, including fund management and tracking progress
- Documentation for any review of accountability of NRCS staff that helps deliver technical and financial assistance through the EWP program
- Information that can be used in coordination activities with other agencies that are involved in disaster response and recovery
- Information that can be used in planning and evaluating disaster mitigation activities
- Documenting compliance with NEPA

NRCS requires the DSR to be complete and accurate to ensure that these objectives are met. This ultimately ensures program integrity and consistency, program accountability and defensibility. It reduces the likelihood of appeals if assistance is denied or limited.

The direct and indirect impacts of individual EWP Program practices are routinely documented and attached to the DSR. DSRs are on file at NRCS state offices.

2.2.2.2 Project Review and Approval in Exigency and Non-Exigency Situations

When NRCS receives an application for EWP Program assistance, the state conservationist immediately investigates the emergency situation to determine if the EWP Program is applicable. In carrying out EWP Program work, state conservationists take into consideration the two broad types of emergency situations: (1) an imminent situation of unusual urgency (an exigency), and (2) an emergency requiring action but of less urgency than an imminent situation (non-exigency) (7 CFR 624.5).

2.2.2.2.1 Exigency Situations

An exigency exists when prompt remedial action is provided to eliminate an imminent threat to loss of life. The state conservationist notifies the Watershed and Wetlands Division, describes the emergency, and estimates the funds needed. If funds become available, the state conservationist authorizes the actions necessary to remedy the emergency. The state conservationist confirms the situation in a memorandum to the chief that explains the nature of the emergency, the location of the emergency, the kind of remedial work and funds needed, sponsors, and a description of potential damage. In these situations, the memorandum from the state conservationist with its brief information constitutes the request for funds. Funds must be obligated within 10 days after the memorandum has been received and all work must be completed within 30 days after the funds are obligated.

2.2.2.2.2 Non-Exigency Situations

If the situation is not exigency, but the impairment justifies emergency assistance, a non-exigency situation exists and the state conservationist submits a request for funds to the chief within 60 days after the disaster. Funds cannot be committed until the NRCS national office provides notification that the funds are available (7 CFR 624.10). Funds must be obligated and work completed within 220 consecutive calendar days after the date of receipt of funds. In non-exigency situations, the economic rationale of the proposed practices must be submitted in appropriate detail with the request for funds. Generally, the expected value of imminent damages (amount of damages multiplied by the near-term probability of their occurrence) must exceed the cost of the proposed emergency practices. Information in the request for emergency funds to support economic defensibility of the practices must include:

- Number and extent of values at risk because of the watershed impairment
- Estimated damages to the values at risk if the threat is realized
- Events that must occur for the threat to be realized and the estimated probability of their occurrence both individually and collectively
- Estimates of the nature, extent, and cost of emergency practices needed to relieve the threat.

The state conservationist also submits adequate information to substantiate the environmental defensibility of the proposed emergency practices. Such information must include:

- Thorough descriptions of beneficial and adverse effects on environmental resources, including fish and wildlife habitat, cultural resources, and recreational resources
- Descriptions of the impact on water quality and water conservation as appropriate
- Analysis of the effects on downstream water rights.

A proposed EWP Program action is justifiable if the combined economic and environmental benefits exceed any adverse effects. This determination, made by the interdisciplinary team members, is documented in the comments section of the DSR. The description of the affected property (i.e., public, private, business, and other), value of repair or replacement cost, damage factor, and near-term damage reduction is documented and entered on the Economic Evaluation Worksheet for the alternative practices.

NRCS regulations (7 CFR 624.6b) and policy (National Watershed Manual 1992) require that practices proposed for installation are economically and environmentally defensible.

2.2.2.3 Environmental Review and Inter-Agency Coordination

NRCS coordinates its work with Federal agencies (U.S. Army Corps of Engineers [USACE], U.S. Fish and Wildlife Service [USFWS], the U.S. Forest Service [USFS], Environmental Protection Agency [EPA], Federal Emergency Management Agency [FEMA]), state agencies (e.g. state emergency management agencies and state historic preservation offices), tribal governments, and local communities. At issue are important regulatory and environmental requirements, such as protecting Federal endangered or threatened species and preserving unique cultural and historic resources.

An environmental evaluation is conducted in both exigency and non-exigency situations. In exigency situations, the assessment and any necessary mitigation are often performed after the emergency work either has been initiated or completed. NRCS state conservationists notify concerned area offices and field offices of the USFWS and EPA of anticipated EWP Program work. Through existing coordination mechanisms of state clearinghouses, state conservationists notify the state fish and game agency and other appropriate agencies. Archeological, historical, or other needed special expertise is solicited from appropriate agencies and groups, while environmental and other considerations are integrated into emergency work by using an interagency and interdisciplinary planning approach. In particular, NRCS coordinates with the USFWS to ensure that Federally-listed threatened and endangered (T&E) species are not jeopardized by project activities. The NRCS state cultural resources specialist or coordinator may recommend consultation with the state historic preservation officer (SHPO) to ensure that cultural resources, including national-register historic properties, are taken into consideration in EWP Program projects. NRCS requests the assistance of these agencies in preparing environmental assessments and in planning and implementing emergency work (7 CFR 624.8).

EWP Program work also is reviewed regarding the requirements of Executive Order 11988, Floodplain Management, 3 CFR 117 (1978), as amended by Executive Order 12148, 3 CFR 412 (1980), and Executive Order 11990, Protection of Wetlands, 3 CFR 121 (1978), as amended by Executive Order 12608, 52 FR 34617. Executive Order 11988 requires that all Federal agencies take action to reduce the risk of flood loss, restore and preserve the natural and beneficial values served by floodplains, and minimize the impacts of floods on human safety, health, and welfare. Executive Order 11990 requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands.

2.2.3 Related Watershed Programs

Watersheds are becoming recognized as logical environmental management entities by a number of Federal agencies, including other NRCS programs. A number of Federal, state, and local programs relate to watersheds. Most are Federally funded and use significant Federal technical assistance. The major Federal agencies involved in watershed-related programs are: NRCS, the USFS, which administers the EWP Program on national forest lands and other USDA agencies (such as the FSA;

the EPA, the USFWS, the National Park Service; the USACE, the Department of Housing and Urban Development, and the Bureau of Reclamation). A number of other federal programs deal with watersheds. At least 16 other NRCS programs are watershed-based or have watershed components (see Appendix A, Table A.3-1-1). Other USDA programs that are watershed-based or have watershed components are listed in Appendix A, Table A.3-1-2. Other federal agency programs are in Table A.3-1-3. State watershed programs often result from state delegation of some or all aspects of the federal programs.

2.3 EWP PROGRAM RESTORATION PRACTICES

When a natural disaster occurs and watershed impairments remain, NRCS takes immediate steps to evaluate the impairments and determine an appropriate course of action. Where warranted to eliminate threats to life and property, NRCS provides funding and technical assistance to install EWP practices. The practices should restore the site to pre-disaster conditions, while being economically and environmentally defensible and technically sound. The types of repair and protection practices NRCS uses to restore watersheds include practices that:

- Restore stream channel capacity
- Stabilize and protect streambanks
- Repair or remove damaged dams, dikes, and levees
- Protect structures located in floodplains
- Restore damaged upland areas of watersheds.

Restoring stream channel (hydraulic) capacity in general requires removing and disposing of debris composed of woody material, sediments, or larger mineral material such as cobbles or boulders. NRCS will not remove hazardous material, such as fuel storage tanks; state agencies are responsible for this. Structural practices (armoring), soil bioengineering, stream restoration, vegetative plantings, or a combination of these practices, stabilize and protect streambanks. The NRCS Engineering Handbook (EFH) details many of these methods aimed at streambank restoration. Streambanks may be protected indirectly by modifying stream flow away from them. Damaged water control structures that include dams, dikes, and levees either require repair practices or may need to be removed if repair is neither feasible nor cost-effective. Floodplain diversions will divert flow away from valued or sensitive structures such as water treatment plants, while sediment or debris basins trap materials up-gradient before they can reach such structures. Critical area treatment of upland portions of watersheds reduces the potential for extreme soil loss and sedimentation, mudslides, and damage to roads and structures through accelerated runoff from unprotected slopes. Critical area treatments include planting or seeding, installing upland diversions, drains and conveyances, and building sediment and debris basins.

The practices described here are those typically used in the EWP Program and analyzed in this PEIS (NRCS, 1996 EFH). This is not intended as an exhaustive list of all possible EWP practices.

2.3.1 Practices that Restore Stream Channel (Hydraulic) Capacity

When a stream channel is obstructed by debris, its hydraulic capacity—the volume of water it can convey—is severely reduced. Debris accumulations (debris dams) may back the water enough to overflow streambanks, cause flooding upstream of the blockage, and deposit sediment in adjacent floodplains, leading to severe damage and threatening homes, businesses, or farming operations in these floodplains. Debris can undermine, damage, or destroy downstream structures such as bridges (Fig. 2.3-1) or culverts or threaten such damage in subsequent storms if not removed. Bridges can be washed out by the pressure of debris backup. Overflows may erode approaches to bridges and culverts. EWP Program debris-removal practices are used either when the hydraulic capacity of a channel is reduced by debris or when debris has the potential to move during subsequent storms. Removal of woody debris and removal of sediment or cobble are discussed separately here because of differences in how they affect stream channels and how they are removed and disposed.

Fig. 2.3-1 Debris blockage of a bridge

Debris removal generally involves the following components:

- Create access when needed to move trucks and heavy equipment to a debris site
- Dewater, if needed, to allow operations in-stream
- Use heavy equipment to remove debris from a streambank or in-stream position
- Restore stream dimension, pattern and profile
- Establish a low-flow channel, when needed
- Grade, shape, and re-vegetate affected streambanks by seeding or planting
- Dispose of debris on or off site

Fig. 2.3-2 Debris removal using heavy equipment (backhoe), Bethel Road site, Hall County, GA

Creating access may require removing riparian vegetation, excavating and bank filling, grading, and stabilization. **Dewatering** diverts water within a stream, resulting in dry conditions. These dry conditions are needed for the completion of EWP Program practices. Using **heavy equipment** either from the bank (Fig. 2.3-2) or in-stream generally is the only feasible way to deal with the weight and volume of material that needs to be removed.

In **establishing a low-flow channel,** heavy equipment is used to excavate an impaired streambed to restore the stream's channel on its outside bends. The low- flow channel maintains the base flow (normal stream flow during average periods of rainfall) of the stream and aids in transporting fine sediment and restoring aquatic habitats.

Grading and shaping affected streambanks may be necessary during the finishing phase of a job to create slopes with a gradient suitable for sustaining vegetative growth. Reestablishing vegetation is accomplished by hand or mechanical seeding or planting and includes plant or seed stock, mulching, and fertilizing.

Debris use or disposal involves a number of choices, and the advantages and disadvantages of each option are affected by feasibility and cost. The method selected depends on the circumstances at the disposal site and an evaluation of how disposal may affect the environment. Debris can be used for a number of purposes either on-site or off-site. Where allowed, it can be burned or buried. Burning or burying the material off-site requires heavy equipment to transport the debris to an adequate site. Hazardous materials in the debris require special consideration in its disposal. Cobbles or boulders may be used to stabilize banks, although retention of cobbles on site may contribute to the debris load in future flood events. Where practical, cobbles and debris is removed from the floodplain. Cobble and gravel can restore fish habitat or modify water flow. Rootwads (tree trunks with root structure intact) and tree trunks can also be used to stabilize stream banks.

The components of debris-removal depend on the location and characteristics of the debris impairment. Some components of these practices, such as creating low-flow channels and revegetating disturbed areas, are the same as or similar to the components involved in stream restoration.

Relationships between a natural disaster, the watershed impairments it may cause, the EWP practices that may be employed to repair them, and the components of those practices are illustrated in Fig 2.3-3. Development of this flow logic was one of the first steps the NRCS interdisciplinary team used in the environmental impacts analysis method outlined in Chapter 5. Appendix B presents comprehensive environmental impact flow diagrams identifying cause-effect relationships between practice components and ecosystem components for aquatic, wetland, riparian, floodplain, and upland ecosystem, and community components for human communities.

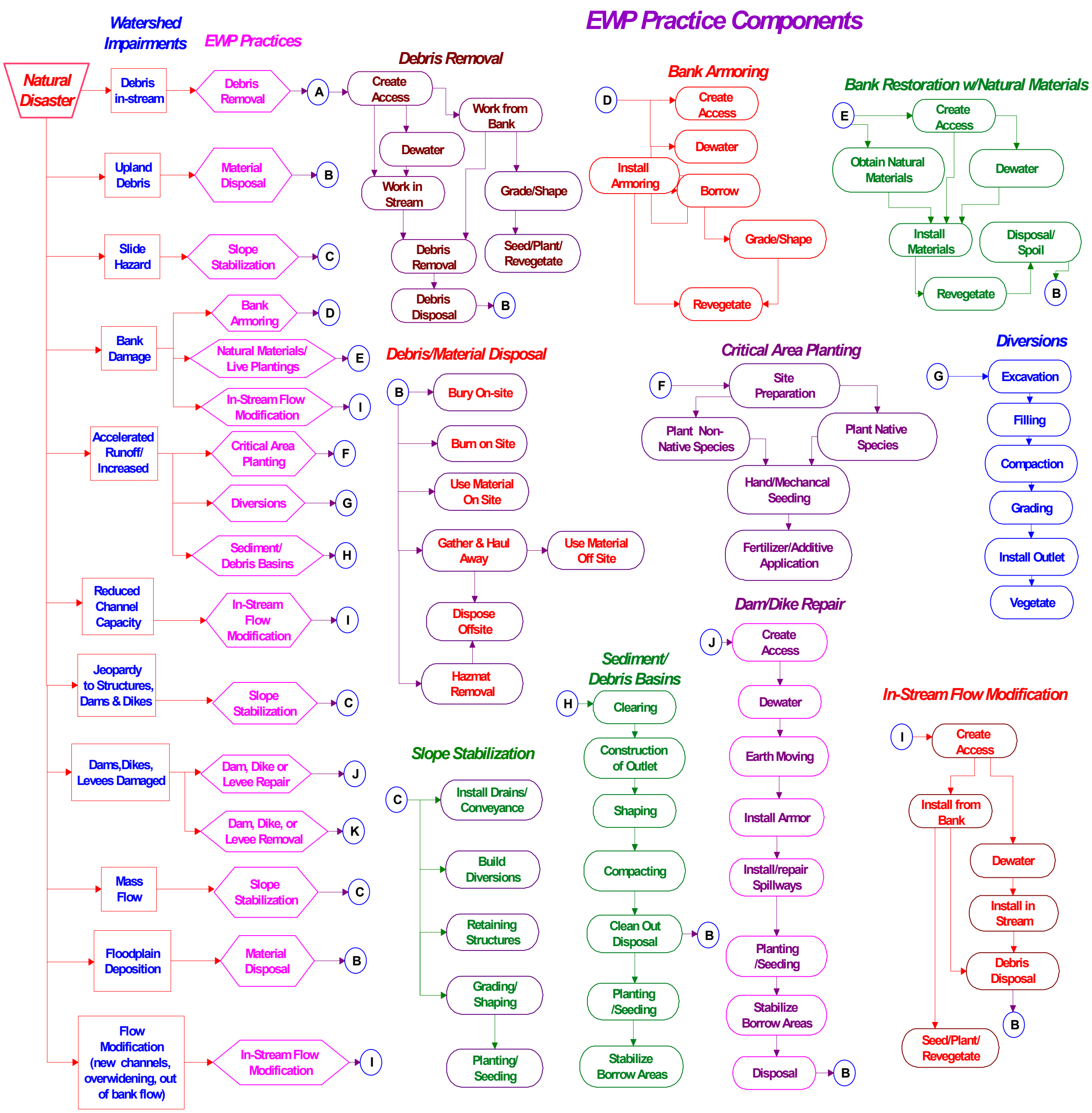


Fig 2.3-3 EWP Project Flow Chart of Watershed Impairments, Practices and Practice Components

2.3.2 Practices that Protect Streambanks

Intense storm flows, caused by the heavy rains associated with hurricanes, tornados, and floods, can intensify bank erosion (Fig. 2.3-4) and remove vital bank vegetation. The vulnerability of streambanks to the damaging forces of disasters can be dramatically affected by the impact of humans in the upper portions of watershed. A greater number of impervious surfaces may increase markedly the volume of runoff, thereby increasing storm peak flows. Greater peak flow increases the stress on streambanks and causes erosion, resulting in a degradation of in-stream habitat and a reduction of water quality because of sedimentation and loss of cover.

Fig. 2.3-4 Property threatened by a failed streambank

Streambanks are stabilized and protected directly by structural practices (bank armoring such as riprap), soil bioengineering, vegetative seeding or plantings, or more often a combination of these practices, or indirectly by installing structures in-stream to deflect stream flow away from the eroding bank.

2.3.2.1 Direct Streambank Protective Practices

Direct protection of streambanks involves installing materials along the damaged bank to protect it from the erosive force of the stream. Those practices include bank armoring and the use of natural woody materials and live plantings. Most often these techniques are used in combination, with armoring where normal stream flow velocities are relatively high—greater than plantings alone could resist—and particularly where high-value structures are immediately adjacent or downstream to the eroding streambank, and the probability of failure must be minimized.

2.3.2.1.1 Bank Armoring

Traditional protective practices, known as bank armoring techniques, use stone and other armored structures to provide protection. Typical armoring practices include gabions and riprap.

Fig. 2.3-5. Gabions installed at Rocky Run, VA

Gabions are large-volume wire-mesh baskets (Fig. 2.3-5) filled with stone or cobble and placed along streambanks and streambeds of smaller streams for stabilization and grade control. Gabions are flexible and can be shaped to conform to topographical features such as sharp bends and steep streambanks. They usually are wired together with durable fasteners, making them structurally sound and long-lasting.

Riprap (Fig. 2.3-6) is a layer of stone placed along eroded streambanks to protect and stabilize them. Like gabions, riprap is used where stream velocities are too great to establish vegetative cover successfully. Gabion or riprap installation generally involves creating access and using heavy equipment. Dewatering is sometimes required. Typically, the upper portion of the armored streambank is not actually armored but instead graded and shaped, then planted or seeded.

Fig. 2.3-6 Riprap installed at Rocky Run, VA

2.3.2.1.2 Natural Materials and Live Plantings

Dead woody materials, including dead trees, tree branches, and cut logs protect banks as well as rootwads. Soil bioengineering combines live plantings with engineered materials for reinforcement. Vegetative plantings and seeding may be used alone where stream velocities allow, but most often are used in combination with armoring or dead woody materials. The roots of live materials secure the streambank soils, making the banks far less vulnerable to erosion and providing riparian and fish habitat.

Fig.2.3-7 Rootwads installed at Rose River, VA

Dead Woody Materials

Rootwads are embedded trunk-first in streambanks (Fig. 2.3-7) to stabilize the banks. They are a more natural, biologically functional alternative to armoring structures. Timber **cribbing** structures (Fig. 2.3-8) are log installations similar to gabions in function.

Soil Bioengineering

Soil bioengineering uses living plants as structural components (NRCS EFH 1996). Adapted types of shrubs or trees are installed initially in configurations that offer immediate soil protection and reinforcement. A typical installation may include riprap, rock fill, or geo-

Fig. 2.3-8 Timber cribbing structure, Cherokee County, NC

textiles, or a combination of these materials with plants inserted through the materials into the soil (Fig. 2.3-9). Soil bioengineering systems create resistance to sliding or mass movement of a streambank as they develop roots or fibrous inclusions. Hydrophytic plants, such as willows that are quick to root and grow, are often used for these projects.

Fig. 2.3-9 Composite photo, live plantings in rock base (left) and soil bioengineering using geotextiles, Glen Arbor, Santa Cruz Co., CA

Streambank repair and protection consists of the following practice components:

- Create access when needed to move heavy equipment to a damaged bank site
- Dewater to allow operations in-stream
- Borrow materials
- Operate heavy equipment from on-bank or in-stream to install protective practices
- Grade, shape, and, when appropriate, revegetate streambanks.

Fig. 2.3-10 Bank vegetation site, Back Creek, Augusta County, VA (with riprap toe section)

Planting and Seeding

Vegetative stabilization techniques (Fig. 2.3-10) involve choices among seeding methods and materials, nonnative or native plantings, and fertilizers and additives. Vegetative plantings are used where they are capable of protecting the bank from the erosive forces of streamflow. A common streambank stabilization detail incorporates structural protection of the bank toe from the bed elevation to the normal water surface or to the approximate 2-year flow line, with vegetative treatment of the upper bank to the general flood plain elevation or as needed. Criteria may be developed locally to define limiting velocities where predominantly vegetative treatments can be used successfully. Many variables, including climate, soils, bank height and slope, plant species, cost, material and labor availability, and animal and human bank traffic, influence the success of vegetative treatment.

Vegetative stabilization practice components include:

- Create access
- Fill or excavate
- Grade
- Harvest plant materials
- Install plants or seeds, and apply fertilizer and mulch.

2.3.2.2 In-stream Flow Modification

In-stream flow modification uses structures placed in a stream to redirect flow, thereby protecting banks from erosion. These techniques are used when out-of-stream practices alone cannot repair a bank stability problem, when they are the most environmentally sound solution, and when there is sufficient area for effectiveness. A **rock weir,** a typical in-stream structure to regulate flow, is a series of boulders placed across a channel (Fig. 2.3-11) and anchored to the streambank or streambed. Rock weirs can also direct flow away from damaged streambanks.

Fig. 2.3-11 Rock weir, Rose River, VA

Rock weir installation involves:

- Create access
- Dewater (if necessary)
- Use heavy equipment
- Grade, shape, and seed.

2.3.3 Dam, Dike, and Levee Repair or Removal

The EWP Program rule prohibits repairs to NRCS-assisted dams (Fig. 2.3-12), dikes, and levees when they are damaged by a natural disaster. However, the rule also allows the NRCS Chief to grant an exception and in 1996, the Chief granted a blanket exception to this rule. EWP Program repair or removal does not apply to water-control structures maintained or owned by other Federal agencies. A dam, dike, or levee is removed when the threat of failure is high and repair is not economically or technically feasible. In some states, agricultural dikes less than six feet high or nonagricultural dikes less than ten feet high are eligible for repair or removal, depending on individual state agreements with the USACE.

Dam, dike, and levee repair may consist of the following practice components:

- Create access, when needed, to move heavy equipment to the site
- Dewater if needed to allow operation to proceed under dry conditions
- Install armor to protect either the dam, dike, levee, or downstream structures
- Repair spillways by fill and compaction
- Grade, shape, and re-vegetate repaired areas and borrow sites by seeding or planting.

Fig. 2.3-12 Spillway damage, Switzer Dam, Dry River, VA

2.3.4 Practices that Protect Structures in Floodplains

Heavy rains associated with natural disasters such as hurricanes can cause intense storm flows that carry storm water and debris downstream or into down-slope floodplains. Debris torrents can threaten life and property, especially in mountainous regions where steep gradients exist. Debris and floodwaters can reduce the capacity of stream channels, damage infrastructure, and potentially impair water quality by damaging the water supply or wastewater treatment facilities. To diminish these threats, the EWP Program installs sediment and debris basins and floodplain diversions.

Fig. 2.3-13 Eighth Street Burn, Boise Hills, ID

2.3.4.1 Sediment and Debris Basins

Sediment and debris basins retain and store debris from floods when this material could threaten life and property and other control methods are deemed inadequate. Practice components involved in sediment and debris basin installation include:

- Create access, when needed, to move heavy equipment to the site
- Excavate soil and shape the basin
- Compact soils to ensure basin stability and water retention capability
- Construct outlets for the release of storm water
- Grade, shape, and revegetate soils by seeding or planting.

2.3.4.2 Floodplain Diversions

Floodplain diversions are constructed when excessive runoff or debris flow threatens valuable structures in a floodplain such as water and wastewater treatment facilities. A floodplain diversion installed at a waste treatment facility that was being flooded by heavy rains in Clarendon, TX (Fig. 2.3-14) will keep the facility from overflowing. The EWP Program practice components involved in installing a diversion are:

Fig 2.3-14 Floodplain diversion site Clarendon, TX

- Create access, when needed, to move heavy equipment to the site
- Excavate soil
- Fill, when needed, and compacting soils for stability
- Construct outlets to release storm water
- Grade, shape, and re-vegetate affected areas by seeding or planting

2.3.5 Practices that Protect Watershed Uplands

Natural disasters such as drought (Fig 2.3-15), fire, and flood can strip large areas of vegetation. Vegetation plays a vital role in controlling wind and water erosion, ensuring groundwater recharge, maintaining soil productivity, and providing habitat. Without adequate vegetation, soils may become susceptible to mass-flow events, which can threaten life and property. Areas that have lost vegetation often become a priority concern for communities or residents living near the impaired area. Unprotected, light soils susceptible to erosion by high winds (Fig. 2.3-15) can reduce visibility causing hazardous driving conditions and irritate eyes and respiratory systems. Heavy rains can cause debris torrents that deposit sediment, woody debris, and other materials in floodplains.

Fig 2.3-15 Dust storms caused traffic accidents near this drought-stricken site at Antelope Valley, CA.

Critical area treatment involves one or more practices to stabilize priority upland areas by increasing the vegetative cover, binding and retaining soils, helping maintain infiltration, reducing surface runoff by slowing water velocity through structures on side slopes and improved infiltration, and improving drainage conditions to protect property. Treatments that stabilize critical areas include critical area planting, installing diversions, check dams, contour trenches, drains, conveyances, and outlet structures.

2.3.5.1 Critical Area Planting

Critical area planting involves seeding (Fig. 2.3-16) or planting areas that are prone to erosion and destabilization. It is used where vegetative cover has been lost, when erosion or sedimentation will create an imminent threat to life or property, or when conventional seeding methods are inadequate. Critical area planting uses permanent grasses and legumes to stabilize the soil and reduce damage from sediment and runoff to downstream areas. It also controls wind erosion of exposed topsoil. Critical area planting includes site preparation, hand or mechanical seeding, planting native or nonnative plants, and applying fertilizers or other additives. **Preparing a site** for planting (Fig. 2.3-16) involves a number of techniques to help establish vegetation, including ripping and raking, which turn soil over to make it more conducive to vegetation growth (Fig. 2.3-17). This is especially important where soils are crusted or hard and do not allow seeds to penetrate the surface layer. Ripping, disking, harrowing, or raking to prepare seedbeds for planting can increase sedimentation and runoff on a short-

Fig. 2.3-16 Critical area tilling and seeding, Antelope Valley, CA

term basis, because any vegetation that may have been present is disturbed. It is most likely, though, that these practices decrease runoff in high-gradient areas if the work is completed in a horizontal pattern across slopes (NRCS, 1999d). The terraced pattern will slow runoff and increase infiltration.

Fig. 2.3-17 After critical area treatment revegetated the site, Antelope Valley, CA

Seeding or planting with native or non-native stock can be accomplished by aerial seeding, drilling, or hand seeding. In aerial seeding, an airplane or helicopter scatters the seeds. With drilling, a tractor-pulled drill, such as the rangeland drill, furrows a trench and plants the seeds. Chains dragged behind the drill cover the trenches and prevents the loss of seed. Drilling is often conducted to help create terraces that slow runoff and aid in the infiltration of surface water (NRCS, 1999d). Hand planting can stabilize impaired areas in settings that are not conducive to mechanical planting or seeding. **Applying fertilizers, additives, or ground cover** such as lime and mulch helps reestablish newly planted vegetation.

Critical area planting may consist of the following practice components:
- Create access, when needed, to move heavy equipment to a planting site
- Prepare sites for planting
- Seed with native, or nonnative grasses
- Plant native, or nonnative seedlings
- Apply fertilizers or other additives.

Fig. 2.3-18 Upland diversions,8th Street Burn, Boise Hills, ID

2.3.5.2 Upland Diversions

Upland diversions (Fig. 2.3-18), which include **contour felling** and **contour trenching**, protect areas that lack vegetative cover, reducing excessive runoff, and protecting downslope communities or structures from debris-laden surface water flow. In contour felling, cut trees are placed in horizontal rows on side slopes to divert water. Contour trenching is similar, except that excavated trenches replace logs. Contour trenches are ditch-like trenches constructed on slopes with moderate-to-deep **rills**. Trenches generally are dug in parallel from the top to the bottom of the slope. Their main purpose is to store accelerated soil erosion and overland flow.

Installing upland diversions involves the following practice components:
- Create access, when needed, to move heavy equipment to a diversion site

- Excavate to create or install the diversion
- Fill to prepare the site to install the diversion
- Install outlet structures (drains and conveyance)
- Compact soils to ensure stability
- Grade, shape, and revegetate affected areas by seeding or planting.

Installing contour trenches consists of:
- Creating access to move heavy equipment, if needed, to a construction site
- Excavating trench to capture runoff
- Grading, shaping, and revegetating affected areas by seeding or planting.

2.3.5.3 Grade Stabilization Structures

Grade stabilization structures are small dams constructed in drainage ways and across or at the base of slopes, to reduce erosion by reducing flow velocity (Fig. 2.3-19). Grade stabilization structures are used in areas that have intermittent flows where it would be impractical to line an area with non-erodible materials. They usually are constructed of riprap, straw bales, logs, or sandbags (Smoot and Smith, 1998).

Installing grade stabilization structures consists of the following practice components:

- Create access to move heavy equipment, if needed, to a construction site
- Excavate to place grade stabilization structures in correct configuration for flow reduction
- Install grade stabilization structures
- Grade, shape, and revegetate affected areas by seeding or planting.

2.3.5.4 Drains, Conveyances, and Outlet Structures

Critical area treatment may require installing practices to protect roads and structures from severe runoff. Drains, conveyances, and outlet structures conduct storm water away from roads, buildings, developed lots, and critically damaged areas and usually discharge into the nearest stream channel. Outlet structures usually are lined with clean stone to reduce the velocity of water leaving the structure, which helps protect the areas of discharge from erosion (Canadian Department of Fisheries and Oceans, 1999).

Fig. 2.3-19 Grade stabilization structure, 8th Street Burn, Boise Hills, ID

Installing drains, conveyances, and outlet structures consists of the following practice components:
- Create access to move heavy equipment to site
- Install drains, conveyances, and

outlet structures
- Install armoring
- Grade, shape, and revegetate affected areas by seeding or planting.

2.3.5.5 Slope Stabilization

Slope stabilization involves a combination of structural and natural techniques that are used in upland watersheds after fires, landslides, or other natural disasters to control or minimize the risk of soil movement, rockslides, and erosion.

Installing slope stabilization consists of the following EWP practice components:
- Create access to move heavy equipment, if needed, to a construction site
- Installing drains or conveyances
- Building diversions
- Planting or seeding
- Installing retaining structures

2.4 FLOODPLAIN EASEMENTS

The Federal Agriculture Improvement and Reform Act of 1996 (commonly referred to as the 1996 Farm Bill) provides the authority for NRCS to purchase floodplain easements under the EWP Program. Authorization for floodplain easements provides NRCS with an opportunity to purchase easements on flood prone lands as an alternative to traditional eligible EWP Program practices. It is not intended to deny any party access to traditional eligible EWP Program practices. Instead, it is intended to provide a more permanent solution to repetitive disaster assistance payments and to achieve greater environmental benefits where the situation warrants and the affected landowner is willing to participate in the easement approach. Current guidance for administering the purchase of floodplain easements under the EWP Program is provided in the National Watersheds Manual (NWSM) 390–V, Circular No. 4, which supplements Part 509 of the NWSM.

Floodplain easements are intended to:

- Reduce the public risk of flood damages, including public risks to downstream or adjacent lands
- Protect lives and property from floods, drought, and the products of erosion
- Retard soil erosion through the restoration, protection, or enhancement of the floodplain
- Allow the unimpeded reach and flow of water in, over, on, or through the easement area, to restore, reconnect, and enhance water conditions on the easement area
- Eliminate future disaster payments that would otherwise be applicable to the area
- Restore, protect, manage, maintain, and enhance the functions of wetlands, riparian areas, conservation buffer strips, and other lands

- Conserve natural values including fish and wildlife habitat, water quality improvement, floodwater retention, groundwater recharge, open space, aesthetics, and environmental education.

Eligible Land: Lands potentially eligible for floodplain easement purchase include agricultural lands damaged by flooding that have been subject to repeated flood damage or are where the flooding can be expected to recur (Fig. 2.4-1). Agricultural lands are predominantly cropland (including orchards and vineyards), grazing land, hay land, or forestland adjoining the channel of a river, stream, watercourse, water body, lake, or ocean. Incidental areas adjacent to, and part of the agricultural land tract that may not meet eligibility criteria independently, may be acquired where necessary to facilitate the acquisition process (i.e., purchase of remaining uneconomic remnants of land, inclusion of lands that are required for the floodplain hydrology reconnection and restoration to occur, or provision for practicable and manageable easement boundaries). The state conservationist, in consultation with the state technical committee, will develop appropriate guidance for field-level use in determining eligibility and will be responsible for closely monitoring implementation.

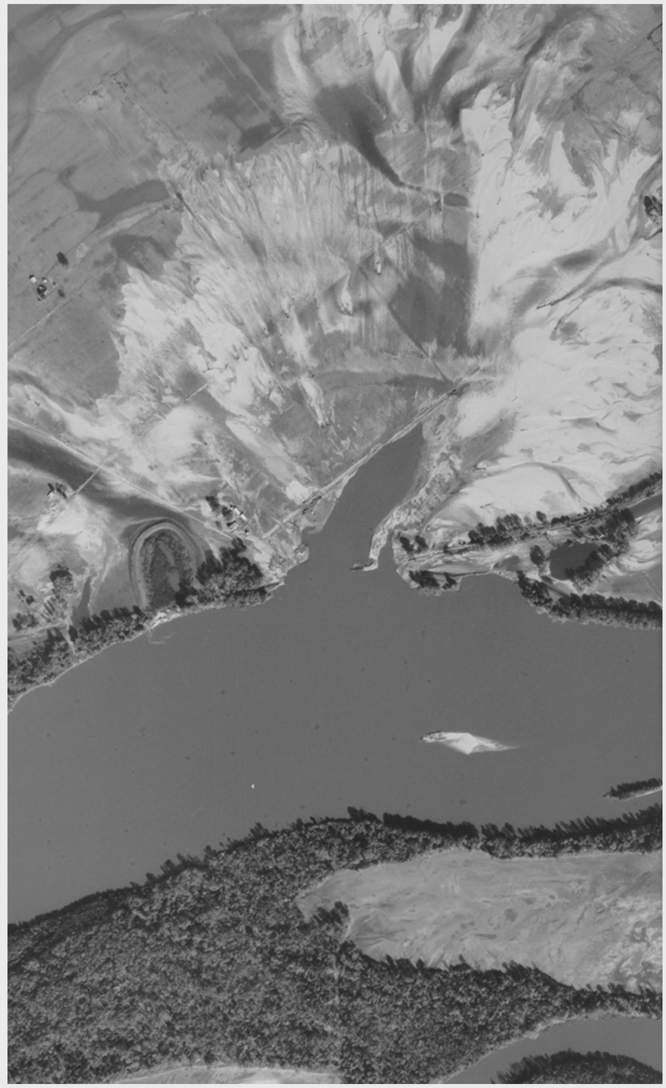


Fig 2.4-1 Aerial photo of washed-out levee and floodplain deposition on the Lower Missouri River

Designation of Land Categories within the Floodplain Easement: Three categories of lands may be designated within a given easement area. A single floodplain easement acquisition may consist of one, two, or all three categories. All easements, including all designated land categories within easements, must:

- Meet eligibility requirements
- Be covered by a perpetual easement
- Have the landowner waive the right to be protected from floodwaters and provide the United States with the right to restore and enhance the reach and flow of waters to achieve flood flow, flood storage, erosion control, or conservation objectives (e.g., removing levees, filling ditches, or impounding surface waters)
- Prohibit construction or maintenance of buildings or other structures
- Waive future disaster assistance that may be applicable to easement lands

- Reserve to the landowner the right to control ingress and egress and the rights to hunting, fishing, and undeveloped recreational activity (e.g., either personal use or commercial leasing)
- Provide the landowner with the opportunity to participate in easement restoration and management activities that the United States acquires through the easement.

Category 1 Criteria include:

- All vegetative buffer areas being restored, established, enhanced or otherwise protected adjacent to a river, stream, watercourse, water body, lake or ocean including distinct drainage and flowage areas (required width to be determined by state conservationist in response to site-specific natural resource needs)
- Habitats of present or potential future importance in the protected, restored, or enhanced condition to state or Federal at-risk species
- Other landscape situations determined by the state conservationist to warrant Category 1 application (e.g., old-growth cypress stands or unusually severe erosion problem areas)

The easement area in this category is restored and enhanced to the extent practicable to optimize floodplain functions and fish and wildlife habitat values. This easement prohibits uses such as cropping, grazing, or timber harvest.

For the easement land payment, landowners are compensated the least of the following three values: 100 percent of the agricultural or other undeveloped or raw land value of the land (assuming a post-disaster restored condition); the geographic rate cap where one is established; or the landowner offer. EWP Program funds may cover up to 100 percent of the cost of land treatment practices and all administrative, survey, appraisal, title insurance, and other costs associated with establishing the easement.

Category 2 Criteria include:

- Eligible floodplain lands that are, or will in the future, be considered as high risk because they will be subject to frequent flooding
- Lands where the type and importance of the habitat, at present or in the restored or enhanced condition, has been determined or is projected to become important to fish and wildlife species of Federal importance (e.g., anadromous fish or migratory birds).

Landowners may request compatible uses including, but not limited to, managed timber harvest, periodic haying, or grazing. To be approved as a compatible use, the activity must be consistent with long-term protection and enhancement of the flood control, erosion control, and conservation purposes for which the easement was established. NRCS makes the final decision concerning the amount, method, timing, intensity, and duration of any compatible use that may be authorized. Cropping will not be authorized as a compatible use nor is haying or grazing on lands that are being returned to woody vegetation.

Landowners are compensated at a level corresponding to the lowest of 100 percent of: the agricultural or other undeveloped or raw value of the land (assuming a post-disaster restored state), the geographic rate cap where one is established, or the landowner's offer.

EWP Program funds may cover up to 100 percent of cost of land treatment practices and all of the administrative, survey, appraisal, title insurance, and other costs associated with establishing the easement.

Category 3 includes only quality farmland that is subject to periodic flooding. Under this category, the landowner retains the right to control cropping, haying, grazing, or timber harvest while the United States acquires all other rights included in the easement.

Landowners are compensated 50 percent of the easement land payment amount that would be paid for the easement acres if they were being placed under Category 2.

Determining Category Boundaries: The state conservationist is required to develop an overall floodplain easement acquisition strategy for floodplain lands whose landowners voluntarily express an interest in the easement option. The two primary components of that strategy are to determine the type and extent of practices required to restore and enhance the floodplain hydrology of potential easement lands, and to locate the boundaries of the appropriate easement land categories that are necessary to address the multiple resources of each offered easement area.

The type and extent of hydrology restoration and enhancement (e.g., restoration or enhancement of the reach and flow of water in, over, on, or through the easement area) will need to be identified before the easement offer is made to the landowner. Enough detail must be included to enable NRCS to determine the potential benefits and general costs and to ensure that the landowner understands the scope of the hydrology change that NRCS would likely implement if the easement is established. At this stage of the easement planning process, there is no intent to develop detailed and specific hydrology restoration and enhancement plans.

The state conservationist determines the spatial arrangement of the three categories of easement lands that will be offered to the landowner within each easement. One, two or all three categories may be applicable to a single easement. The boundaries are established as to provide the benefits for which the floodplain easement is being acquired and are consistent with site- specific land resource needs, including the need for manageable boundaries. Surveys generally are required to establish effective category boundaries. This determination becomes the NRCS easement offer for that particular tract.

Easement Terms and Conditions: A single floodplain warranty easement deed document applies to all floodplain easement situations. NRCS prepared this document in consultation with its Office of General Council and modification of the document is not authorized.

Application Process: The floodplain easement program follows the same general application, ranking, funding allocation request, easement development, restoration plan development, contract administration, and easement management process used by the Wetlands Reserve Program (WRP). They use forms similar to WRP forms with modifications to reflect accurately the funding source, program name, authority, and resource management goals for the EWP Program.

Easement Administration: EWP Program floodplain easements are administered by the NRCS. NRCS may enter into partnerships with eligible local sponsors or other partners to further the purposes of the program. Title to the easement is held by the United States through the Secretary of Agriculture. NRCS is the acquiring agency but has the flexibility to delegate management, maintenance, monitoring, and enforcement responsibilities to eligible partners. Eligible partners may include Federal and state agencies. In conjunction with the delegation of responsibility, provision is made for NRCS to ensure that the terms of the easement are upheld and in the event that NRCS determines it necessary, the NRCS can terminate the delegation and have all responsibility revert to the NRCS.

Easement Plans and Files: NRCS maintains an easement plan that reflects the current management, restoration, and delegation decisions for each particular easement. The official file is kept in the state office. It includes a copy of the filed easement, the easement plan, and copies of correspondence concerning compatible use requests and agency responses. This file material is in a secure location and serves as a backup if, during the course of easement management and monitoring, one has to refer to a complete record or has to replace materials that are lost or damaged during field work. In addition, the responsible field office has a working file that can be used for reference when landowner or monitoring questions arise. The working file can be taken to the field for on-site reference.

All easements require a plan that outlines objectives, conservation treatment needs (e.g., removal of fences or buildings, establishing vegetation, realigning or removing levees, filling ditches, breaking tiles, and impounding surface water to restore or establish wetland or flood storage conditions), partnerships, long-term operation and management requirements, and status reports in response to annual monitoring efforts. If restoration, management, maintenance, monitoring, or enforcement responsibilities are delegated, they are noted in the plan and a procedure is established to ensure that the delegated activities are carried out in a manner consistent with agency responsibilities. While the intent is that all actions by NRCS following purchase of an easement and under the terms of the plans are undertaken in cooperation with the landowner, the plans are living documents and NRCS may modify these documents within the authority provided in the easement.

Economic Justification: All conservation easements and practices must be economically, environmentally, socially, and technically defensible. The costs of restoring lands and structures, costs associated with the repeat of future disasters, and the costs of efforts that would be required to prevent a repeat of such events, are considered in the cost-efficiency analysis of the easement alternative. The easement alternative must be cost-effective in comparison with other traditional EWP practices.

Establishing Priorities: The program can be targeted to individual project sites where the benefits are associated with the individual site, or to clusters of projects in defined problem areas in general, where the combined benefits of the cluster form the basis for an eligibility determination that applies to the entire cluster. Priority consideration may be given to those sites where eligible sponsors and partners are willing to share the cost of acquisition, restoration, management, monitoring or enforcement. Special consideration is given to those situations that provide the greatest reduction in threat to life and property, cost effectiveness in achieving conservation objectives, and environmental benefits from the restoration, protection, and enhancement of conservation values. Efforts are made to extend outreach efforts to all potential participants including, but not limited to, communities with limited resources.

Disaster Assistance Payments: In no case is an owner eligible for future Federal disaster assistance on the easement land purchased with EWP Program funds. Where landowners purchased private insurance benefits under the Crop Insurance Act, they are treated as follows:

- Payment through the Non-Insured Crop Disaster Assistance program for damage to crops for which insurance is not available is disaster assistance, and is not available to owners for which the easement has been purchased under the EWP Program.
- Benefits obtained through crop insurance programs offered under the Federal Crop Insurance Act are not considered disaster assistance and are available to owners of Category 3 land for which the easement has been purchased under the EWP Program.

Easement Payment: NRCS appraises the land to determine its agricultural value. For incidental lands not in active agricultural use, the appraised value is the raw land value excluding speculative commercial, industrial, or residential values. The payment offer for the easement lands is based on the agricultural value or other undeveloped or raw land value, a geographic land payment cap, or landowner offer. The least of the three potential values forms the basis of the NRCS offer.

The easement land payment amount for Category 1 and Category 2 lands is the least of the following: (1) agricultural value of the land as if restored for agricultural production or the applicable undeveloped or raw land value; (2) the geographic cap established by the state conservationist; or (3) the landowner offer. For lands that are not used directly for cropping or other relative intense agricultural activity (e.g., woodlot, riparian stream border, or permanent pothole wetland), the easement payment is the undeveloped or raw land value excluding any value that might be assigned for speculative residential, commercial, or industrial development. With Category 3 lands, the payment will be not more than 50 percent of the amount that would have been paid for the same area had it been under a Category 1 or Category 2 classification.

The acquisition of buildings or other surface improvements and facilities is not an integral part of the floodplain easement program. If state the conservationist determines that the presence of such isolated farm buildings, improvements, or facilities may warrant special consideration, the Director, Watersheds and Wetlands Division may consider the case.

If the state conservationist, in consultation with Federal, state, or local officials familiar with agricultural land values in the area, determines that the landowner has made an offer clearly below even the most conservative estimate of the value of the potential easement area and cap, or the cap is clearly below the most conservative estimate of such value, no detailed evaluation to determine value is required. The basis for the determination by the state conservationist that such a situation exists is documented and placed in the project file and the landowner offer or cap value may be considered potentially acceptable.

EWP Program funds may be used to pay up to 100 percent of the cost of installing land treatment practices deemed necessary and desirable to achieve the purposes of the easement. Such practices as fencing to exclude livestock or restoring surface hydrology and natural vegetation are the type expected to be most common. The use of EWP Program funds for installing land treatment practices will be commonplace with Category 1 and Category 2 lands. In the case of Category 3 lands, such funding is largely limited to hydrology restoration and enhancement actions (e.g., removing levees, filling ditches or impounding water for flood storage or restoring or establishing wetland conditions).

There is no authority to provide EWP Program funding for implementation of land treatment practices that are associated with the landowner's agricultural use of the easement area of Category 3 lands.

2.5 RECENT PROGRAM HISTORY

As part of the impacts evaluation, the PEIS uses example restoration and easement sites in nine states: Arkansas, California, Georgia, Idaho, Iowa, Missouri, North Carolina, Texas, and Virginia. The states were chosen because they provide a range of disaster types and of terrain and climatic conditions that are representative of the range of impairment types and watershed environments the EWP Program typically addresses. Tables 2.5-1 to 2.5-9 list recent EWP Program activities in the nine states. Listed are the natural disasters and resulting watershed impairments, total EWP Program funds expended for repairs and technical assistance, and the practices installed.

Table 2.5-1 Recent EWP Program Activities in Arkansas

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1998 Arkansas EWP Work					
Miller County	5/28/98	52,345	Flood	Abutments De-stabilized	Bank Stabilization
				Erosion Near Abutments	Debris Removal
				Endangered Structures & Roads	
Miller County	5/28/98	82,244	Flood	Abutments Destabilized	Bank Stabilization
				Silt Bars Blocking Channels	Debris Removal
				Roads Threatened	
Mississippi County	4/16/98	3,500	Tornado	Debris Blockage of Major Drain System	Debris Removal
				222 Residences	
				22 Businesses	
				Loss of Utilities	
				Increased Threat of Flooding	
				Emergency Access Blocked by Debris	
Clay County	Not Stated	163,298	Not Stated	Not Stated	Bank Stabilization
Columbia County	Not Stated	56,413	Flood	Abutments De-stabilized	Bank Stabilization
				Scour Near Abutments	
1997 Arkansas EWP Work					
Clark County	3/1/97	79,411	Tornado	Debris Blockages in Streams	Debris Removal
				Storm Water Drains Clogged	
				Day Care Center Endangered on Slope	Bank Stabilization
				Flooding Potential Increased	
Clark County	3/1/97	70,480	Tornado	Trees and Debris Blocking Channels	Debris Removal
				Roads/Bridges/Culverts Endangered	Bank Stabilization
				Drainage Outlet Clogged With Debris	
Cross County	3/1/97	737.50	Tornado/Heavy Rains	Drainage Channels Clogged With Debris	Debris Removal
				Increased Risk of Flood to City	
Jackson County	3/1/97	9,000	Tornado/Rainfall	Drainage Channels Blocked with Debris	Debris Removal
				Destroyed 40 Homes	
				Utilities Disrupted	
Clay County	3/1/97	51,873	Heavy Rains/Flooding	Erosion	Bank Stabilization
				Sloughing	Debris Removal
				3 Homes Threatened	
				Bridge Threatened	

Table 2.5-2 Recent EWP Program Activities in California

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1997 California EWP Work					
Placer County	1/1/97	291,890	Flood	Failing Streambanks	Streambank Stabilization
				Debris Jams Threatened Bridges/Homes	Debris Removal
				Channels Clogged	Rechannelization
				Access Routes Threatened	Diversions
				Sediment Accumulation	
Tehama County	1/1/97	752,682	Flood	Increased Threat to life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Plumas	1/1/97	406,728	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Butte	1/1/97	2,376,707	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Trinity	1/1/97	39,238	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Humboldt	1/1/97	174,000	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
S Luis Obis	1/1/97	31,500	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Shasta	1/1/97	16,390	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal
Napa	1/1/97	485,461	Flood	Increased Threat to Life and Property	Repair/Restoration of Levees
				Bridges/Utilities De-stabilized	Streambank Stabilization
					Debris Removal

Table 2.5-2 Recent EWP Program Activities in California, Cont'd

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
3 National Forests	1/1/97	195,000	Flood	Sedimentation	Revegetation
				Clogged Channels	Debris Removal
				Eroded Banks	Grade Stabilization
				De-stabilized Banks	Stabilize Banks
Sacramento	1/1/97	3,491,778	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank De-stabilization	Streambank Stabilization
Sutter	1/1/97	31,935	Flood	Clogged Waterways	Debris Removal
				Levee De-stabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization
Colusa	1/1/97	187,500	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization
Santa Cruz	1/1/97	402,655	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank De-stabilization	Streambank Stabilization
Yuba	1/1/97	13,500	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization
Kern	1/1/97	64,510	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization
El Dorado	1/1/97	45,798	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization
Siskiyou	1/1/97	122,507	Flood	Clogged Waterways	Debris Removal
				Levee Destabilization	Repair/Restoration of Levees
				Streambank Destabilization	Streambank Stabilization

Table 2.5-2 Recent EWP Program Activities in California, Cont'd

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1996 California EWP Work					
Lassen	08/96	241,558	Flood	Not Stated	Reservoir Construction
City of Malibu (LA County)	10/96	18,761	Fire	Threats of Mudslides	Clearing
				Threats of Debris Flows	Diversions
				Threats of Drainage Clogging	
				Threats of Channel Clogging	
				Loss of Vegetation	
Baldwin WS (LA County)	10/96	6,706	Fire	Threats of Mudslides	Clearing
				Threats of Debris Flows	Diversions
				Threats of Drainage Clogging	
				Threats of Channel Clogging	
				Loss of Vegetation	
Kalarama St/Aliso (Ventura County)	10/96	19,450	Fire	Threats of Mudslides	Clearing
				Threats of Debris Flows	Diversions
				Threats of Drainage Clogging	
				Threats of Channel Clogging	
				Loss of Vegetation	
1994 EWP California EWP Work					
Sierra County	08/94	241,932	Fire	Flood Threat Increased	Spillway Repair/Installation
				Sediment Damage Increased	Clearing
				Increases in Runoff and Debris	
Ventura, San Bernardino,	01/94	2,486,254	Earthquake	Sediment and Debris Flows	Debris Basin Construction
Santa Barbara			Fires	Threat to Life and Property	Streambank Stabilization
Northridge	01/94				
1993 California EWP Work					
Topanga/Malibu Fires	11/93	7,843,459	Fire	Vegetative Reduction	Revegetation
LA, Ventura, Orange, San Bernardino,				Restoration	
Riverside and San Diego Counties					
1992 California EWP Work					
Arroyo Simi, Ventura County	10/92	173,655	Flood	Streambank Erosion	Streambank Protection
				Buildings/Homes Threatened	

Table 2.5-3 Recent EWP Program Activities in Georgia

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1996 Georgia EWP Work					
Douglas County	08/96	234,000	Flooding	30 Roads Damaged	Bank Stabilization
				3 Miles of Stream Destabilized	Debris Removal
				Debris Jams	
				Sediment Deposition	
				Flooding	
				Damage to Property	
				Damage to Utilities	
				Flows Redirected Out of Banks	
1995 Georgia EWP Work					
Effingham, Long Counties	08/95	1,026,455	Flooding Tropical	Debris/Sediment Accumulation	Bank Stabilization
			Depression Jerry	Roads Washed Out	Debris Removal
			Hurricane Opal	Culverts/Roads Unsafe	
				Hazardous Driving Conditions	
				Threat of Flooding to Life and Property	
1994 Georgia EWP Work					
Thomas, Grady, Dector,	11/94	1,100,000	Flooding	Debris Accumulation	Debris Removal
Mitchell, Brooks, Colquitt Counties				Bridges, Culverts, and Abutments Damaged	Bank Stabilization
				Increased Threat of Flooding	
				Hazardous Driving Conditions	
				Newly Cut Channels	
				Increased Bank Erosion	
				Damaged Properties	
56 Counties Throughout State	07/94	19,800,000	Tropical Storm Alberto	Dams Failed	Not Stated
				Rivers Rose	
				Floods Occurred	
				Roads/Culverts Washed Out	
				Railroad Trestles/Bridges/Utilities Undermined	
				Water Covered 10,000 Square Miles	
				50,000 People Driven From Homes	
				Damage to Infrastructure and Agriculture	
Tobesofkee Creek Watershed	07/94	30,554	Flooding	Earthen Dams and Spillways Scoured	Debris Removal
				Erosion	Bank Stabilization
				Threat to Life and Property Increased	
				Debris Accumulation	

Table 2.5-4 Recent EWP Program Activities in Idaho

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1997 Idaho EWP Work					
Bingham, Bonneville, and Madison Counties	06/97	607,232	Flood	Erosion/Sediment	Streambank Stabilization
				Streams Clogged	Debris Removal
				Increased Flood Threat	Revegetation
				Threat to Life and Property	
Boise National Forest - Valley,	01/97	359,181	Flood	Access Roads Damaged	Drainage Projects
Idaho, Washington, and Adams Counties				Utility Service to District Forest Offices Cut off	Bank Stabilization
				Mass Movement of Uprooted Trees Filled Channels	Debris Removal
				New Channels Formed	
				Recreation Facilities Swept Downstream	
				Culverts/Ditches Plugged	
Adams, Boise, Gem, Idaho,	01/97	564,000	Flood	Roads/Infrastructure Destabilized	Streambank Stabilization
Latah, Nez Perce, Payette, Washington and Valley Counties				Channel Capacity Limited by Debris and Sediment	Debris Removal
				Potential Threats to Life and Property	Dike Repair
				Homes/Businesses Destroyed	Revegetation
1996 Idaho EWP Work					
Boise 8th Street Burn	8/96	5,662,254	Fire	Loss of Vegetative Cover	Revegetation
				Erosion Potential Increased	Streambank Protection
				Sediment-Laden Waters May Increase	Channel Flow Alteration
				Debris Accumulation Potential	Debris Removal
				Increased Threat to Life and Property	Grade Stabilization Structures
Nez Perce County	02/96	765,937	Flood	Erosion/Sedimentation	Streambank Stabilization
				Streams Clogged	Debris Removal
				Increased Flood Threat	Dike Repair
					Revegetation
Clearwater County	02/96	380,340	Flood	Erosion and Sedimentation Increases	Revegetation
				Streambank Degradation	Streambank Stabilization
				Debris Accumulation	Debris Removal
				Dike and Levee Degradation	
				Out-of-Bank Damage Downstream	
Latah County	02/96	402,577	Flood	Erosion/Sediment	Streambank Stabilization
				Streams Clogged	Debris Removal
				Increased Flood Threat	Dike Repair
				Threat to Life and Property	
					Revegetation

Table 2.5-4 Recent EWP Program Activities in Idaho, Cont'd

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1996 Idaho EWP Work					
Lewis County	02/96	96,720	Flood	Streambank Degradation	Bank Stabilization
				Debris Accumulation in Channels	Debris Removal
				Increased Flood Threat	
				Increased Threat to Life and Property	
Benewah County	02/96	84,300	Flood	Channel Capacity/Stability	Channel Reconstruction
				Threat to Life and Property Streams	
Bonner and Boundary	02/96	32,769	Flood	Channel Capacity	Debris Removal
				Increased Flood Threat	Dike Repair
				Increased Erosion/Sedimentation	Streambank Stabilization
				Threat to Life and Property	
Kootenai County	02/96	97,390	Flood	Streambank Erosion	Streambank Stabilization
				Increased Flood Threat	Debris Removal
				Threat to Life and Property	Dike Construction
Shoeshone County	02/96	171,886	Flood	Channel Capacity	Debris Removal
				Increased Flood Threat	Streambank Stabilization
				Increased Erosion/Sedimentation	Dike Repair
				Threat to Life and Property	Revegetation
1995 Idaho EWP Work					
Boise National Forest	08/95	219,270	Flood	Road and Utility Damage	Debris Removal
Boise, Elmore Counties				Channel Capacity/Sediment Dams	Streambank Stabilization
North Fork Boise River				Culverts Plugged	Seeding
				Mass Movement	Riparian Planting
				Streambank Erosion	
1994 Idaho EWP Work					
Boise County	08/94	105,817	Flood	Erosion/Sedimentation	Erosion Control Structures
Star Gulch Fire				Streams Clogged	Grade Stabilization
				Increased Flood Threat	Seeding
					Riparian Planting
1993 Idaho EWP Work					
Elmore County	08/93	830,670	Flood	Increased Erosion/Sedimentation	Seeding
Foothills Fire				Increased Flood Threat	
				Threat to Life and Property	

Table 2.5-4 Recent EWP Program Activities in Idaho, Cont'd

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1992 Idaho EWP Work					
Boise County	09/92	46,4318	Flood	Increased Erosion/Sedimentation	Seeding/Revegation
Dunnigan Creek Fire				Increased Flood Threat	Sediment Retention Structures
				Threat to Life and Property	
Blaine County	08/92	89,898	Fire	Increased Erosion/Sedimentation	Seeding/Revegation
Ro Fire				Increased Flood Threat	Sediment Retention Structures
				Threat to Life and Property	

Table 2.5-5 Recent EWP Program Activities in Iowa

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1993 Iowa EWP Work					
84 Counties	1993	31,900,000	Flood	Sedimentation	Debris Removal (136 Sites)
(Great Flood of 1993)				Erosion	Bank Stabilization (455 Sites)
				Damage to Levees	Levee Repair (54 Sites)
				Damage from Flooding	Other Erosion and Sedimentation Repair (57 Sites)
				Bridges/Culverts Destabilized	
				Roads/Properties/Drainage Ditches Damaged	
				Debris Accumulation	

Table 2.5-6 Recent EWP Program Activities in Missouri

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Practices
1996 Missouri EWP Work					
statewide	1996	295,290	Flood	Infrastructure Threatened	Not stated
				Levees Damaged	
				Ditches Damaged	
				Streams Blocked	
				Streambank Erosion	
1995 Missouri EWP Work					
statewide	1995	18,294,154	Flood	Infrastructure Threatened	Easements
				Levees Damaged	
				Ditches Damaged	
				Streams Blocked	
				Streambank Erosion	
1993 Missouri EWP Work					
statewide	1993	19,000,000	Flood	Streambank erosion	Bank stabilization
				Threats to bridges, culverts	Obstruction removal
				Threats to water and sewer lines	Dams and dikes
				Damage to levees and dams	
				Threat of property damage	
				Threat to public health	
				Debris in channels, culverts	
				Sedimentation	
				Threats to public lands	
statewide	1993	30,240,917	Flood	Infrastructure Threatened	Easements
				Levees Damaged	
				Ditches Damaged	
				Streams Blocked	
				Streambank Erosion	

Table 2.5-7 Recent EWP Program Activities in North Carolina

Location	Disaster Date	Total Federal$	Disaster Type	Watershed Impairments	EWP Practices
1996 North Carolina EWP Work					
Polk, Yancey, Mitchell	1/13/96	1,176,778	Heavy Rains	Stream Blockage	Bank Stabilization
Avery, Watauga, and				Threat of Property Damage	Obstruction Removal
Caldwell County				Flooded Cropland	Revegetation
				Stream Bank Erosion	
1995 North Carolina EWP Work					
Nantahala NF	10/5/95	11,253	Landslide	Sediment Deposition	Revegetation
				Threat of property damage	Obstruction removal
				Threat of road damage	
				Threat of bridge damage	
				Stream Blockage and bank erosion	
Nantahala NF	4/1/95	13,876	Flood	Threat of road damage	Bank Stabilization
				Stream bank erosion	Obstruction Removal
				Threat of fisheries damage	
Clay County	2/15/95	356,941	Heavy Rains	Stream Blockage	Bank Stabilization
Cherokee County				Threat of property damage	Revegetation
Graham County				Threat of utility damage	Obstruction removal
				Threat of road damage	
				Stream bank erosion	
1990 North Carolina EWP Work					
Graham County	3/15/90	39,104	Flood	Bank Erosion	Bank stabilization
Jackson County				Property Loss	Revegetation
				Sedimentation	
Swain Conty	2/9/90	48,400	Heavy Rains	Bank Erosion	Bank Stabilization
				Property Loss	Obstruction Removal
				Health and Safetey Threat	Revegetation
				Debris in River Channel	
1989 North Carolina EWP Work					
Watauga County	9/22/89	210,000	Hurricane	Stream Blockage	Bank stabilization
Ashe County				Threatened Bridges	Obstruction removal
				Flooded Cropland	
				Threat of property damage	
				Debris in channels, culverts	
				Streambank erosion	
Union County	9/22/89	387,500	Hurricane	Stream Blockage Clearing	Bank stabilization
				Threatened Bridges	Obstruction removal
				Threat of property damage	
				Debris in channels, culverts	
				Streambank erosion	

Table 2.5-8 Recent EWP Program Activities in Texas

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1997 Texas EWP Program work					
Bandera County	6/23/97	55,800	Floods	Stream Crossings Endangered	Not Stated
				Access To Subdivision Threatened	
Donley County	4/24/97	58,000	Floods	Sewer Treatment Plant Endangered	Levee Installed at Treatment Plant
				Sewer Water Backing Up into Homes	
1996 Texas EWP Program work					
Red River County	7/29/96	26,700	Floods/Heavy Rains	Debris/Sediment Accumulation in Channel	Debris Removal
				Flooding of Homes in Minority Neighborhood	
1995 Texas EWP Program work					
Collingsworth, Childress, Hall,	6/95	1,306,100	Floods	Sewage Treatment Plant Flooded	Diversion Use
Wheller, Foard, and Willbauger				Water Quality Degraded	
Counties				Roads/Bridges Endangered	Bank Stabilization
Collingsworth, Childress, Hall,	6/95	204,000	Floods	County Roads and Bridges Endangered	Bank Stabilization
Wheller, Foard, and Willbauger Counties				Sewage Treatment Plant Threatened	
1994 Texas EWP Program work					
Polk County	10/94	9,484	Floods	Head Cut	
				Utilities Exposed	Bank Stabilization
				Road Crossings Threatened	Debris Removal
Polk County	10/94	22,722	Floods	Head Cut	
				Utilities Exposed	Bank Stabilization
				Road Crossings Threatened	Debris Removal
Trinity County	10/94	9,065	Floods	Debris Jams	Debris Removal
				Bridges Endangered	
				Roads Endangered	
				Access for 100 Landowners Threatened	
Nacogdoches County	10/94	4,058	Floods	Head Cut	
				Utilities Exposed	Bank Stabilization
				Road Threatened	Debris Removal
				Rural Waterline Threatened	
Tyler County	10/94	124,292	Floods	Embankment Slope Failure	Bank Stabilization
				Outlet Channel Structures Eroded	Clearing
				Utilities Exposed	Debris Removal
				Access Road Threatened	
				Emergency Access Prohibited	

Table 2.5-8 Recent EWP Program Activities in Texas, Cont'd

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1994 Texas EWP Program work					
San Jacinto	10/94	9,705	Floods	Head Cut	Bank Stabilization
				Utilities Exposed	
				Outlet Structures Destabilized	
				Access Road Threatened	
1991 Texas EWP Program work					
Milam and Williamson Counties	1/20/91	140,000	Floods	Roads Endangered	Bank Stabilization
				Debris and Sediment Accumulation	Debris Removal
1990 Texas EWP Program work					
Comanche County	4/12/90	50,000	Floods	County Roads and Bridges Damaged	Streambank Stabilization
					Bank Stabilization
Austin, San Jacinto, Newton, Navasota, and Montgomery Counties	6/5/90	376,150	Floods	Roads Threatened	Streambank Stabilization
				Bridges Threatened	Bank Stabilization
				Homes/Churches/Cemeteries Threatened	

Table 2.5-9 Recent EWP Program Activities in Virginia

Location	Disaster Date	Total Federal $	Disaster Type	Watershed Impairments	EWP Program practices
1998 Virginia EWP Work					
Allegheny, Bath, and Rockbridge Counties	01/98	71,968.4	Flood	Stream Blockages	Obstruction Removal
					Streambank Stabilization
					Revegetation
1996 Virginia EWP Work					
Augusta County (George Washington and Jefferson National Forests)	09/96	32,000	Hurricane Fran	Log Debris/River Cobble in Channel	Obstruction Removal
				Forest Development Road threatened	Channel Alteration
15 Counties/ 2 Cities	09/96	7,214,300.1	Hurricane Fran	Threat to Life (1,019 People)	Streambank Stabilization
				Houses, Bridges, Business, Public and Private	Slope Stabilization
				Roads, Utilities, Agricultural Land Threatened	
				Debris in Streams	Obstruction Removal
				Streambanks Destabilized	
				Sediment Accumulation	
				Eroded Slopes/Land	Revegetation
				Flood Control Dams Damaged (13)	Dams/Dikes Repaired
				Stream Restoration Sites Damaged	
Augusta, Grayson Counties	01/96	17,000	Flood	Debris in Channel	Obstruction Removal
(George Washington and Jefferson National Forests)				Roads Threatened	Streambank Stabilization
				Campground Endangered	

Chapter 3

ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives—This section is the heart of the environmental impact statement. Based on information and analysis presented in the sections on the Affected Environment (1502.15) and the Environmental Consequences (1502.16), it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining issues and providing a clear basis for choice among options by the decisionmaker and the public. (40 CFR 1502.14)

This chapter summarizes the NRCS scoping process that gathered input on the EWP Program from NRCS personnel, other agencies, and members of the public and used that input to define the Program alternatives to be analyzed. It describes the EWP Program alternatives, including the no-action alternative, the proposed action, and an alternative to the proposed action, that were analyzed in detail. The chapter describes alternatives that were identified in the scoping process but not considered in detail in the PEIS analysis, and explains why NRCS eliminated those alternatives. The chapter provides text and tabular comparisons of the important aspects of the proposed action and alternatives that would likely cause differences in environmental impacts and summarizes and compares the beneficial and adverse environmental impacts of the program alternatives based on the detailed analysis presented in Chapter 5. It then describes mitigation measures developed in the course of evaluating the alternatives that NRCS could employ to reduce or eliminate adverse environmental impacts.

3.1 FORMULATION OF THE ALTERNATIVES—SCOPING FOR THE EWP PEIS

As noted in Chapter 1, the purpose and need for the NRCS proposed action is to incorporate changes into the Program recommended to improve the Program's effectiveness and to address environmental and other concerns. Authorization of floodplain easements for the Program in the 1996 Farm Bill and the recommendations of the O&E team were the first items to factor into defining the proposed action.

3.1.1 Ensuring Public and Agency Participation in the PEIS

In September 1998, NRCS announced its intent to prepare an EIS on the EWP Program (see 1998 NOI in Appendix A) and initiated a formal scoping process to solicit input on issues, concerns, and opportunities for Program improvement from the public and other local and Federal agencies. To ensure the public had an opportunity to comment, public scoping meetings were advertised in regional and local newspapers and held in Kansas City, Atlanta, Sacramento, Minneapolis, Albany, and Washington, DC. The first five cities were chosen because they are centrally located in regions where most EWP Program activities were being carried out and are accessible to

Scoping: There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. … the lead agency shall:…invite the participation of affected … agencies, and affected Indian tribe[s], and other interested persons … determine the specific issues to be analyzed in depth … [and] identify and eliminate from detailed study the issues which are not significant (CEQ NEPA Regulations, 40CFR1501.7).

the public by air, automobile, and rail transport. Meetings at these locations were expected to facilitate the involvement of state agencies as well. Washington, D.C. was included to facilitate participation of interested Federal agencies. Public comments also were received by mail, e-mail, and toll-free phone line.

NRCS also held discussions with other agencies, including FSA, EPA, USFS, FEMA, USACE, and USF&WS as well as NRCS field personnel who routinely deal with EWP projects.

In addition to the Federal agencies, 19 state agencies in 14 states and 20 county agencies in 12 states commented, as did regional agencies, a Native American tribe, and environmental groups.

3.1.2 Issues Identified through Scoping

A number of issues surfaced repeatedly during the scoping process. Most of the commenters said that the EWP Program is a good program because it works and that purchasing easements is a good idea because so much effort and money are spent to fix recurrent problems. Many said that methods more environmentally friendly than armoring should be used, that the exigency category is inconsistently and improperly used, that bureaucratic red tape delays projects, and proactive measures such as interagency pre-planning and coordination are critical.

Some commenters said that operating and maintaining easements might place too heavy a burden on landowners and that NRCS monitoring and maintenance of easements might be a problem. Others said that purchasing easements could lead to the introduction of T&E species where none existed before, creating serious concerns for their protection. A few commenters said that the EWP Program is so good that it should stay exactly as it is—it should not be altered in any way. Other commenters said that NRCS should include relocation of households out of flood damaged locations as an alternative to installing restoration practices, and that NRCS should reduce funding for repairs on recurrent impairments. Some commenters urged NRCS to include drainage ditches, unstable channels, and lakeshores in the Program, and allow for substitution projects in which funds could be used, for example, to rebuild a recurrently damaged bridge at a different location. Details of the EWP PEIS scoping process and a review of each comment received are provided in Appendix A.

NRCS reviewed the scoping comments and incorporated many of them into the definition of the alternatives, including the proposed action, which has been modified since the proposal was published in the NOI. How the recommendations made by the O&E Team (see Chapter 1), other NRCS personnel, and by commenters during the formal scoping process correspond with the elements of the Proposed Action is outlined in Section 3.2.2.1 of this Chapter.

3.2 ALTERNATIVES EVALUATED IN DETAIL

NRCS considered five EWP Program alternatives and evaluated the environmental impacts of three of those alternatives in detail. The alternatives that were evaluated in detail are described here and summarized in Table 3.2-1.

Table 3.2-1 Progressive Increments of Program Change Across Alternatives

	Alternative 1	Alternative 2	Alternative 3
	No action—Continue the Current EWP Program	**Proposed action—EWP Program improvement and expansion**	**Prioritized watershed planning and management**
Types of watershed impairments NRCS would address	Address traditional types of watershed impairments—in-stream, near-stream on floodplain, and in critical upland areas	Include more types of watershed impairments—in floodplains away from stream, upland debris sites, enduring conservation practices	Include more types of watershed impairments—address impairments in floodplain away from stream, upland debris sites, enduring conservation practices, and others
Improvements in EWP Program delivery and defensibility	No EWP Program improvements would be made	Institute Program improvements to deal with current and new types of impairment work	Institute Program improvements to deal with current and new types of impairment work
New program planning and management structure	No new planning and management structure would be instituted	No new planning and management structure would be instituted	Institute prioritized watershed planning and management

3.2.1 Alternative 1—No Action—Continue the Current Program

Under the no-action alternative, NRCS would continue to administer the EWP Program as it does now. NRCS would not make substantive changes in its administration, the mechanisms for review of projects before funding, or follow-up on the Program's procedures after completion. NRCS would continue to purchase floodplain easements on agricultural lands but would not institute purchase of floodplain easements on non-agricultural lands. NRCS would not expand the EWP Program to include watershed impairments it does not currently address, nor would it make any other changes that have been recommended to improve the delivery or defensibility of the Program. This alternative simply continues the current Program described in Chapter 2.

3.2.2 Alternative 2—The Proposed Action—EWP Program Improvement and Expansion

Under the proposed action, NRCS would institute changes to improve Program delivery and ensure the economic, environmental, and social defensibility and technical soundness of its decisions and practices. NRCS would also expand the EWP Program to deal with disaster recovery work it has not addressed previously and introduce easement purchase on improved lands.

3.2.2.1 Elements of the Proposed Action

The proposed action is comprised of 15 elements. The first 11 change how the EWP Program is conducted. Elements 12 to 15 incorporate new types of disaster recovery work that currently are covered to some extent by other USDA programs or state or local authorities, or that may not be covered at all.

1. Eliminate the terms "exigency" and "non-exigency"

The term “exigency” is applied too liberally and implemented for purposes for which it was not intended. States have used different interpretations for so long that the meaning is no longer uniform. Interpretations of “exigency” and “non-exigency” vary so widely among NRCS personnel and are so ingrained, that uniform definitions cannot be reached. In some cases, an “exigency” allows certain contracting procedures to be waived; in others, an “exigency” ensures funding of a project; and in still others, sponsors use “exigency” to obtain a better cost-share rate and to circumvent normal permitting requirements. These interpretations are not what NRCS intended when the two categories were established. Rather, the original intent was to allow NRCS to respond quickly to only those situations that needed immediate attention and that could be addressed within 30 days. Current regulations tie cost-sharing to this designation, although NRCS has not applied the higher cost sharing rate originally set for exigencies for the past five years, applying a single cost-share rate of 75 percent to exigency and non-exigency situations.

Under the proposed action, the terms would be eliminated and all sites would be considered emergency sites. Recognizing that certain situations require immediate attention, a second related change also has been proposed and is discussed under element 2.

The most substantive implication of eliminating the terms “exigency” and “non-exigency” is that the term “exigency” is cited in several nationwide 404 permits issued by the USACE for in-stream work. These permits allow recovery work to proceed quickly without the issuance of an individual 404 permit for each site. Other agencies’ documents may need to be changed as well.

This change would result in more uniform delivery of the EWP Program across the nation. A single emergency category would leave no room for interpretation. Eliminating “immediate need” for action would allow the DSR team the time to evaluate all aspects of a site from economic, environmental, and social standpoints. This change should not affect Program funding. This change would necessitate parallel changes by other agencies and may cause confusion until agencies and sponsors adjust to new terminology.

2. Stipulate that "urgent and compelling" situations be addressed immediately upon discovery

“Urgent and compelling” situations exhibit an extremely high potential for loss of life or significant property damage unless immediate action is taken. Instituting this element of the proposed action would allow NRCS to provide immediate funding and contract emergency-response measures on the spot.

Occasionally a situation demands immediate action to avoid potential loss of life and/or property should another event occur shortly thereafter. An urgent and compelling situation cannot be ignored in good conscience. Examples of such a situation are debris jamming into a bridge or culvert, causing water to back up and possibly endanger nearby buildings or the bridge itself; and a streambank undercutting a building that, if not stabilized immediately, could result in loss of the building.

This change to the EWP Program would allow immediate action when no reasonable alternative is available. The NRCS damage survey team leader would be authorized to carry out the needed remedial work to alleviate the urgent and compelling situation once

- A DSR is completed
- A team member has, or can secure, procurement authority
- EWP funds are available
- A determination is made that cost-share funds are available from the sponsor(s)
- Necessary land rights have been acquired

Other agencies would be notified as quickly as possible after the fact. All work on urgent and compelling situations would be completed within five days of the site becoming accessible.

Relieving an urgent and compelling situation could entail a simple temporary correction until a more permanent solution can be designed and implemented. The “urgent and compelling” designation would not be used to circumvent the permitting process, although permits could be obtained after the fact.

Staff members with appropriate procurement authority would be permitted to hire a contractor and relieve the immediate threat after a site is evaluated. Funding of up to $25,000 per state would be immediately available without request from a special fund established in the national office of NRCS for these situations. This would allow NRCS field personnel to react quickly and appropriately. Table 3.2-2 addresses actions that a state can take based upon the availability of funds.

Table 3.2-2 Actions Available for Urgent and Compelling Situations

Availability of Funds	Cost $25,000 or less	Cost > $25,000
EWP funds available in state	Proceed immediately	Proceed immediately
State does not have sufficient EWP funds available	Proceed immediately Funds available from national office Notify national office when job is complete	Contact national office for funding over $25,000 Proceed when notified funds are available

The changes introduced by this and the previous elements of the proposed action would reduce the number of situations when immediate action is taken, limiting immediate action to situations of an extremely critical nature. It would save time and better respond to local needs.

3. *Set Priorities for Funding EWP Practices*

In some situations, more EWP work needs to be carried out than can be covered with available funds. In other cases, damage is so great that an extended period is necessary to complete work on all eligible sites. When a state conservationist declares a local disaster, this element of the proposed action would impose the following priorities to determine the order in which sites would be repaired.

Table 3.2-3 Priority Order of EWP Funding

PRIORITY	DAMAGE SITUATION
1	Urgent and compelling situations
2	Sites where there is a serious, but not immediate, threat to human life
3	Sites where buildings, utilities, or other important infrastructure components are threatened
4	Sites with Federally Protected Resources, including: ➢ Sites inhabited by Federally-listed T&E species or containing the species designated critical habitat where the individuals of the species or the critical habitat would be in jeopardy without the EWP practice ➢ Sites that contain or are in proximity to cultural sites listed on the National Register of Historic Places where the listed resource would be jeopardized if the EWP practice were not installed ➢ Sites where prime farmland supporting high value crops is threatened ➢ Sites containing wetlands that would be damaged or destroyed without the EWP practice ➢ Sites that have a major affect on water quality
5	Sites containing unique habitat– supporting State-listed T&E species or species of concern, recreation, or State-identified sensitive habitats other than wetlands
6	Other lands

Currently, in a Presidentially declared disaster, NRCS takes its direction from FEMA (or the state agency having emergency recovery responsibilities). NRCS would continue to do so after the implementation of this change, following priorities set by those agencies. This could result in some deviation from the above priority list in those circumstances.

4. *Establish a cost-share rate of up to 75 percent for all projects (except for those in limited-resource areas, where sponsors may receive up to 90 percent)*

Under current EWP Program regulations, exigencies receive up to 100 percent Federal funding and non-exigencies up to 80 percent Federal funding. Eliminating the exigency and non-exigency categories would also eliminate the differential cost sharing and make these regulations moot. A single category of emergency would require a single cost-share rate. In addition, NRCS would reduce the general cost share ceiling to align it with the rate used in related Federal programs. Under the proposed action, NRCS would reduce the general cost share rate, funding all emergencies up to 75 percent.

However, some increase in the Federal cost-share rate appears warranted for sponsors with limited resources because NRCS recognizes the needs of those who might not be able to participate in the Program at the 75 percent cost-share rate. Therefore, NRCS would make limited-resource sponsors eligible to receive up to 90 percent Federal funding.

A limited-resource area (normally a county) would be defined as an area where housing values are less than 75 percent of the state average, per capita income is less than 75 percent of the national median income, and unemployment during the preceding three years is twice the U.S. average. All three criteria would have to be met to qualify. The most recent U.S. census data for an entire county would be used regardless of the income of individual communities. About ten percent of U.S. counties are expected to qualify as limited-resource areas.

If a natural disaster strikes a limited-resource community in a non-limited-resource area, the NRCS state conservationist would have the authority to document the limited-resource status using state census data for the three factors mentioned above, and thus approve the 90-percent cost-share rate for that community. In no case would this procedure be used for a unit smaller than a community, which is defined as a unit of government or a group of people within a bounded geographical area who interact within shared institutions, and who possess a common sense of interdependence and belonging. Non-government communities would be categorized as limited-resource communities based on their median housing values, per capita income, and level of unemployment. Implications of this change are that participation in the Program would be more readily available.

Reducing the rate from 100 percent to 75 percent would not change Program operation since the 100 percent rate has not been used for the past five years, but it could result in a need for additional Program funds to cover the higher rate for limited resource areas. This change also would keep the EWP Program aligned closely with the emergency programs of other agencies.

5. *Stipulate that practices be economically, environmentally, and socially defensible and identify the criteria to meet those requirements*

Current EWP Program review standards require NRCS staff to review proposed EWP emergency practices for environmental and economic defensibility as well as for technical soundness. Under the proposed action, NRCS would add a social defensibility review requirement, which would require review of alternatives based on the ideals and background of the community and individuals directly affected by the recovery activity. All three defensibility categories would be used to determine a project's overall defensibility. Further, a project that is not economically defensible could be eligible for EWP Program funding if there were a compelling social or environmental justification for the work.

Because more values are at issue in decisions concerning EWP practices than can be expressed in strictly economic terms, NRCS proposes to change its policy to ensure that all benefits—not just dollar benefits—are included in site evaluations. The Government tends to deal strictly with a cost-benefit ratio and does not generally account for benefits that cannot be expressed in dollar terms. However, social factors have a direct impact on or are affected by EWP work but cannot be expressed easily in terms of dollars. This change is proposed to ensure that community values as well as economics are taken into consideration.

Only EWP sites that meet the overall defensibility criteria would be installed with EWP Program funding. The EWP work proposed for a site would be considered defensible if the practices installed:

- Comply with Federal, state, and local laws
- Are acceptable to affected individuals and communities
- Protect natural resources effectively
- Include all necessary physical components
- Reduce targeted threats to life and property effectively

A logical sequence of steps (Fig. 3.2-1) would be taken in reviewing the decisions to be made at an EWP site.

The process assumes the determination has been made that life or property is being threatened by a watershed impairment as a result of a natural disaster. First, a determination is made as to whether an easement would be feasible for the site. If not, a preliminary design for an appropriate EWP practice is prepared and reviewed for technical soundness. Then, the environmental, social, and economic defensibility of the proposed practices are evaluated. The Tier 1 environmental and social defensibility reviews employ checklists to determine if the installed EWP practice or some aspect of the EWP project could potentially harm some important element of the environmental or social communities in the locality. Where such adverse effects are likely and may be significant, mitigation to reduce the effect below a level of concern is considered. Where such mitigation is not feasible, redesign is considered. Where redesign would not help, the proposal would not go forward.

Tier 2 checks are undertaken if the determination is made in the economic evaluation that the proposed practice is not economically justified simply in

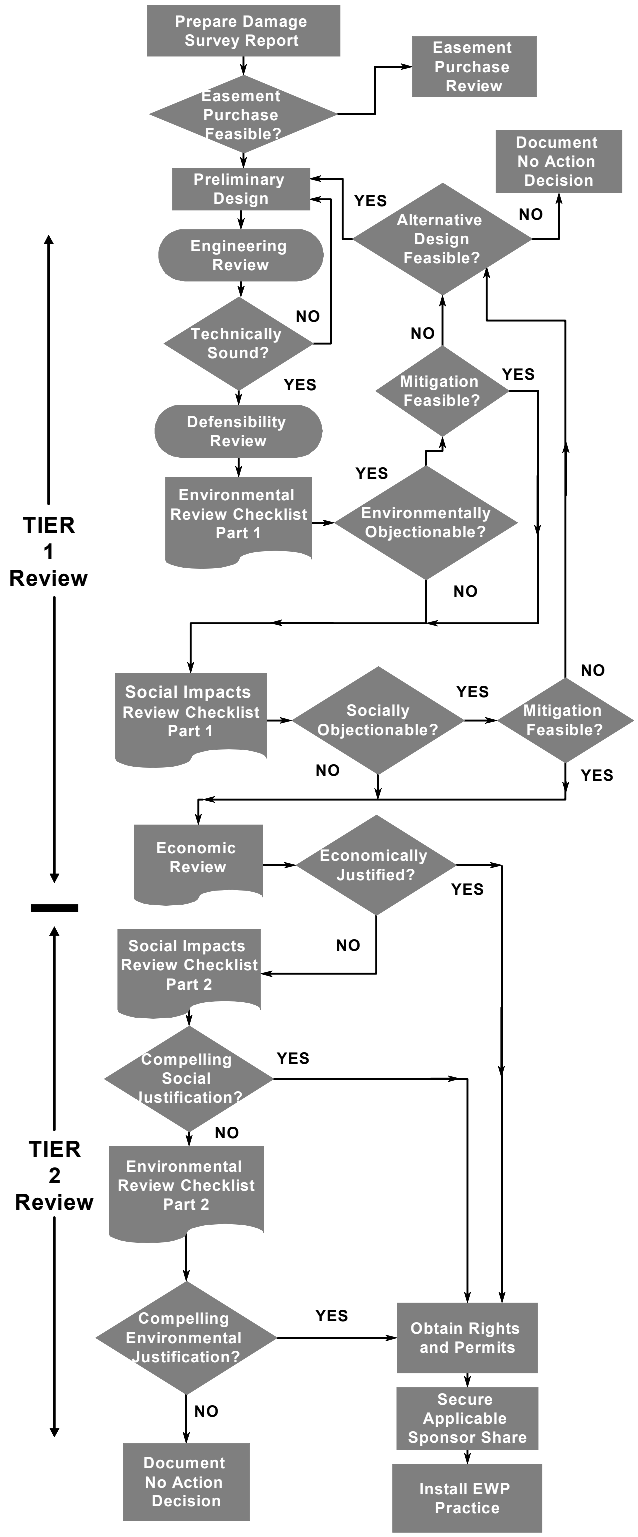


Fig. 3.2-1 Flow logic for defensibility review of EWP practices.

terms of the monetary value of the protected property and related dollar values. Where compelling environmental or compelling social values would be protected, the recommendation may be to proceed with the installation of the EWP practice. Where neither case could be made the proposal would not go forward.

To determine economic defensibility, near and long-term probable damages to the property, not the market value of the property being protected, would be evaluated. (See proposed revised DSR in Appendix C.)

EWP work would be environmentally defensible if 1) the proposed recovery work would not adversely affect the environment or 2) any adverse effects could be adequately mitigated. If there were a potential for a significant environmental impact at a site, for example, a potential for the EWP work to jeopardize a T&E species, mitigation would be required before any work would proceed. The mitigation might involve delaying the work or employing some alternative restoration measure, or the decision might be made to not do any work at all. Work in a stream that supports salmon reproduction might need to be delayed to ensure that no impact to their spawning occurs. Where adverse impacts might occur that would not be significant, all reasonable mitigation efforts to minimize the adverse effects would be accomplished as feasible, and the proposed work would proceed.

NRCS is considering how to consistently evaluate the social defensibility of EWP Program practices at the field level. The approach under consideration is based on a checklist of social, socioeconomic, and local/community cultural values that EWP Program field personnel would use when filling out the DSR for a site. This checklist would be in line with the economic and environmental evaluation checklists that are part of the DSR described in the National EWP Handbook. NRCS would ensure that this checklist is consistent with the social impact evaluation in the PEIS. For example, installation of a large debris basin may protect individual homes but might disrupt the pattern of social life in the affected neighborhood. Consideration would be given in this case to possible redesign or relocation of the debris basin to minimize the effect.

6. *Improve disaster-recovery readiness through interagency coordination, planning, and training*

NRCS would seek improved coordination between EWP and other emergency programs, request state conservationists prepare emergency action plans (EAPs) that detail working relationships with other groups on the Federal, state and local levels, and employ disaster assistance recovery training (DART) teams to train its employees.

Interagency coordination. NRCS would evaluate and implement ways to improve coordination between the EWP Program and other emergency programs. Coordination would help each agency understand better the roles and responsibilities of the other agencies. This would entail working more closely with EPA, FWS, USACE, and state emergency response and recovery agencies to avoid problems with permits, regulatory consultation, and duplication of work. This was a key point brought out at public scoping meetings.

Planning. NRCS would request state conservationists to prepare Emergency Action Plans (EAPs) to define working relationships among Federal, state, and local groups. The state conservationist would activate an EAP when a natural disaster occurs or an emergency is declared. In those cases where a state plan already exists, and NRCS is a major partner in that plan, a separate EAP would not be required.

State conservationists would take the lead in establishing and coordinating EWP disaster-readiness teams to develop state EAPs for implementation in case of emergency. A state team should consist of leaders of the USFS, USFWS, EPA, USACE, FEMA, other USDA agencies, state agencies, state associations of conservation districts, and other agencies and partners needed to accomplish the task of this team. A state disaster-readiness team should meet periodically (at least annually) to review procedures, update the EAP if appropriate, and meet other agencies' emergency-preparedness personnel.

The EAP should address:
- role of each cooperating agency
- coordination of immediate disaster response
- potential sponsors of EWP work
- typical practices used in recovery work
- expediting the permitting process
- contracting procedures,
- environmental concerns, especially identifying critical habitat of T&E species, wetlands, and cultural resources
- appropriate public outreach efforts to keep the public informed
- other issues as needed

This plan is expected also to include a record of those areas that would require consultation with the U.S. Fish and Wildlife Service on threatened and endangered species, SHPO on cultural resources, USACE on 404 permitting, and State DNR (or other cognizant state agency) on state permits. EWP Program planning would identify environmental baseline information, including T&E species, cultural resources, and other sensitive resources such as wetlands and fisheries deemed important by the state and other resource agencies, including the USFWS and the National Marine Fisheries Service. All these resources would be identified in the EAP.

Training. NRCS would employ interdisciplinary DART teams with up-to-date knowledge of the EWP Program to provide disaster-readiness training to NRCS employees on a non-emergency basis. The teams also could be dispatched to disaster sites to train employees, sponsors and others in emergencies. DART team services would be provided upon request of a state conservationist and could be adapted to meet specific needs.

In an emergency, the team would help a state conservationist establish an emergency recovery office, train local personnel, and recommend operating procedures. Once a work force is trained, DART team members would return to their duty stations but remain available for consultation. DART would uniformly execute the EWP Program across state lines.

DART disaster-readiness training would emphasize how best to be prepared in the event of a disaster. Teams would focus on developing Emergency Action Plans (EAPs) and coordinating with other agencies to avoid having to make fundamental decisions under duress.

Implications of this element include the establishment of more uniformity in Program delivery, improved cooperation between agencies involved in recovery work, and a more efficient response to disaster.

7. Allow repair of impairments to agricultural lands using sound conservation alternatives

Under current regulations, long-term structural protective practices are not implemented on unimproved agricultural land. The proposed action would allow NRCS to install sound structural practices on unimproved lands where economically, environmentally, and socially defensible.
Current policy does not allow permanent structures such as riprap to protect agricultural lands. In the past riprap was used indiscriminately to stabilize streambanks. This was not in the best interest of conservation and the process often raised economic questions.

Current policy discriminates against agricultural landowners with high-value agricultural lands. This policy is being dropped because the USDA is moving away from riprap and due to the increased emphasis on defensibility to justify carrying out needed work. NRCS technical specialists would be encouraged to use combinations of armoring, bioengineering, and vegetation to protect streambanks where appropriate.

Implications of this action are increased streambank work carried out under the Program and thus increased Program costs. In addition, landowners would have equal chances of receiving needed benefits.

8. Limit repair of sites to twice in a 10-year period

Successive disasters may strike one area within a relatively short period and require repeated emergency EWP interventions at one location. Under the proposed action, NRCS would limit repairs to twice within a 10-year period. If a site already has been restored twice and less than 10 years have elapsed between the disaster that triggered the first repair and the disaster now triggering a third repair, the only options available would be to purchase a floodplain easement on the damaged site or to take no action at all.

If a building is protected it is considered one EWP site. Regardless of what practice was used or in what specific location it was restored to protect the building the first two times, any third restoration to protect the building would not be allowed. Because dikes (or levees) can run contiguously for miles, a specific location on a dike (or levee) is considered one EWP site for the determination of where a recurrent failure occurs along the dike. Repairs can be made repetitively on a dike so long as the same location on the dike is not repetitively repaired.

Other programs are available to landowners and sponsors to plan and implement protective practices to solve resource problems that continue to recur. The Federal Government does not have funds to indemnify those reluctant to relocate homes, businesses, and farming operations out of harm's way. If a landowner is not interested in selling a floodplain easement, the needed recovery work would not be accomplished.

Other emergency programs limit the number of times the Federal Government would compensate individuals who suffer disaster damages. This proposal would bring the EWP Program in line with this general trend in Government. EWP Program guidance would stress the need for sufficient local documentation of EWP Program implementation to monitor this requirement.

EWP is a recovery program, not a prevention program. Other programs are available to plan and implement protective practices to solve recurrent problems. This Program change would encourage individuals and project sponsors to use those programs to solve existing resource problems.

Implications of this change are not great. Cases where a site is repeatedly damaged are not numerous. Therefore, additional costs to the Program are expected to be minimal. This change would encourage people to allow the floodplain to perform its natural function.

9. *Eliminate the requirement that multiple beneficiaries (property owners) be threatened before an impairment location site would be eligible for EWP Program repairs*

NRCS policy has always required an EWP practice to have multiple beneficiaries to be eligible for funding (except in exigencies when single beneficiaries are allowed), primarily to avoid windfall benefits to a single landowner and to ensure that the general public benefits from the Federal funds spent. However, experience with the Program indicates that only rarely does EWP site work result in substantial benefits to only a single landowner. Under the proposed action, NRCS would eliminate the multiple-beneficiaries requirement.

This change would be implemented because NRCS recognizes that natural resource issues affect areas that are not bounded by property ownership lines. Areas downstream of repaired sites benefit from repairs in ways that include sediment reduction and habitat preservation. Recognizing that these downstream benefits do result, it was decided to eliminate the multiple-beneficiaries requirement.

In current practice, DSRs are complete enough that the defensibility of work in terms of multiple beneficiaries should not be at issue. These benefits already were being specified in most cases. This change therefore would not change Program costs or NRCS staff time spent on Program activities because this proposal simply codifies current practice.

10. *Apply the principles of natural stream dynamics and bioengineering to the design of EWP restoration practices where they constitute the least-cost defensible solution*

This element of the proposed action would be implemented by incorporating design techniques published in the NRCS Handbook "Stream Corridor Restoration: Principles, Processes, and Procedures" developed by 15 Federal agencies under the leadership of NRCS. DART teams would incorporate these concepts into training presentations, and NRCS employees responsible for EWP practice design or review would be encouraged to take training in the principles of stream restoration.

For the past five years, NRCS has encouraged technical assistance to be more sensitive to the environment in the design and installation of EWP practices. Much has been accomplished, but the agency seeks to carry this concept further. It proposes that NRCS look at more than just site damage alone; that they also consider the dynamics of the overall stream environment and design practices that lead to a more stable hydraulic and environmental condition. These techniques are effective only in certain situations, and sites would be evaluated individually according to the resources affected.

The implications of this proposal in terms of increased training costs would be compensated by the cost savings from better design of stream restoration practices. Channels would be more stable and aquatic species would be able to reestablish themselves in a shorter period. Fewer failures would occur if the stream environment was stable and in equilibrium, which would decrease costs in the long term.

11. Simplify purchase of agricultural easements.

For this change, NRCS would establish a single agricultural easement category and would specify compatible landowner uses. Current NRCS easement guidelines, which are presented in National Watersheds Manual Circular 4, define three categories of floodplain easements that differ in the level of restriction on landowner uses, from prohibiting uses such as cropping, grazing, or timber harvest (under Category 1) to allowing the landowner to retain rights for cropping, haying, grazing, or timber harvest (under Category 3 which pays only 50% of the easement value). Category 2, which allows compatible uses would be the single category retained. Landowners would have the right to request compatible uses including, but not limited to, managed timber harvest, periodic haying, or grazing. To be approved as a compatible use, the activity would have to be consistent with long-term protection and enhancement of the flood control, erosion control, and conservation purposes for which the easement was established. NRCS would make the final decision relative to the amount, method, timing, intensity, and duration of any compatible use that might be authorized. Cropping would not be authorized as a compatible use and haying or grazing would not be authorized as a compatible use on lands that are being returned to woody vegetation.

12. Repair enduring (structural or long-life) conservation practices

Under the proposed action, NRCS would make enduring conservation practices that are damaged during disaster events eligible for EWP Program cost-share assistance. Nonstructural management practices such as conservation tillage would not be eligible. This provision would include repair of such conservation practices as waterways, terraces, embankment ponds, diversions, irrigation systems, and animal waste systems.

This change to the EWP rule would formalize the current policy set by the blanket exception to the EWP rule made by the NRCS Chief in 1996 for NRCS-assisted dams. It would permit repair of NRCS-assisted structural practices constructed under the Small Watershed Protection and

Flood Control Program (Watershed Protection and Flood Prevention Act of 1954, "PL 83-566"), Flood Prevention Program (Flood Control Act of 1944, "PL 78-534"), Resource Conservation and Development Program, and the Pilot Watershed Program.

When a disaster strikes, NRCS-assisted, project-type flood control structures may be damaged beyond the level that would normally be dealt with under routine operation and maintenance activities and beyond the sponsor's ability to make needed repairs. For example, when an emergency spillway is damaged, extensive repairs can be required to allow it to function properly in the future. However, in many cases these dams are high-hazard structures above towns where failure cannot be tolerated. The EWP Program regulations currently prohibit providing structural assistance unless the chief of the NRCS grants an exception. In 1996, the chief granted a blanket exception to this requirement and assistance has been provided on several occasions.

With respect to enduring conservation practices, upgrading damaged or undersized practices when technology advances or construction techniques warrant would be permitted. All structures that require a permit issued by a state or local entity shall be designed and installed to meet the minimum requirements of the permit.

Implications of adopting this proposal include:

- The repair work would address conservation needs that may not be addressed elsewhere
- It would help ensure that practices remain functional rather than being abandoned
- It would allow the EWP Program to assist more landowners
- Rapid treatment by the EWP Program might prevent further damage on and off site
- It might lead to repairing practices that were poorly designed or inadequately maintained
- Needed repairs could be made in a timely manner if sponsors know they would receive help to make them
- It would increase the dollar amount in NRCS supplemental appropriations requests for EWP Program funds to cover the additional work

13. ***Partially fund improved alternative solutions***

If a sponsor would want to increase the level of protection provided by a proposed EWP practice or extend the protection afforded by the practice beyond what is justified under EWP policy and guidelines, the sponsor would have to pay 100 percent of the upgrade or additional work (in addition to the required 25 percent of basic EWP cost). NRCS would do the environmental evaluation and design work as part of the total package, but any necessary additional permits and/or mitigation would be the sponsor's responsibility. For example, NRCS might consider a 200-foot structural practice sufficient to meet the streambank restoration need at an EWP site but a sponsor might want greater protection with a 300-foot design. In this case, NRCS would assist in the design and defensibility evaluation of a 300-foot structural practice but would fund only 75 percent of the cost of the 200-foot design. The sponsor would pay their 25 percent share of the 200-foot installation plus 100 percent of the cost of the extra 100-feet. NRCS would assist with the design and their limited share of the funding of this larger installation so long as the increased-size work was otherwise environmentally and socially defensible.

Substitution of one practice for another would be allowed if the benefits of the practice were not reduced, the sponsor paid additional costs associated with the change, and the new practice was environmentally and technically sound and compatible with local zoning. NRCS would determine if the proposed change is acceptable. Changes that appreciably increase the time NRCS would have put into the original planning, design, or installation may require reimbursement of NRCS by the sponsor for additional time spent.

This policy change would make the Program more locally-led by giving sponsors and landowners more opportunity to determine what is in their best interests but would ensure that public funds would be used only for public benefit. This added element also would allow more work to be carried out under NRCS supervision, rather than a sponsor deciding to do the work on their own without EWP assistance. It would result in some additional cost to the Federal Government because installation time might increase slightly. This is not expected to cause much change in Program operation because requests in the past have not been numerous. However, it is possible that the number of requests was low because sponsors knew substitution was not permitted.

NRCS recognizes that there are times when a sponsor may decide to do additional work after the initial EWP work is completed and accepted. In some cases, this is work that NRCS would not approve or install under any circumstances. Landowners have also been known to hire the contractor for "after hours" work for a cash payment. NRCS would discourage this type of activity (including contract termination) if there were reason to believe it might occur to ensure that the additional work does not jeopardize the EWP work.

14. Allow disaster-recovery work in floodplain areas away from streams and in upland areas

Currently, EWP Program work is normally confined to watercourses and areas immediately adjacent, except in case of drought or fire, when work may be carried out on critical areas in upland portions of a watershed. However, agricultural productivity, public health and safety, and the environment often are threatened in the aftermath of disasters that occur outside these limits. NRCS proposes that the EWP Program expand to include practices needed on all lands.

This element of the proposed action would expand the EWP Program to include areas away from streams and would allow the removal of sediment from agricultural land (croplands, orchards, vineyards, and pastures) and other debris (generally windblown) from upland areas, particularly in environmentally sensitive areas.

EWP Floodplain Deposition Recovery Practices

Deposition of excessively large quantities of sediments on floodplains may result from heavy flooding. Such materials are usually coarse and infertile, and they often destroy or smother plants. This is a normal occurrence in the dynamics of floodplain systems but it can jeopardize the productivity of agricultural lands. Alternative practices that are considered in these cases would include:

- Removal and disposal of the sediment
- Incorporating the sediment into the underlying soil

Where neither option is feasible, a floodplain easement would be encouraged. The most effective alternative treatment depends upon many factors such as the size of the particles, depth of material deposited, lateral extent of the deposit, land use and soil type of the underlying material, and value of the land to the entire agricultural operation. When the extent of the sediment is not great, heavy equipment can usually be used to scrape it up and load it into trucks. Some type of disposal area is required with this solution. Without NRCS assistance, it may be pushed to the side of the field to form a low berm, which would reduce the productive acreage of the agricultural land but more importantly would serve as a sediment storage area that would wash further downstream to affect some other agricultural land. In those situations where the affected area is large, this solution often is not an alternative.

Floodplain easements are usually a viable option in cases when there is too much deposition to incorporate and it is not feasible to dispose of the debris. EWP funds can be used to purchase rights to the affected acreage that would then be allowed to function as a natural floodplain. A one-time payment is made in exchange for the agricultural and development rights to the land. No future disaster payments would be made to the landowner once the easement has been purchased.

The practice components used to deal with floodplain deposition include:
- Creating access when needed to move trucks and heavy equipment to the site
- Using heavy equipment to plow in or remove the sediment
- Grading and shaping the area affected by the debris operation
- Using or disposing of the sediment off-site

EWP Upland Debris Removal Practices

Most debris deposited on upland areas is wind-borne, and it is the result of hurricanes and tornadoes. Such debris usually consists of downed trees, telephone poles, fence posts, hazardous or toxic household materials such as paints, petroleum-based organic liquids, propane and other gas tanks, or building materials, such as insulation, shingles, metal roofing, metal siding, and similar non-biodegradable materials, which may cover portions of several watersheds. These items may constitute a public health and safety threat, as well as a threat to water quality. They are potentially harmful to wildlife within the area, and may pose a fire hazard or a breeding ground for undesirable pest species.

NRCS recognized that much of the necessary debris removal in these situations is not eligible for assistance through any Federal program and can be cost prohibitive for a landowner to deal with. Much of the debris may be scattered in rural or sparsely populated areas on private lands.

The practice components used to deal with upland debris deposition include:
- Creating access when needed to move trucks and heavy equipment to a debris site
- Using chain saws, other power tools, winches and other machinery and heavy equipment to gather and process the debris for onsite disposal or removal
- Disposing of debris onsite by burial, chipping, or burning
- Loading on trucks for removal and disposal off site

- Obtaining special technical assistance and personnel to handle hazardous materials such as asbestos, petroleum products, propane or other compressed gas containers, or other potentially hazardous or toxic compounds or materials
- Grading, shaping, and revegetating, by seeding or planting, any portion of the area affected by the debris removal operation

15. Purchase easements on non-agricultural lands.

In 1996, the EWP Program was expanded to include the purchase of floodplain easements as a tool in the disaster-recovery process to reduce future Government outlays for damages. Currently, purchasing floodplain easements is allowed on agricultural lands only. (Agricultural lands are predominantly cropland, including orchards and vineyards, pasture, hayland, and forested land, adjacent to watercourses.) This change would allow NRCS to purchase easements on both unimproved and improved rural lands regardless of land use. Current procedure for purchasing unimproved-lands easements is described in Chapter 2. Purchase of non-agricultural land simply would be added to this procedure.

For improved land, NRCS would provide 100 percent of the predisaster cost of the easements with all interests and rights included. A deed restriction would permit uses compatible with the natural floodplain functions as determined by NRCS. Since this would be a voluntary selling, the Uniform Relocation Act would not apply. Structures would be demolished or relocated outside the 100-year floodplain, whichever is least-cost, based on a 75/25 cost-share. Landowners would be responsible for finding new housing and moving their belongings. These easements would necessitate a sponsoring local organization who would take title to the property, carry out any monitoring of use, enhancement, or operation and maintenance needed. A deed restriction would permit only uses compatible with the natural floodplain functions as determined by NRCS.

This element of the proposed action would tend to increase Program costs in the short run, but reduce costs to the Federal government in the long run, as people are relocated out of the floodplain. As more acreage is returned to an open condition, the floodplain would be able to function in a more natural fashion. Since in most cases the holder of the easement restrictions would be a town or local municipality, it would be easier for the sponsor to control its use and reserve the land for appropriate floodplain uses.

3.2.2.1 Correspondence between Proposed Action Elements and Scoping Recommendations

Table 3.2-4 summarizes how the elements of the EWP proposed action address the recommendations made by the O&E Team and others during scoping. Some changes that are being implemented but that would not cause environmental impacts are noted but are documented elsewhere. Recommended changes that were not included in the Proposed Action are also noted.

Table 3.2-4 Correspondence between O&E Team and other Scoping Recommendations and Elements of the EWP Proposed Action

Oversight & Evaluation Team Recommendations	
Objective 1 Recommendations	**Resolution**
Provide training to NRCS employees and partners.	Element 6 of the Proposed Action (PA) would provide for additional training of NRCS staff to improve program effectiveness.
Limit use of the exigent classification to situations where funding is immediately available, the near-term probability of damage to life and property is high enough to warrant immediate NRCS action, funds can be obligated within 10 days, and construction completed in 30 days.	PA Element 1 would eliminate the use of 'exigency', instead using 'urgent and compelling', as defined in element 2.
Limit assistance at road crossings to instances where the facility is not covered by an Operation and Maintenance Agreement with a division of state government or is not under other agency jurisdiction.	The current EWP Program allows for protection of only non-Federally-assisted roads.
Objective 2 Recommendations	**Resolution**
Revise policy to emphasize restoration of the ecological functions of a system at an eligible site. Emphasize use of bioengineering, fluvial geomorphology, and similar techniques. Require an interdisciplinary team approach for site assessments, alternative selection, and design.	PA Elements 5 and 10 would stress design of restoration work using the principles of natural stream dynamics. Element 6 would foster further training, coordination, and planning.
Develop new and strengthen existing national, regional, and state partnerships by entering into EWP-specific agreements with agencies and organizations to address coordination, permit issuance, training, outreach, responsibilities, and follow-up to completed work.	PA Element 6 would facilitate improved coordination with other agencies.
Record EWP sites geo-spatially; use these data to locate recurrent EWP activity; then fund studies to identify more permanent solutions in the watershed.	PA Element 8 would require NRCS to track the number of repairs at each site so that no site is repaired more than twice in 10 years.
Provide national guidance to evaluate an appropriate sample of EWP repairs in state quality-assurance plans.	This objective was considered but not evaluated in detail.
Objective 3 Recommendations	**Resolution**
Institute outreach procedures during EWP activation in each state.	Outreach procedures are part of the planning process under PA Element 6
Restructure Operation and Maintenance agreements to accommodate sponsors with limited resources and reduce their responsibilities to a shorter time frame.	PA Element 4 would provide for a larger Federal cost share in resource-limited areas.
Revise Part 509 of the National Watershed Manual to encourage use of sponsors or contracting for these activities and revise the handbook accordingly.	This process is underway.
Seek an annual allocation to fund exigent situations, maintain a level of preparedness, and fund interdisciplinary EWP response teams.	PA Element 2 would establish a fund from which 'urgent and compelling' repair work can be completed almost immediately. PA Element 6 would provide for further training and disaster preparedness.
Revise national policy to emphasize inter-state uniformity in the application of EWP; regions should establish collectively a process to ensure such uniformity.	PA Element 6 DART Teams would be set up to do just that.
Revise policy to streamline data requirements and develop an electronic process to request funds, document partner activities, submit final reports, and record site damages.	The proposed revised EWP Manual contains these changes.

Table 3.2-4 (continued)

Other Recommendations From Scoping	
Floodplain Easements	**Resolution**
Easements are appropriate as a preventative tool or as an alternative to engineering solutions, especially where repeated use of engineering solutions has been unsuccessful.	PA Element 8 would limit repairs to twice in 10 years. Elements 11 and 15 would allow purchase of easements at those sites.
The policy on using floodplain easements should be clarified. Provide sufficient guidance on the use of easements- specifically, on what criteria trigger use of easements, the applicability of repeated flooding as a trigger and what cost/benefit considerations apply.	PA Elements 11 and 15 and the revised EWP Manual clarify easement policy.
Easement use would require additional funding and staffing Purchasing easements would increase the burden on NRCS staff. Hire additional staff dedicated to EWP.	NRCS would seek increased appropriations for easement purchase.
Easement use where there are residences should include relocation of residents.	PA Element 15 would provide for relocation
Focus easement purchases in flood-prone areas, purchasing contiguous plots of land to avoid a patchwork system.	PA Elements 11 and 15 would promote purchase of contiguous plots where feasible.
Eliminate Category 1 of the proposed action, and purchase cropping and development rights along with easement purchases.	PA Element 11 eliminates category 1 easements. Purchase would include development rights and would not allow cropping.
Allow some level of funding for the maintenance of easements because of potential problems outside the easement if no maintenance is done. Employ a land management company to manage the easements	NRCS is considering this recommendation, although no definitive action has been taken.
Extend easements to urban areas.	PA Element 15 would extend easement purchase to improved lands but NRCS does not anticipate easement purchase in major urban areas.
Speed the easement purchasing process to take advantage of land that comes on the market.	The cost of easements for the number of landowners willing to sell now far outstrips the available funding.
Inform the seller of tax implications	This would be stressed at a series of workshops planned for FY2000
Coordinate easement purchases with other federal programs pooling funds from several agencies to purchase easements	Was considered but not included in proposed alternative.
Floodplain Easements	**Resolution**
Floodplain easements do not fit in the EWP mandate to relieve imminent threats to life and property.	NRCS believes that easements are a realistic alternative to repetitive repairs and government outlays in disaster-prone areas.
Use easements in certain low relief and developed areas only if set-back levees are used. Some areas in CA are farmed in summer, flooded in winter.	Use of setback levees with easement purchase is part of the current program. PA Element 11 would eliminate cropping as a compatible use and thus address this practice.
Limited Resource Sponsors	**Resolution**
What constitutes a limited-resource sponsor be defined clearly, fairly, and objectively	PA Element 4 identifies a practical equitable approach for determination of a limited resource area

Table 3.2-4 (continued)

Economic, Environmental, and Social Defensibility	Resolution
For the installed EWP measures to be environmentally defensible, they need to take into consideration T&E species and shallow-water habitats for fish, wildlife, and invertebrates.	PA Element 5 would ensure that environmental review of proposed solutions would cause no significant adverse effects to these ecosystem components. Coordination with the U.S. Fish & Wildlife Service would ensure no T&E species is jeopardized
Where the installed measures are found to be not completely defensible environmentally, EWP funds should be made available for mitigation work.	PA Element 5 would ensure that mitigation for adverse effects would be accomplished before implementing a restoration practice.
NRCS should consider alternative funding mechanisms in cases of recurring requests, for example, the Federal cost-share could be reduced to less than 75 percent for second and subsequent projects that deal with watershed impairments in the same location.	NRCS has proposed instead under PA Element 8 to not fund a third solution at a site in a 10-year period.
The defensibility categories should have clearly defined criteria to evaluate them.	PA Element 5 identifies the criteria that would be used to evaluate economic, environmental, and social defensibility.
Upgrading the environmental defensibility of the program was necessary and to do this, the review process would need to provide more backup documentation.	The revised DSR would provide such documentation.
DART Team Training	**Resolution**
Training needs to be conducted before disaster strikes so that local, rather than federal personnel can respond. The locally trained teams know the areas and should write the DSRs.	Disaster-readiness training would be provided under PA Element 6.
Countrywide meetings would help ensure uniform policy application and interpretation	A series of six regional workshops are planned for the spring of 2000.
Eligible Impairments	**Resolution**
EWP-eligible work should include broadening the scope of EWP work to include lakeshores, single landowner or windfall benefits, dams, concrete spillways, substitution projects	Lakeshores were considered but eliminated from the PA because they constitute O&M situations. Single beneficiaries are allowed under PA Element 9 but the economic review would not allow windfall benefits. Dam and spillway repair are allowed under the current program. Substitution projects were considered but eliminated from the PA as noted under PA Element 13.
Include repair of storm water detention basins.	EWP is a recovery, not a preventative, program. Stormwater detention basins are a flood prevention structure so repair is considered normal operation and maintenance work not recovery work.
Permanent Solutions to Watershed Damage	**Resolution**
The EWP Program should adopt a program approach, involving natural hydrology, floodplain management, bioengineering, vegetation, and relocation solutions. Permanent solutions are many times more cost effective in the long term than short-term fixes. Permanent solutions are important even in an emergency situation and should be implemented.	The Proposed Action does move the EWP Program toward more permanent solutions, particularly use of the principles of natural stream dynamics for repairs and use of agricultural and improved lands easements.

Table 3.2-4 (continued)

Program Monitoring	Resolution
Initiate a series of long-term monitoring projects that would allow personnel to implement proven environmentally sound projects that would function on a holistic level. Establish a long-term monitoring database to help exchange information on successful projects among states.	Monitoring projects are considered beyond the scope of the EWP Program because of the major increase in staff that would be needed to do an adequate job.
A national database should be set up at NRCS headquarters to help track EWP projects. The database should include GIS, fund tracking, efficacy of the installed practice, costs, and benefits. Use Newton pads for DSR completion	A national database has been set up to do this tracking.
Coordination, Planning, and Outreach	**Resolution**
Interagency coordination and advance planning are essential in the emergency-response process, that red tape bogs down the process, and that permits need to be issued faster and more easily. T&E species and permitting issues should be handled in these pre-emergency interagency coordination meetings.	PA Element 6 would address this concern.
Remedy misuse of the 400-mi^2 standard.	A memorandum of understanding would be entered into with the USACE to reach an agreement on this matter.
Pre-disaster planning needs to be better staffed and to include public outreach to address environmental justice.	PA Element 6 would go a long way to helping solve this concern. Public outreach is part of the planning process.

3.2.3 Alternative 3—Prioritized Watershed Planning and Management

Under this alternative, NRCS would integrate the EWP Program into the broader NRCS mission and mandate of watershed management and restoration through regulatory, policy, and directive changes that would address all of the important aspects of watershed management. This alternative anticipates that decisions about specific EWP projects would be made in the context of knowledge of the overall watershed values and dynamics at issue. This would make the Program more comprehensive and proactive than the proposed action in several respects because it would integrate and enhance many of the features of the proposed action and place them in a broader management context. Some EWP work would be undertaken within the context of broader interests in the watershed natural resources goals and other objectives identified in the locally led process. Included in this integrated Program would be acquisition of baseline resource information, analysis, and management; planning and interagency coordination; training and technical assistance; and integrated watershed-based decision-making. Prioritized watershed planning would combine the specific Program improvements and expansion of the proposed action alternative with focused, “program-neutral”, disaster-readiness and mitigation planning for selected, high-priority watersheds.

Alternative 3 would include the following components:

1. ***Continue to deliver EWP project funding and technical assistance to address immediate threats to life and property as required by law.***

This would continue to be the highest, but not sole, priority in the EWP Program. EWP Program funding and technical assistance would be applied, post-disaster, when and where it is needed for eligible projects in a manner consistent with the changes identified in the proposed action.

2. ***Institute the 15 improvement and expansion items of the proposed action noted above.***

3. ***Facilitate a locally led disaster-readiness and mitigation planning effort.***

This component of the alternative would be a locally-led effort initiated and coordinated by NRCS. It would address concerns about recurrent applications of EWP repair practices in watersheds with a history of frequent disasters and integrate EWP Program activities in those watersheds with other NRCS programs that deal with other watershed issues. The steps required to implement this aspect of the Program would include:

- Categorizing watersheds (8-digit hydrologic units) according to the degree to which they are disaster-prone and according to important priorities in a state such as water quality
- Integrating a watershed's score in each category into an overall priority score that incorporates the disaster-prone ranking and other important criteria
- Ranking the watersheds in each state as high, medium, or low priority.

4. ***Fund priority watersheds in each state for disaster-readiness and mitigation planning and management.***

High-priority watersheds (and, as funding permits, medium-priority watersheds) would undergo disaster-readiness planning and management if a state, county, tribal organization, or other eligible entity agrees to sponsor the pre-disaster planning. The Federal portion of the funding to do pre-disaster planning (75 percent) would come in equal parts from 25 percent of the current year's supplemental appropriations for EWP Program work and matching funds from other NRCS program(s) active in the watershed(s).

Part of planning funds would be used to hire an executive director to facilitate the process of planning and public involvement. Funding to implement the plan would come from applicable Government agency programs and would be cost-shared at each agency's applicable rate.

5. ***Coordinate disaster-readiness and mitigation planning and management efforts with Federal, state, and local agencies and interested stakeholders.***

- Establish an overall watershed management plan for the priority watershed that includes preventive and restorative practices that take watershed functions and values into account
- Integrate NRCS program authorities and practices with the overall EWP Program goal of reducing the likelihood of catastrophic consequences from natural events and restoring watershed functions and values
- Purchase floodplain easements on a stepwise, proactive, risk-reducing basis as an integrated part of overall watershed management rather than a program-specific post-disaster measure

- Combine the EWP Program with other program authorities to enhance watershed values, including fish and wildlife habitat improvements such as pool and riffle installation on individual EWP sites where economically feasible, rather than simply restoring the site to pre-disaster conditions

This alternative offers a comprehensive approach that would most fully address the impacts of the broad variety of activities in a watershed, the natural processes at work in shaping the watershed, and the risk of threats to life and property from floods or other disaster events. It would form a sound basis for ongoing NEPA-based analyses and documentation of cumulative watershed effects. Environmental aspects of EWP Program projects and of other NRCS projects in the watershed would be evaluated and reviewed within the context of a specific watershed.

3.3 Alternatives Considered but not Evaluated in Detail

3.3.1 Other EWP Program Alternatives

Two EWP Program alternatives were considered but eliminated from detailed evaluation in the PEIS. These alternatives would provide certain benefits in terms of diminishing NRCS workloads and oversight requirements. Overall, these alternatives were deemed unacceptable because NRCS judged that they would not improve the delivery or defensibility of the Program.

3.3.1.1 Reduced Federal Role

Under this alternative, NRCS would maintain its role in the EWP program administration and provision of technical assistance. However, it would shift greater responsibility and authority to the States for project evaluation and monitoring. NRCS would rely upon the efforts of the state emergency management organization (EMO) to accomplish the needed work. NRCS employees would continue to determine eligibility of all sites. Funds needed to accomplish the work would be given to the EMO by the state conservationist. The EMO would be responsible for designing and installing the needed practices. NRCS would follow-up to ensure that the job is done, documentation is complete and in order, and would monitor any needed operation and maintenance activities. This alternative would allow NRCS employees to continue to service normal, everyday workload requests without interruption.

3.3.1.2 Total Grant To Sponsors

Under this alternative, NRCS would not maintain its role in EWP program administration and provision of technical assistance. Instead, it would provide EWP program grant funds to qualified sponsors in each State. Sponsors would complete a Damage Survey Report (DSR) and determine eligibility of the damage sites. This information would provide the basis for an application for funding from the appropriate regional NRCS office. Design, installation, and operation and maintenance, where warranted, would be carried out by the sponsor. There would be minimal oversight by NRCS, enough to ensure that the sponsor should be allowed to participate in the program in the future.

3.3.2 Other Proposed Action Elements

A number of other changes were recommended during scoping as elements of the proposed action but were eliminated from detailed evaluation for various reasons. Among these are the use of non-profit organizations as floodplain easement sponsors, repair of lakeshore damage, and removing threats to Federal-aid highways.

3.3.2.1 Nonprofit Sponsors

It was originally thought that organizations that promote natural floodplains be permitted to act as sponsors for the acquisition of floodplain easements. Although non-profits did not have all the requirements of regular sponsors, they had the best interest of the floodplains at heart. However, since all easements are voluntary and the Federal Government holds the easement, sponsors are not necessary. NRCS policy already has provisions for the agency to enter into partnerships with other organizations to carry out aspects of the program without them having be a sponsor.

3.3.2.2 Repair of Lakeshore Damage

A proposal that NRCS allow repair of lakeshore damage as part of the EWP Program was raised during the scoping sessions. Such repair has not been permitted in the past since most lakeside damage is due to ongoing wave action from winds and boats. It is difficult to determine whether a disaster or simply an ongoing erosive process is the cause of the damage. Therefore, a decision was made to not include this option in the Program.

3.3.2.3 Removing Threats to Federal Highways

This is another proposal resulting from the scoping meetings. The Federal Highway Administration (FHA) already has a program called the "Emergency Relief for Federally Owned Roads" (ERFO) which provides 100 percent of the cost to repair these highways. In addition, the Federal-aid Highway Emergency Relief (ER) Program provides cost-share funds to state highway departments to repair damage to Federal–Aid Highways. These are Interstates, National Highways, major rural and urban arterial and collector roads. It would be a duplication of effort for the EWP program to do this work and therefore the proposal was not pursued.

3.4 COMPARISON OF THE ALTERNATIVES

This section presents the impacts of the EWP Program alternatives in comparative form to define the issues that clearly distinguish the alternatives and provide a clear basis for choice among options by the decision-maker and the public (CEQ Regulations 40 CFR 1502.14).

3.4.1 Comparison of Implementation Aspects Likely to Affect Impacts

Major aspects of the EWP Program that would change under the proposed action and alternative 3 and that have implications in terms of potential effects on watershed ecosystems and human communities are summarized in Table 3.4-1. Implications of the 15 elements of the Proposed Action are presented in Table 3.4-2.

The principal changes that would influence program-wide differences in environmental impacts among the three EWP Program alternatives (Table 3.4-1) involve changes in the design of restoration practices and in the Program's emphasis on and level of funding for purchase of floodplain easements. Under Alternative 1, armoring would continue to be the principal method of restoration to repair and protect streambanks. Alternatives 2 and 3 would involve training and emphasis on design of restoration based on the principles of natural stream dynamics and the use of natural materials, and planting and seeding, alone or in combination with "hard" structural materials and geotextiles. Program-wide there would likely be more installations of the latter type and fewer simple armoring practices.

Table 3.4-1 Summary of Major Implementation Differences of EWP Alternatives

Major EWP Program Aspect	No Action	Proposed Action	Prioritized Watershed Planning and Management
Use of armoring versus "greener" methods[1] for stream restoration	Slow, steady shift to "greener" methods	Accelerated shift to "greener" methods	Accelerated shift to "greener" methods
Relative number of armoring practices contracted	Likely to be the Highest of the 3 Alternatives	Reduced due to emphasis on bioengineering methods and increased number of easements purchased	Greatest reduction due to emphasis on bio-engineering methods and greatest number of easements purchased
Use of Floodplain Easements on Agricultural Land	Retain 3 categories of Agricultural Easements	Easement categories 1 & 3 eliminated	Easement categories 1 & 3 eliminated
Floodplain Easement Purchase on Non-Agricultural Lands	None	Purchase improved lands easements	Purchase improved lands easements and focus on broad easement purchase in disaster-prone watersheds
Funds Allocated for Easement Purchase	Lowest amount	Moderate amount	Highest amount

[1]design based on the principles of natural stream dynamics and bioengineering

Use of floodplain easements would change in terms of the types of compatible uses allowed on agricultural easements, purchase of easements on improved lands, and the total funding available for both agricultural and non-agricultural easement purchases (Fig 3.4-1). Under Alternative 1, NRCS would continue to purchase agricultural easements, some of which would allow cropping as a compatible use. Under the Proposed Action, NRCS would

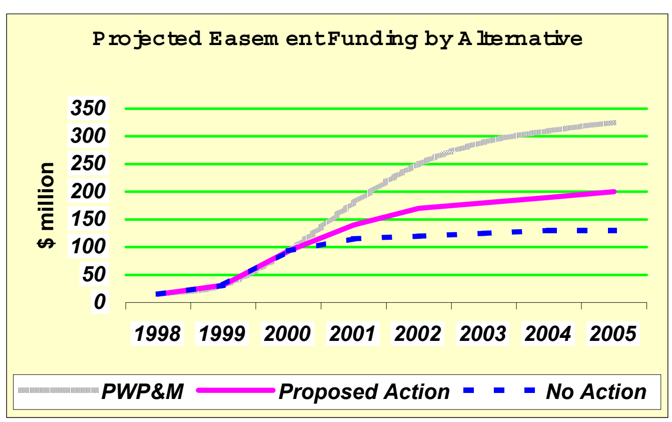


Fig. 3.4-1 EWP Floodplain Easement Funding by Alternative

eliminate cropping as a compatible use on agricultural easements and would allow additional easement purchases on non-agricultural lands. This would require an increase in EWP funding of easement purchases program-wide. Under Alternative 3, NRCS would focus a broad, multi-program, locally-led effort in disaster-prone watersheds on purchase of contiguous blocks of easements. Alternative 3 would likely have the highest amount of funding committed to easement purchase of the three alternatives, because funding from other programs would be added to the increased EWP easement funding noted under Alternative 1. Landowner offers for easement purchase are likely to exceed available easement funds under all three alternatives.

Specific elements of the Proposed Action (Table 3.4-2) likely would cause some differences in environmental effects program-wide. The exigency terminology change and adoption of the new funding approach to deal with urgent and compelling situations should reduce the number of instances across the Program when a situation is considered a serious enough threat to warrant immediate EWP action. This change would tend to increase the time available for project review for those situations that, in the past, may have been labeled exigencies, but that were not truly urgent and compelling.

Setting priorities for EWP funding should tend to focus agency work where there are Federally recognized resources at issue before more routine EWP work is undertaken. Reducing the general Federal cost-share from 80 to 75 percent likely would not have much effect in terms of reducing numbers of sites restored because 75 percent has been the level applied in practice for the last five years. However, establishing a higher Federal cost-share rate for limited resource areas would tend to increase the number of restoration practices installed, as would the addition of the social aspect of defensibility.

Improvements in disaster readiness would tend to make the process of coordinating the activities of sponsors and reviewing agencies more efficient, speed the work of restoration, and educate the public about the benefits of the "greener" restoration methods and of floodplain easements. Several of the other proposed changes could have somewhat offsetting effects. Allowing structural repairs to agricultural lands would tend to increase the use of armoring in some watersheds to protect cropping while limiting repairs to twice in 10 years would tend to decrease the program-wide use of armoring and increase purchase of easements. Simplifying agricultural easement purchase would tend to foster reduced production of agricultural crops in the floodplain. Also tending to decrease program-wide use of armoring would be the shift in emphasis on restoration design using the principles of natural stream dynamics and bioengineering. Repair of enduring conservation practices and disaster recovery work in uplands should help minimize the possibility of disaster-caused impacts on water quality.

Table 3.4-2 Implication for Impacts Analysis of Implementation of Specific EWP Program Changes in Proposed Action

Change under Proposed Action	Would Affect Implementation of		Implications for Environmental Impacts Analysis
	Practices	Easements	
1. Eliminate the terms "exigency" and "non-exigency."	✓		Would allow more time for site environmental review for normal emergencies
2. Stipulate that "urgent and compelling" situations be addressed immediately	✓		Would reduce time-to-repair and time for initial environmental review and coordination in high risk situations
3. Set priorities for funding of EWP practices	✓		Would require review and repair of sites with T&E, cultural resource, and other sensitive sites sooner than other normal emergency sites
4. Establish cost-share of up to 75%; up to 90% in limited-resource areas	✓		Potential to have more EWP practices funded across nation
5. Stipulate that practices be economically, environmentally, and socially defensible	✓	✓	May increase the number of sites restored. More environmentally and socially acceptable.
6. Improve disaster-readiness through interagency coordination, training, and planning.	✓	✓	Would ensure NRCS, agencies, and stakeholders are better prepared to respond to emergencies while factoring in environmental considerations.
7. Allow repair of impairments to agricultural lands using sound engineering alternatives.	✓	✓	Would tend to increase use of structural practices but would emphasize bioengineering solutions. May conflict with the NRCS goal of promoting the use of easements
8. Limit repair of sites to twice in any ten-year period.	✓	✓	Would tend to decrease use of structural practices but would emphasize bioengineering solutions. Consistent with the NRCS goal of promoting the use of easements
9. Eliminate the multiple beneficiaries requirement for site repairs.	✓	✓	Would not likely change number of sites repaired; simply an acknowledgement that restoration almost invariably benefits more than one landowner.
10. Apply the principles of natural stream dynamics and bio-engineering in restoration.	✓		Would promote solutions in line with natural stream dynamics that would restore streams to more stable configurations with better fish and wildlife habitat values.
11. Simplify purchase of agricultural easements.	✓	✓	Would tend to promote more uses of the floodplain than Category 1 under Alt 1 but would not allow crops (Category 3)
12. Repair enduring (structural or long-life) conservation practices.	✓		Would allow EWP Program to employ practices to repair structures that protect water quality and watershed health
13. Fund part of improved solutions.	✓		Would ensure that NRCS is involved in more projects to provide technical assistance and environmental review
14. Allow disaster-recovery work in floodplains away from streams and in upland areas.	✓		NRCS would become involved in more situations where watershed effects are at issue.
15. Purchase easements on non-agricultural lands.		✓	Would expand the use and number of easements and promote floodplain restoration goals

3.4.2 Comparison of the Impacts of the Alternatives on Watershed Ecosystems

Table 3.4-3 presents an overall summary of the impacts differences between the alternatives. More detailed alternative comparisons are presented in the following sections on watershed ecosystems, human communities, and cumulative impacts.

Sections 3.4.2.1 to 3.4.2.4 compare the impacts of the alternatives on aquatic, riparian, floodplain and wetland ecosystems. The discussion is based on proposed changes in debris removal, streambank restoration, and dam, dike, and levee repair practices, as well as on changes in floodplain easements across the alternatives. Section 3.4.2.5 discusses the implications of Program changes under the alternatives for the practices that would not change in terms of execution: protection of structures in the floodplain and critical area treatment and for proposed new practices that would be executed in the same way under Alternatives 2 and 3: floodplain deposition removal, upland debris removal, repair of damaged conservation practices, and funding of improved alternative solutions.

Table 3.4-3 General Comparison of Impacts of EWP Alternatives

Impact	No Action Continue the Current EWP Program	Proposed Action EWP Program Improvement and Expansion	Prioritized Watershed Planning & Management
Impacts on Aquatic, Wetland, Floodplains & Riparian Ecosystems	Greatest likelihood for local and downstream adverse effects due to continued Use of armoring practices and limited use of easements	Reduced likelihood of adverse impacts due to emphasis on bio-engineering practices and broader use of easements	Highest likelihood of reduced adverse effects and increased beneficial effects especially in well-managed priority watersheds
Impacts on Human Communities	Highest likelihood of continuing to protect all uses of floodplain	Use of non-agricultural easements encourages more restricted uses of floodplain, some older rural communities may be disrupted	Highest likelihood of encouraging best use of floodplain but highest potential for disruption of older rural communities
Cumulative Impacts	Lowest likelihood of addressing watershed-wide effects—e.g. water quality	Increased likelihood of addressing watershed level effects—e.g. water quality, fisheries—using bio-engineering practices and more easements	Greatest likelihood of planning for and addressing watershed level effects—e.g. water quality

3.4.2.1 Aquatic Ecosystem Impacts

Under Alternative 1, aquatic ecosystems (Table 3.4-4) would continue to benefit in the short term from restoration of channel capacity and reduction of bank erosion at EWP repair sites. The hydrology of disaster-damaged stream reaches would be restored and turbidity and sedimentation reduced, which would improve conditions for aquatic life in many respects. However, aquatic ecosystems would continue to be adversely affected in other ways, and in the longer term, as they have in the past, primarily due to the widespread emphasis on the use of armoring and removal of in-stream debris. These effects would not be offset program-wide as much by the compensatory benefits of easements due to a lesser emphasis under this alternative on easement purchase. Generally, armoring practices, as well as repairs to levees, would continue to provide lower quality habitat for aquatic life, limit riparian vegetation growth, and redirect stream energy to downstream locations with potentially damaging consequences. Continued heavy reliance on armoring would continue to reinforce increased flow velocities and increased turbidity in restored stream reaches.

Table 3.4-4 Comparison of Impacts to Aquatic Ecosystems

	No Action	Proposed Action	Prioritized Watershed Planning & Management
Impacts on Habitat Structure[1]			
Impacts of Restoration Practices	Adverse effects would likely continue to occur from almost complete removal of in-stream debris, as this removes habitat and nutrients. Armoring would continue to limit re-vegetation and redirect flows downstream to other banks. Levee repairs would continue to limit natural floodplain function. There would be no provision to structurally protect agricultural lands, which would limit use of armoring.	Adverse effects would be reduced by retaining more in-stream debris and using restoration design based on the principles of natural stream dynamics. Benefits would accrue from increased use of easements, as floodplain functions return and habitat is created or improved. Agricultural lands could be protected with structural practices if economically defensible.	Coordinated planning would incorporate natural resources in the management strategy, resulting in increased usage of natural stream dynamics and other long-term approaches that create additional quality habitat. Agricultural lands could be protected with structural practices if economically defensible.
Impacts of Floodplain Easements	Continuing to use 3 easement categories would result in some easement lands serving as natural floodplains, while others would support intensive agriculture. Benefits and adverse effects would vary accordingly.	Using only Category 2 easements would eliminate the most restrictive of compatible uses, while also eliminating the least restrictive. Floodplain and riparian habitats would improve using Category 2 but not as quickly as under Category 1.	Coordinated easement purchases would help create contiguous restored floodplain areas.
Impacts on Water Quality[2]			
Impacts of Restoration Practices	Removal of in-stream debris may increase velocity and increase turbidity. Repair of levees continues the channelization of stream and leads to increases in turbidity. Short-term decrease in water quality during construction with increases in turbidity and risk of pollutants.	Retention of some in-stream debris may reduce turbidity. Natural stream dynamics should reduce flow velocity and increase sinuosity, decreasing turbidity.	Coordinated planning may incorporate natural resources in the management strategy, resulting in increased usage of natural stream dynamics and other long-term approaches that improve water quality.
Impacts of Floodplain Easements	Varied effects, depending on category of easement. Category 1 easements increase filtration, improve vegetation and increase flood storage. Category 3 may lead to agricultural runoff and declines in water quality.	Improvements in water quality, as easement purchases are increased. Category 2 easements would likely provide benefits in water quality, though not to the degree of Category 1. Purchase of agricultural and improved land easements would reduce urban and agricultural runoff.	Coordinated easement purchases may create contiguous floodplain areas, improving water quality on a large scale.
Impacts on Biota[3]			
Impacts of Restoration Practices	Armoring may provide habitat for invertebrates and small fish but limits vegetative cover for larger biota. Structures may also redirect flows to other reaches and damage habitat there. Use of woody structures (root wads, revetments, etc) may mitigate these effects. Removal of debris may remove habitat.	Substantive improvements over current program, as habitat and channel structure increase in quality under natural stream dynamics.	Coordinated planning may result in contiguous habitat areas and allow for permanent establishment of biotic populations.
Impacts of Floodplain Easements	Category 1 easements may provide high quality habitat, whereas Category 3 would likely lead to poor habitat. In general, easements would lead to increased vegetation and improved habitat features such as pools.	Elimination of Category 1 reduces quality of habitat, whereas removing Category 3 may yield higher quality habitat following easement purchase. Increased easement purchases offer improvements in habitat and channel structure.	Coordinated easement purchase may create contiguous floodplain areas, improving habitat and benefiting biotic resources.

[1] Habitat structure includes habitat quality, sedimentation and channel structure
[2] Water quality includes turbidity, temperature, dissolved oxygen, and pollutants
[3] Biota includes plant and animal species

Debris removal under the current program would continue to consist in many cases of almost complete removal of all in-stream debris, which adversely affects aquatic communities by removing habitat, nutrients, and streamflow regulation.

Under the No Action Alternative, easements would continue to be purchased under three categories and would have wide ranging environmental impacts, from closely approximating natural floodplain environments to continuation of intensive agriculture. Since presumably, landowners would wish to continue to gain some income from use of their lands under easement, the likelihood is that a larger fraction of lands in easements would be cropped than would have the greatest use restrictions under Category 1, notwithstanding the lower easement price for lands that are cropped. Therefore, this alternative would carry with it the adverse impacts of cropped easement lands on water quality and aquatic ecosystems wherever those easements are purchased.

Under the Proposed Action, program-wide training in and use of stream restoration design based on the principles of natural stream dynamics and floodplain easements would provide substantial benefits and reduce the severity of the types of adverse impacts to aquatic ecosystem that would likely continue to be seen under Alternative 1. Natural stream dynamics techniques employing natural structural materials and bioengineering would help restore sinuosity, regulate stream flow, create habitat, and improve water quality. In combination with a greater focus on purchase of floodplain easements, natural streamflow conditions may be closely approximated in many watersheds and improvement in the quality of aquatic ecosystems likely to follow.

Under the Proposed Action, only one category of agricultural easement would be available, which would allow compatible uses such as grazing, haying or timber. While the most restrictive category of easement in terms of compatible uses would be removed, the least restrictive is also removed from the Program. In particular, this alternative would not have the potential for adverse impacts of cropped easements.

Under Alternative 3, planning and coordination at the local level would act to focus restoration efforts on high priority disaster-prone watersheds. Through watershed scale management, the benefits realized with restoration design based on natural stream dynamics, and purchase of floodplain easements could be amplified, as contiguous habitat areas and longer reaches of naturally flowing streams could be restored.

3.4.2.2 Riparian Ecosystem Impacts

Under Alternative 1, riparian communities (Table 3.4-5) would continue to be adversely affected, again primarily due to reliance on armoring practices and continued levee repairs. While these practices do stabilize streambanks, the structures used limit or damage riparian vegetation, reduce the quality of habitat for aquatic and riparian species, redirect streamflow energy further downstream, and restrict natural floodplain function. Increased use of natural structural materials such as rootwads and revetments may mitigate these impacts. Easements would be eligible under each of the three categories and would continue to offer a range of benefits and adverse effects.

Under the Proposed Action, emphasis on stream restoration based on the principles of natural stream dynamics and increased easement purchases could provide considerable benefits for riparian communities. Natural stream dynamics techniques, use of natural structural materials, and bioengineering methods promote natural re-vegetation, dissipate stream energy, establish aquatic and riparian habitat, and restore natural channel structure and morphology. Easements would serve to augment these benefits by restoring floodplain function.

Table 3.4-5 Comparison of Impacts to Riparian Ecosystems

	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Prioritized Management
Impacts on Bank Stability			
Impacts of Restoration Practices	Short-term improvements, such as armoring practices and levee repairs, stabilize streambanks. May cause long-term problems as stream energy is directed to up or downstream reaches. Some stability may be lost as vegetation is removed during construction. Removal of embedded debris may destabilize banks.	Short and long-term benefits, as local impairments are repaired and natural stream dynamics techniques dissipate stream energy and minimize effects on other reaches.	Coordinated planning may result in decreased emphasis on local impairments, focusing on watershed scale stream function.
Impacts of Floodplain Easements	Stability not as great a concern, as channel would be allowed to meander. Natural re-vegetation would likely reestablish and generate improvements in stability. Category 1 would yield the greatest benefits, while Category 3 would yield minimal benefits.	Increased easement purchases would result in long-term benefits, as natural flows can meander as needed and vegetation is reestablished. Elimination of Categories 1 and 3 remove greatest and least potential for vegetative restoration.	Coordinated planning may result in contiguous easement sections, reducing the need for streambank repairs.
Impacts on Streamside Cover			
Impacts of Restoration Practices	Armoring and levees may inhibit riparian vegetation establishment. Planting and seeding would increase re-vegetation. Debris removal may involve damage to riparian vegetation.	Substantive improvements, such as natural stream dynamics techniques promote natural riparian regeneration.	Coordinated planning may result in contiguous riparian areas.
Impacts of Floodplain Easements	Natural re-vegetation would likely improve cover, especially under Category 1. Planting and seeding in easement management plan would augment natural processes.	Natural re-vegetation under Category 3, although at a slower rate than Category 1. Natural streamflow and meandering may also contribute to re-vegetation.	Coordinated easement purchases may establish contiguous ecosystem components, such as riparian forests and buffer zones.
Impacts on Biota			
Impacts of Restoration Practices	Armoring and levees may deny vegetation establishment and wildlife access to stream.	Improvements for biotic components likely, as natural channels and riparian areas are established.	Coordinated planning may result in benefits to biota, through establishment of larger or contiguous habitat areas and more natural stream function.
Impacts of Floodplain Easements	Improved habitat, as riparian vegetation provides cover and areas of slack water may provide habitat for reptiles, amphibians and emergent aquatic vegetation.	Increased purchase of easements should benefit biotic communities, as riparian habitat and access to streams is increased.	Coordinated easement purchase may result in extensive, contiguous natural habitat, benefiting biotic communities.

Under Alternative 3, coordination and planning may result in contiguous segments of higher quality riparian habitat, as easements and design based on natural stream dynamics promote naturally flowing streams and the development of riparian habitat.

3.4.2.3 Impacts on Floodplain Ecosystems

Under Alternative 1, floodplain ecosystems (Table 3.4-6) would continue to be adversely affected. Armoring alters natural floodplain function and levees confine flood flows to the stream channel, protecting the lands behind them while preventing natural floodplain development. Stream energy would continue to be channeled to downstream reaches and floodplain habitat would continue to be absent or underdeveloped. Easements would be eligible under each of the three categories and offer a range of benefits and adverse effects.

Under Alternative 2, natural stream dynamics and an increased emphasis on easements would improve floodplain function, increase flood retention capabilities, and promote floodplain habitat.

Under Alternative 3, coordination and planning may lead to the establishment of large segments of contiguous, freely flowing stream and floodplain systems.

3.4.2.4 Impacts on Wetland Communities

Under Alternative 1, wetland communities (Table 3.4-7) may be adversely affected. Armoring and levee repair act to restrict stream hydrology and may limit the water available for wetland functions. Filtration, flood retention, groundwater recharge and wetland habitat functions may be affected. Easements eligible under three categories offer a range of benefits and adverse effects.

Under Alternative 2, natural stream dynamics and a focus on easement purchase may lead to improvements in wetland communities. By restoring more natural hydrologic regimes, wetlands may develop in areas with appropriate soils. Easements would also likely restore wetlands and wetland functions, as periodic flooding would promote wetland growth and development.

Under Alternative 3, planning and coordination would likely lead to further improvements to wetland communities. Watersheds may be managed for natural streamflows, which may serve to establish and promote wetlands. This may also result in contiguous segments of wetland, which would augment the quality of habitat and filtration capacity.

Table 3.4-6 Comparison of Impacts to Floodplain Ecosystems

	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Prioritized Management
Land Use and Development			
Impacts of Restoration Practices	Armoring and levee repairs may serve to maintain agricultural or urban uses.	Natural stream dynamics may lead to change in land use to more natural land uses, as stream channel is allowed to meander.	Coordinated planning may convert floodplain land uses to more natural uses, improving floodplain function and reducing threats to life and property.
Impacts of Floodplain Easements	Substantive improvements with Category 1, as easement purchases would return developed lands to a more natural state. Category 3 easements offer minimal benefit, as intensive agriculture is allowed.	Substantive improvements, as easement purchases would return developed lands to a more natural state.	Coordinated easement purchases may focus on problematic land uses or frequently damaged areas and return these areas to a more natural state.
Hydrology			
Impacts of Restoration Practices	Armoring and levees offer minimal benefits, as practices tend to transfer stream energy to other reaches. Armoring alters floodplain function while levees restrict it. Complete removal of debris from channel fails to slow flow velocity and divert waters into the floodplain.	Marked improvement, such as natural stream dynamics, may dissipate stream energy. In-stream debris would lead to some pooling and overflow into the floodplain.	Coordinated easement purchases may create contiguous reaches of well-regulated flows and result in an overall reduction in stream energy and destructive power.
Impacts of Floodplain Easements	Substantive improvements, as all easement categories would return floodplain function to the site. Water quality and infiltration would be best served by Category 1 easements.	Substantive improvements, as Category 2 easements return floodplain function to the site. Limitations on compatible uses may offer benefits to water quality, infiltration, and groundwater recharge.	Benefits of coordinated easement purchases do most to approximate a free flowing river.
Biota			
Impacts of Restoration Practices	Minimal benefits from armoring and levees, as floodplain hydrology and full function is not restored.	Minor benefits due to some flooding from debris jams or stream sinuosity. Floodplain function is not fully returned, minimizing benefits to floodplain biota.	Minor benefits due to some flooding from debris jams or stream sinuosity. Floodplain function is not fully returned, minimizing benefits to floodplain biota.
Impacts of Floodplain Easements	Category 3 offers very little in habitat. Under Category 1, substantive benefits may be seen for both plant and animal floodplain communities, as floodplain function is returned.	Substantive benefits to both plant and animal floodplain communities, as floodplain function is returned. Category 2 easements likely would not return floodplain function as quickly or completely as Category 1.	Coordinated easement purchase may result in extensive, contiguous natural habitat, benefiting biotic communities.

Table 3.4-7 Comparison of Impacts to Wetlands

	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Prioritized Management
Hydrology			
Impacts of Restoration Practices	Continuing current debris removal, armoring, and levee repair practices, would not help restore natural stream hydrology and normal flood regime to promote wetland growth or function.	Stream restoration based on principles of natural stream dynamics and debris left in-stream, would help restore natural stream hydrology and normal flood regime to minimally promote wetland growth and function.	Coordinated planning may lead to contiguous reaches with sufficient flooding and natural hydrology to maintain and improve wetland areas.
Impacts of Floodplain Easements	Continued purchase of agricultural easements would continue to restore some natural flooding conditions, improving wetland hydrology in some watersheds.	Increased purchase of agricultural easements plus non-agricultural easements would increase restoration of natural flooding conditions, improving wetland hydrology in more watersheds.	Coordinated purchase of agricultural and non-agricultural easements would maximize restoration of flooding conditions, improving wetland hydrology in flood-prone watersheds.
Water Quality			
Impacts of Restoration Practices	Continuing current debris removal, armoring and levee repair practices, would not help restore natural flooding regime to improve water quality.	Some benefits, such as natural stream dynamics, may give rise to some wetland formation.	Coordinated planning may lead to contiguous reaches with sufficient flooding and hydrology to promote wetland areas.
Impacts of Floodplain Easements	Substantive improvement, such as easements, may promote wetland creation, resulting in increased filtration	Substantive improvement, such as easements, may promote wetland creation, resulting in increased filtration	Coordinated easement purchase may result in contiguous wetland areas, resulting in large scale filtration
Biota			
Impacts of Restoration Practices	Minimal benefits, such as wetland habitat and development, is not promoted by debris removal, armoring and levee repair.	Some benefits, such as natural stream dynamics, may give rise to some wetland formation.	Coordinated planning may lead to contiguous reaches with sufficient flooding and hydrology to promote wetland areas.
Impacts of Floodplain Easements	Purchase of floodplain easements would continue to promote wetland creation or growth, resulting in increased wetland habitat.	Increased use of easements, would promote increased wetland creation or growth, resulting in greater increases in wetland habitat.	Coordinated easement purchase may result in creation or growth of more extensive wetland habitat than Alternatives 1 or 2.

3.4.2.5 Impacts of Other EWP Practice Changes

Protection of floodplain structures would be carried out as required under the EWP Alternatives regardless of which alternative is selected (See Table 3.4-8 above). However, the locally-led process under Alternative 3 would provide the best forum for discussion and decision-making at the local level about placement or removal of infrastructure in the floodplain. Critical area treatment, too, would remain the same under all alternatives. See Table 3.4-8 for detailed impacts.

Floodplain deposition removal and repair of damaged conservation practices would be done under EWP in Alternatives 2 and 3 and would benefit from the technical oversight of NRCS.

Floodplain deposition removal may conflict somewhat with the goals of the EWP floodplain easement program by returning lands that would be likely candidates for easement purchase to agricultural use. Funding of improved alternative solutions would ensure that NRCS participates in design and environmental review of practice installations that under the current Program would likely have been carried out without NRCS knowledge or oversight.

Table 3.4-8. Comparison of Watershed Ecosystem Impacts of Other EWP Practices

	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Prioritized Management
Current EWP Practices			
Diversions and Sediment and Debris Basins	Restoration would be conducted in same manner as current program.	Would be conducted in same manner as current program.	Locally-led process may restrict placement of municipal infrastructure within the floodplain.
Critical Area Treatment (including drought)	Restoration would be conducted in same manner as current program.	Restoration would be conducted in same manner as current program.	Use would tend to reduce the level of concern in some flood prone watersheds for the effects of damage to such critical areas.
Proposed EWP Practices			
Floodplain Deposition Removal	Currently carried out under FSA ECP Program or by landowner.	EWP would fund removal or deep tilling. May conflict with the goals of floodplain easements.	EWP would fund removal or deep tilling. May conflict with the goals of floodplain easements.
Upland Debris Removal	Other agencies or landowner responsible for removal.	EWP assistance would ensure environmentally sound cleanup and disposal.	EWP assistance would ensure environmentally sound cleanup and disposal.
Repair of Damaged Conservation Practices	Currently operated under FSA or privately by landowner.	EWP would fund repair of conservation practice.	Locally-led process may address placement of conservation structures within the floodplain.
Improved Alternative Solutions	Currently carried out by sponsor or landowner without NRCS involvement.	EWP may approve substitute solution but is obligated to only pay cost share of restoration work being replaced.	Locally-led process may address benefits of substitutions on watershed scale, leading to more natural methods or easements.

3.4.3 Comparison of the Impacts of the Alternatives on Human Communities

This section summarizes the impacts of the EWP Program alternatives on human communities. Brief descriptions of the findings of the impacts analysis for the different aspects of the socioeconomic environment in potentially affected communities under each alternative are given in Table 3.4-9.

<u>3.4.3.1 Impacts of Alternative 1</u>

Continuation of the current program would be expected to have an essentially minimal impact to the local economy of affected communities. Most of the proposed projects are relatively small in scope and, despite the smaller rural characteristics of most of the communities involved, the total dollar expenditures would not contribute substantially to the local economy.

Impacts to land use from implementation of the EWP program would depend on the type of EWP practice installed and the speed with which the installation can be completed. The overall impact of practices that do not include the exercise of a floodplain easement would most likely be minimal. Where an easement is purchased, the previous use of the land would be altered and the value of any associated agricultural production from the affected acreage would be lost.

The structural practices used in the EWP program are designed to restore the pre-disaster land use. The effect of the installed practices under this alternative would represent a benefit by restoring or protecting economically productive or residential properties that represent an asset to the community. EWP installed practices may result in the repair and protection of the land thereby restoring its previous value. However, this does not necessarily eliminate the need for further repair in the future. With respect to infrastructure and social resources and services, the effect of the Program is generally beneficial. Installed practices restore the previously existing condition and provide a measure of protection for important structures and resources. In some cases, visual impairment from installed practices may diminish the aesthetic quality or recreational experience associated with some properties, but in general the Program would not likely have a major adverse effect.

The primary direct effect would be beneficial in providing for the recovery of previously existing levels of service. Purchase of an agricultural easement in some cases may provide the additional benefit of protecting open space and improving the visual or recreational quality of an area. Provision of the sponsor's share of project cost may represent a serious adverse impact on some smaller, independent communities where support from county or state jurisdictions is absent. A corresponding strain on local resources may be evident, with the indirect effect of under-funding other important social efforts within the community. Because project defensibility under this alternative is based primarily on environmental and economic justification, some concern does exist from an environmental justice perspective. In socioeconomically disadvantaged areas, some property owners may be denied assistance because the cost of protecting the property is greater than the value of the property itself. However, the same project at the same cost may be justifiable in another area because property values are higher. This leads to a potential for disproportionately greater access to the benefits of the program for more affluent communities and may be especially important in socioeconomically distressed or minority communities.

3.4.3.2 Alternative 2

In general, the elements of the proposed action would be generally beneficial to affected human communities. The potential impact of the installation of engineered solutions at individual project sites does not substantially differ from that under the no-action alternative. Expansion of the floodplain easement option to include non-agricultural and improved land would likely increase the potential for disruption of local communities or neighborhoods by the displacement of residents, but it also represents an opportunity for the community to reduce the impact of natural disasters and the associated recovery cost, especially on improved properties.

Table 3.4-9 Impacts of the EWP Program Alternatives on Human Communities

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Prioritized Watershed Planning and Management
Local Economy	Some potential for income associated with continuing disaster payments. Benefit from restoration of previous productive use. Purchase of floodplain easements could result in a loss of employment and income from agricultural land but would reduce demand for services and disaster assistance.	General effect would be similar to the No Action alternative, however, expansion of floodplain easements to improved land may have a greater impact on employment and income from affected properties A correspondingly greater reduction in demand for services and disaster assistance could result.	More efficient use of capital resources and economic potential of watershed resources would be possible. Easement s may reduce income from productive lands and facilities but the highest corresponding reduction in demand for services and disaster assistance could result.
Value of Natural Resources	Repair and protection of land restores previous value, but may induce additional development in flood prone areas increasing risk from future natural disaster Purchase of easement on agricultural land potentially withdraws acreage from production, but may increase value of neighboring properties	Purchase of easement on improved and unimproved land potentially withdraws productive property from community use, but may increase value of neighboring properties. Community tax base may be affected.	Purchase of easement withdraws land from production and decreases its value, but may increase value of neighboring properties
Infrastructure	Repair and protection of previous capability, infrastructure; Restores service to community Potential benefit from the restoration of the natural floodplain.	Effects would be similar to those under the No Action Alternative	Increased emphasis on total system maintenance could help improve infrastructure services and may mitigate threats of sudden impairment.
Property	Short-term benefits from protecting structures, no long term benefits from moving structures out of harm’s way with easements. Emphasis on protecting existing property, but resources may be inefficiently used	Short-term benefits from protecting structures, long term benefits from moving structures out of harm’s way with easements. Requirement that practices be defensible may affect some structures. Easement purchases may result in the loss of business, commercial, or residential structures	Short-term benefits from protecting structures. Best strategy for long-term benefits from moving structures out of harm’s way with easements in disaster-prone watersheds. Easements may result in community loss of business, commercial, or residential structures.
Public Health and Safety & Community Resources	Short-term benefit from protecting public H&S directly and indirectly by protecting emergency services. Long-term PH&S would be better served by easements. Would not substantially alter existing community resources, but may result in some visual impairment.	Short-term benefit from protecting public H&S directly and indirectly. Improved lands easements help long-term PH&S considerations. Improved cost share for communities with limited resources; alternative uses of easement properties represent additional benefit	Short-term benefit from protecting public H&S directly and indirectly. Watershed mgmt best long-term solution to protect PH&S. Some loss of existing resources is possible, but may increase availability of watershed related recreational, educational and other uses

Table 3.4-9 (continued) Impacts of the EWP Program Alternatives on Human Communities

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Prioritized Watershed Planning and Management
Demographics	Existing community would be maintained, but some potential indirect change from in or out migration in response to level of perceived risk.	Purchase of easement may alter population mix by displacing current residents, however, existing community would be maintained in most cases.	Purchase of easement may alter population mix by displacing current residents, however, existing community would be maintained in most cases.
Land Uses	Would maintain existing uses of the land, but may increase habitation and use of flood prone acreage increasing cost of future protection except where agricultural easements are purchased.	Floodplain easements could alter previous land uses on subject and neighboring properties	Easements could alter previous land uses on subject and neighboring properties
Social Patterns	Some temporary disruption during project construction may result, but no permanent disruption to local community.	Improved lands easements may result in the breakup of existing residential networks or neighborhoods	Improved lands easements may result in the breakup of existing residential networks or neighborhoods

Expansion of the defensibility criteria for the project would substantially increase access to potentially beneficial effects of the project for socially disadvantaged or minority persons who may have been previously excluded. Similarly, the provision for funding up to 90% of the cost of EWP projects in limited resource communities also decreases the potential burden on these communities and has the effect of increasing potential access to program benefits.

However, several proposed changes under this alternative would influence the overall impact of the Program on the human social environment and may alter the proposed solutions or the manner of participation for affected communities. Program modifications in funding, priorities, and easement purchase would create the potential for change. Additionally, the proposed action allows for greater opportunities for cooperation with local land use plans. Where easements are purchased, there is some possibility that the easements could become part of an area's comprehensive plan for growth, by meeting a portion of the need for functional open space for the community.

Elimination of the exigency designation and the installation of a new priority ranking system would be expected to have some influence on this capability. Implementation of the priority ranking system could result in the delay or denial of protection to certain properties that may have been otherwise protected under the old system. However, the provision to provide additional financial support to areas designated as "limited resource" would have the effect of encouraging EWP participation by communities that might not otherwise have access to the program. As an environmental justice issue, this provision reduces the potential for disproportionate access to program benefits for socio-economically disadvantaged communities that may have previously failed to repair damage because the provision of the sponsor's share of the project cost represented too great a burden on available public funds. Inclusion of criteria for social defensibility, in addition to the economic and environmental defensibility criteria that are part of the current Program, also has implications for the consideration of environmental justice. By establishing a social rationale based on the utility of the property to the landowner, the proposed action includes a category of participant who might otherwise have been left out of the current program, especially in circumstances where the economic value of a property may be low or difficult to calculate.

3.4.3.3 Prioritized Watershed Planning and Management (Alternative 3)

The primary effect of the proposed watershed planning and management approach proposed under this alternative is the proactive benefit of allowing watershed planning on a macro scale. Where this alternative would continue to provide funding and technical assistance similar to that proposed under the Proposed Action Alternative, similar impacts would be anticipated. However, the incorporation of pre-disaster planning and management of the watershed on a macro scale provides a greater understanding of a land use vision for the community. The integration of watershed planning into the process enables environmental concerns to be addressed as part of the community's long-term growth strategies. An integrated approach to program management allows for more efficient use of capital resources and the economic potential of the watershed, while minimizing adverse environmental effects. Some potential for loss of existing community resources may be possible, but this is offset by the increased availability of watershed related recreational, educational, or other uses. An important beneficial effect associated with this approach concerns the involvement of multiple program authorities, local and State agencies, and stakeholders in the process.

Proactive use of easements in a planned approach would minimize potential problems associated with reliance on a project-by-project approach, especially where neighboring or adjoining properties are volunteered for the program at different times and under differing circumstances. Where easements are purchased, there is the potential that open spaces can be planned as integral components of the area landscape. Similar to the Proposed Action alternative, purchase of improved lands easements could alter the composition or structure of the community by displacing current residents. Easements could also alter the existing land uses or may result in the breakup of residential networks. These potentially adverse effects may be offset, however, by the more effective use of easement purchases as a part of a longer-term flood management and watershed planning approach and could reduce Federal funding outlays in the long term.

3.4.4 Comparison of the Cumulative Impacts of the EWP Alternatives

CEQ regulations at 40 CFR 1508.7 define cumulative impact as *the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.* This section compares the cumulative impacts of the EWP Program alternatives at the watershed level, based on the analysis of the example watersheds, and at the national or program level based on the general findings of the impacts analyses.

3.4.4.1 Cumulative Impacts at the Watershed Level

The contribution of the effects of EWP practices to cumulative impacts on watershed ecosystems, based on the analysis of the example watersheds, were minimal under all three EWP Program alternatives. However, in the East Nishnabotna River watershed, where wetlands are already highly stressed according to EPA, the overall cumulative impacts were found likely to be significant. Therefore, EWP environmental evaluations should pay particular attention to watershed health indicators in order to limit potential cumulative impacts to acceptable levels.

Because the requirements for protection of Federally-protected resources in watersheds are for the most part site specific, EWP restoration work may be one of the best ways to protect those resources that would otherwise be threatened. This is particularly true of cultural resources, where EWP work might not only remove threats to the property directly but also protect the environmental setting where the property is located. In the case of T&E species as well, EWP work may be a necessary part of habitat maintenance as a species recovers, although in the long term, not desirable as a necessity to survival. In some instances, easements might provide a better solution for ensuring habitats are available that are conducive to a species recovery.

Alternative 1 (No Action Alternative) would not change cumulative impacts from their present levels. For aquatic resources, there would continue to be minor turbidity, sedimentation, and flow altering effects from restoration practices. These effects would add in the long term to the slow decline of watershed health in some watersheds and to more rapid decline in others. For wetlands, riparian areas, and floodplains, minor effects from restoration practices would continue to occur and would add to the habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline.

Human communities like the City of Buena Vista would continue to benefit from protection of their homes and businesses and would continue to derive income from performing EWP restoration practices although minor community disruptions may occur. Major floodwork by the USACE and NRCS at Buena Vista have combined to help sustain the viability of the community in the face of repeated recent flood damage, a community that has seen a marked industry decline because of the floods and other factors. The viability of agricultural communities such as that along the East Nishnabotna and of rural fringe communities such as Boise Hills, depend in large measure on damage restoration and preventative measures. In the long term, however, the cumulative drain on local, state, and Federal resources to maintain any such communities that are repeatedly threatened may lead to sufficient impetus to seek longer-term solutions. Agricultural easements that are part of the current program are likely to be major parts of this solution.

Alternative 2 (the Proposed Action) involves EWP program improvement and expansion. Under this alternative, NRCS would emphasize more environmentally sensitive implementation of EWP practices and would expand the types of watershed impairments to activities away from streams, upland debris sites, enduring conservation practices, and others. Fifteen specific program changes would improve the EWP program and incorporate new restoration practices. For aquatic resources, there would be a reduction in minor turbidity, sedimentation, and flow altering effects from restoration practices. This would diminish the degree to which any of these adverse effects would add in the long term to decline of watershed health. In some watersheds these improved practices may even slow or reverse some of the decline. For wetlands, riparian areas, and floodplains, there would be some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the EWP work may reverse such a trend. Better coordination with other federal, state, and local agencies and additional projects approved should result in less overall habitat destruction.

Human communities would continue to be protected in the short term but a greater emphasis on agricultural easements and introduction of improved lands easements should provide better long-term solutions than repetitive repair work where repeated damages occur. Shifts in program emphasis may result in slightly different mix between agriculture and other uses as easement lands increase.

Table 3.4-10 Cumulative Impacts of the EWP Program Alternatives

Environmental Resource	Alternative 1 Continue the Current Program	Alternative 2 The Proposed Action	Alternative 3 Prioritized Watershed Planning and Management
Impacts to Aquatic Resources	Minor effects from restoration practices would continue to add to long-term declines in quality of aquatic habitat. These effects may be important in watersheds stressed by other factors such as development. Easements should help slow declines in some cases.	Upgrade in restoration practices would diminish any adverse effects and may slow long-term declines in quality of aquatic habitat. Expanded easement program would also help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality of aquatic habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Wetlands, Riparian and Floodplains Resources	Minor effects from restoration practices would continue to occur and would add to habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline. Agricultural easements may mitigate these effects in some watersheds.	Some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the better designed EWP work may reverse such a trend. Expanded easement program would help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality and acreage of wetland, riparian, and floodplain habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Socioeconomic and Other Human Resources	Life and property would continue to be protected but longer term solutions to repeated damage would not be a major consideration. Minor income would be derived from performing restoration practices, but resources may be inefficiently used.	Life and property would continue to be protected but longer term solutions to repeated damage would begin to be a major consideration, especially with use of improved lands easements. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.	Life and property would continue to be protected but better organized and funded longer term solutions to repeated damage would be the major consideration. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.

Alternative 3 would tend to minimize EWP program impacts because it would be the most proactive and integrative EWP approach to disaster recovery and damage avoidance. It would allow maximized use of more environmentally beneficial EWP practices by focusing the resources of NRCS and other entities in disaster-prone watersheds. Here, restoration design based on the principles of natural stream dynamics and bioengineering would likely cause the most marked reductions in degradation of stream hydrology and habitat. When used in conjunction with purchase of floodplain easements in these more highly stressed watersheds, some substantive abatement or reversal of watershed degradation is possible. In less seriously stressed watersheds, use of these practices and easements would help maintain watershed integrity. NRCS and other technically cognizant agencies would need to take adequate steps during the locally-led conduct of the watershed plan to ensure all decisions are well-informed decisions, made with the best available scientific information and soundest technical advice to help avoid decisions made simply because they appear on first inspection to be heading in the right direction.

3.4.4.1 Cumulative Impacts at the National Program Level

To the extent that the EWP program protects life, health and public and private property, there is a beneficial cumulative effect in terms of the Program's contribution to the overall viability of the community itself. The cumulative socioeconomic benefit from program implementation nationwide could be estimated in terms of the aggregate benefit to communities participating in the program. This benefit could be expressed in terms of the total number of human lives protected and the total value of all property protected as a result of the EWP Program. Without the Program, both would be in jeopardy nationally.

The level of risk to life and property resulting from natural disasters could be estimated. By reducing this potential risk, the EWP program protects the general health and safety of the population both directly, in terms of the immediate residents or users of affected property, and indirectly for the community as a whole through the protection of public health and safety systems. In both cases, the beneficial result is an improved quality of life for local residents through increased public safety and restoration of the economic value and social use of the affected property.

In addition to the direct cost of repairing damaged land and installing protective measures to reduce the risk of future adverse impacts, the public cost of a natural disaster also includes the protection of the public during and immediately after the disaster event. Funding allocated for the operation of emergency services (police, fire, rescue, etc.) and the costs associated with evacuation of the public to safe shelters and the maintenance of support services for the displaced population can cause a significant strain on the fiscal resources of an affected community. Resources consumed for this purpose would have to be taken from other important public services provided by the community for its residents. By providing the necessary funding and technical assistance to the community for the protection and repair of damaged property the EWP program contributes to the general welfare by freeing up assets for other socially important uses.

The aforementioned benefits are relatively short term compared with longer-term consideration of the inherent risks of continuing to live and work in disaster-prone areas, particularly in flood-prone watersheds. The numerous EWP restoration practices executed in the aftermath of disasters in watersheds that are repeatedly affected by major storms arguably simply act cumulatively to restore and maintain an overall short-term solution for the watershed that is not likely to be viable in the long term. In many cases, upgradient changes in these watersheds, particularly by intensive agriculture or development, affect the flow capacity requirements of downstream reaches, which cannot absorb the higher, swifter flows of the markedly changed system and which may be quickly damaged by erosion. These human-induced changes exacerbate the natural tendency of stream courses to vary over time, moving laterally and deepening or becoming shallow over different reach segments. These natural dynamics can pose a threat to agriculture or improved property near the stream even in relatively undisturbed watersheds. In developed watersheds, such threats are likely to appear more often over larger portions of the watershed. Continued reliance on EWP restoration practices in these watersheds simply postpones the time when measures other than restoration, measures that locate crops, homes, and businesses out of harm's way, would be the only viable solution to deal with repeated damages and further threats of damage. The EWP policy of allowing repairs only twice in 10 years at a damage site was proposed in recognition of this problem.

Traditional restoration techniques used in the current EWP Program, that would continue under the No Action alternative, tend to maintain the status quo in flood-prone areas; and may actually result in increased human habitation and use of these areas. Although affording a short-term reduction in the risk to public health and safety and a degree of protection for affected property, these practices have the potential to increase risk over the longer term by allowing increases in the size of potentially affected populations and increasing the value of the land and associated property that may be potentially damaged. Restoration design based on the principles of natural stream dynamics can help restore or approximate as closely as possible the natural hydrology of these systems and can help maintain and protect otherwise non-viable human communities. These communities may not have the room to move their valued property out of harm's way because the majority of useable land is near stream courses. In other cases, however, EWP purchase of floodplain easements in lieu of repairs provides the better long-term alternative strategy. Both agricultural and improved lands easements are available tools for this purpose under the Proposed Action. The management strategy proposed under Alternative 3, emphasizing the use of easements on improved land and local ordinances to restrict future development in these areas applies these tools in an overall strategy, and represents the most comprehensive, organized approach. Although costs and potential cumulative impact to the local community may be higher in the short term, this strategy would be preferable for reducing long-term overall costs to the community, the States, and to Federal taxpayers and for reducing problems associated with public health and safety.

3.5 EWP PROGRAM MITIGATION

According to the CEQ NEPA regulations at 1508.20, mitigation includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- Compensating for the impact by replacing or providing substitute resources or environments

3.5.1 Mitigation for Aquatic Community Resources

Potential adverse impacts to aquatic community resources could be mitigated through reducing the dependence of EWP program activities on structural practices that harden stream banks, remove protective riparian vegetation, and generally increase runoff and the consequent delivery of non-point source pollution to the stream. Use of restoration designs based on the principles of natural stream dynamics, and bioengineering would help mitigate these impacts. Other governmental programs could be encouraged to restore and rehabilitate armoring sites to a more natural riparian state where practicable. Where such natural practices are inappropriate, ensuring that the structural EWP practices are properly maintained would help mitigate the need for additional structural practices due to failure of the original structures.

NRCS would continue to consult with the U.S. Fish and Wildlife Service in any situation where there is a potential for jeopardy to a T&E aquatic species and would work with USFWS to develop adequate protective measures.

3.5.2 Mitigation for Wetlands, Floodplain and Riparian Resources

Potential adverse impacts to wetlands, floodplains, and riparian resources are described in Chapter 5, Section 5.2. Like the impacts to aquatic community resources, these impacts could also be mitigated through reducing the dependence of EWP program activities on structural practices that harden stream banks, remove protective riparian vegetation, and generally increase runoff and the consequent delivery of nonpoint source pollution to the stream.

Coordination with other federal, state, and local agencies and the landowning public to encourage understanding of the concepts underlying the EPA 404(b)(1) guidelines for wetlands protection in land use activities, and ensuring that the guidelines are followed as a planning practice, as well as for wetlands mitigation, would help mitigate the loss of both wetlands and floodplain resources.

NRCS would continue to consult with the U.S. Fish and Wildlife Service in any situation where there is a potential for jeopardy to a T&E wetland, riparian, or floodplain species and would work with USFWS to develop adequate protective measures.

3.5.3 Mitigation for Watershed Upland Resources

Reducing the dependence of EWP program activities on structural practices would help mitigate damage to terrestrial resources by reducing the use of heavy equipment in surrounding upland areas. Use of more advanced techniques such as helicopter seeding for critical area treatments would reduce heavy equipment impacts on soils.

NRCS would continue to consult with the U.S. Fish and Wildlife Service in any situation where there is a potential for jeopardy to a T&E upland species and would work with USFWS to develop adequate protective measures.

3.5.4 Mitigation for Socioeconomic & Other Human Resources

EWP activities may draw heavily on a community's resources for funding, which can be destabilizing – at least in the short run. These impacts can potentially be mitigated by keeping bid packages for EWP work small, so that local contractors with the skills required would have a fair chance to obtain the work, thus returning some portion of the funds to the locality. Where floodplain easements are used in place of structural practices, floodplain usage may be reduced, requiring relocation of people and activities currently in those areas. Attention paid to preserving and protecting neighborhood structure and residential networking can mitigate the effects of this relocation. In rural communities, certain institutional structures, such as churches, schools, and other "special" places, may require special consideration to mitigate adverse effects from such changes.

Where land under easement purchase is removed from economically productive activities, which were contributing to the local economy and tax base, compensation can be encouraged through seeking alternative replacement activities through such vehicles as HUD's urban development block grants and similar public-private measures. There would be some measure of local economic self-correction inherent in the process anyway, because the community would no longer need to provide the same level of services (power, sewer, road repair) to the easement locality and would no longer have to pay their share of the cost of disaster damage repairs in the future. Nevertheless, NRCS would encourage income-producing activities on easement lands that would be compatible with their basic purpose. On improved lands easements where the sponsor gains title to the land, entry fee to open space uses such as trails, walkways, fishing and boat access might be feasible. On agricultural easements, the landowner keeping title might charge a fee for hunting.

3.5.5 Mitigation for Cultural Resources

Currently, some NRCS field offices define the Area of Potential Effect (APE) for EWP projects as the immediate site location, which may inadvertently omit addressing potential adverse impacts to historic properties nearby or downstream. The Cultural Resource Coordinators in the example site states indicate that EWP activities need to be very near to historic resources for NRCS to consider the possibility of impacts. Therefore, at present, unless potential historic structures located in the floodplain, such as homes or mills, are directly affected by sudden impairments and NRCS is planning EWP work to protect them, such resources would not be considered to be in the APE. In addition, NRCS focus on historic structures may result in omitting cultural resources such as archaeological sites, viewsheds, historic landscapes, and cultural places. With narrowly defined APEs, cultural resources may also be affected by ancillary activities such as soil borrow and heavy equipment staging. Mitigation practices for these potential effects could include more comprehensive training at the state level in the types and prevalence of all cultural resources that might be encountered in each region of the state.

Consultation with the SHPO is a part of the EWP planning and coordination function before a disaster occurs and contact with the SHPO is made before actions at EWP are taken. Because cultural resources are locality specific, mitigation to protect particular cultural resources would be developed if needed at the site level as part of the defensibility review of the EWP practice.

Chapter 4

AFFECTED ENVIRONMENT

Affected Environment—The environmental impact statement shall succinctly describe the area(s) to be affected or created by the alternatives under consideration. (40 CFR 1502.15).

The environment affected by the Emergency Watershed Protection Program is comprised of the portions of watersheds of the United States that have been impaired by natural disasters over the years to such an extent that life or property is threatened. The impaired conditions that trigger the EWP Program make it fundamentally different from most other Federal programs because other programs are usually undertaken in relatively undisturbed environmental conditions. This chapter describes the aquatic, floodplain, wetland, riparian, and upland ecosystems of the U.S. watersheds, focusing on characteristics that indicate their general condition or health. These characteristics are used to evaluate the effects of natural disasters and of the EWP Program. The chapter then describes the characteristics of human communities in U.S. watersheds, focusing on the rural communities most likely to be affected by EWP Program activities. The chapter briefly describes typical EWP practice sites, easement sites, selected human communities, and watersheds that are used as examples of the environmental consequences of the EWP Program in the impacts assessment in Chapter 5.

4.1 OVERVIEW OF THE AFFECTED ENVIRONMENT

The environment affected by the EWP Program consists of the portions of the watersheds of the U.S. states and territories that are associated with human uses, and communities where watershed impairments resulting from natural disasters may threaten life or property. Potentially affected watersheds include all of those of the 50 states and territories except coastal areas and Federal lands not managed by the USFS. Although EWP Program work can be performed in virtually any watershed location, a typical EWP Program restoration site is in the upper reaches of a relatively small watershed, in a rural area, or rural outskirts of an urban area. There are exceptions to this general rule, as in the case of the 1993 Upper Mississippi floods, when the EWP Program assisted in the recovery effort in many different ways, such as repairing mainstem river levees.

This PEIS addresses the impacts of the EWP Program on watershed aquatic, floodplain, wetland, and riparian ecosystems. It also addresses the impacts of certain practices, such as critical area treatment and upland debris removal, on watershed upland ecosystems. The analysis is based on the potential for both adverse and beneficial changes in the watershed ecosystems. The PEIS addresses the conditions of these ecosystems before a disaster, in the aftermath of a disaster, and after the EWP Program practice or floodplain easement is installed. It covers current EWP Program restoration practices and easements as well as proposed practices and easements.

The condition of aquatic habitats is characterized using EPA's bioassessment protocols based on aspects of in-stream habitat and channel morphology. Water quality and pollutants are also addressed in classifying habitats according to how well they support aquatic communities, including T&E species. Similar classifications are for the before-disaster, after-disaster, and after-EWP Program conditions of floodplain, wetland, riparian, and upland watershed ecosystems. The evaluation of impacts incorporates analyses of the environmental effects of Program practices at example project sites typical of EWP Program practices.

Threatened and endangered (T&E) species are Federally protected and site-specific in occurrence. They are addressed before implementation of every EWP project, and they are protected, as appropriate, on a case-by-case basis. They are not characterized, nor evaluated, species-by-species in the general programmatic impacts analysis. However, they are described as protected components of the affected environment for each of the example EWP sites and are discussed as sensitive biotic components of the affected ecosystems.

Aspects of human communities potentially affected by the EWP Program include the economic, social, cultural, and recreational resources. These aspects of rural communities nationwide are described, and then example communities where substantial EWP work has recently been carried out are also described. The selected rural outskirts, small towns, and rural agricultural locations typify the range of human communities where the EWP Program is called in to deal with threats to life and property.

Cultural resources are site-specific and community-specific resources that are addressed before implementation of every EWP project and protected, as appropriate, on a case-by-case basis. They are not characterized programmatically, nor evaluated, in the general programmatic impacts analysis. However, they are described as protected components of the affected environment for each of the example EWP sites.

The cumulative impacts of EWP Program projects and other watershed activities are described using selected minor watersheds (USGS 12-digit watersheds) and major watersheds (8-digit USGS hydrologic units).

Twenty-three individual practice or easement sites were selected in 14 watersheds (Table 4.1-1) to represent typical impairments and EWP Program practices. Of the locations (Fig. 4.1-1), six were chosen to represent the range of affected human communities, and three were selected to illustrate cumulative effects throughout the watershed.

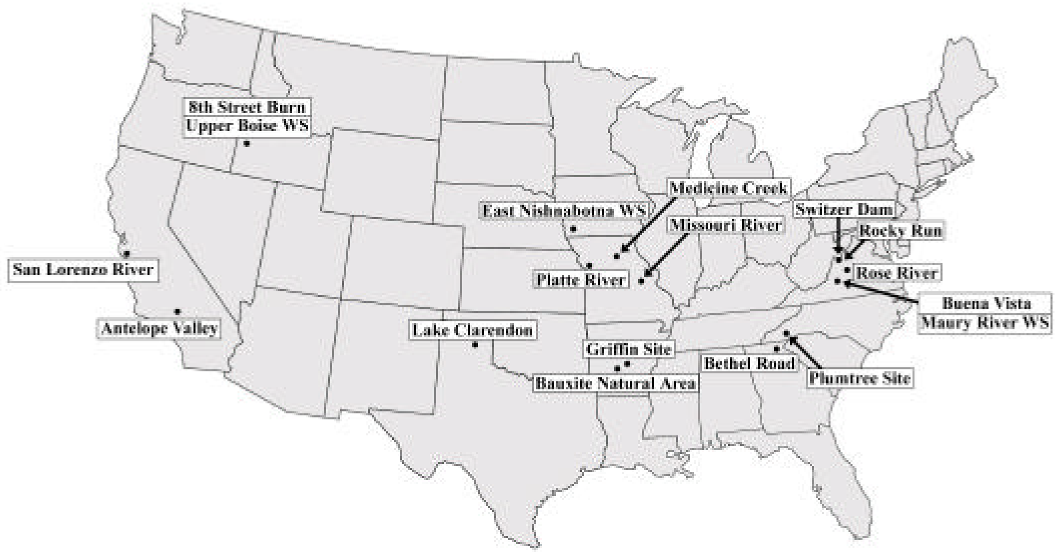


Fig. 4.1-1. Watershed impairment sites used as examples in the analysis of EWP Program impacts (WS = watersheds used in cumulative impacts analysis).

Table 4.1-1 Watersheds and project sites where potential ecosystem, human community, and cumulative impacts are addressed in the PEIS.

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities	Cumulative Impacts Affected Area
Lower Boise (17050114)	8th Street Burn, Boise Foothills north of Boise, ID	Critical Area Treatment of Major Burn Area in outskirts of Boise	Rural area in a metropolitan county	Lower Boise River Watershed, Ada Co., Region
Maury River (02080202)	Buena Vista, VA (small city on the Maury River)	Debris removal in 4 streams flowing through city	Independent city of Buena Vista in predominantly rural region	Buena Vista and Maury River Watersheds, Rockbridge County
	4 conservation practice locations in watershed, VA	Enduring conservation practices		
East Nishnabotna (10240003)	3 East Nishnabotna restoration sites, IA	Riverton Easement Debris, bank and levee damage on 3 sites on river and tributaries	Incorporated rural community of Shenandoah, IA and nearby farms	E. Nishnabotna Watershed, Fremont Co.

Table 4.1-1 Cont'd

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities	Cumulative Impacts Affected Area
East Nishnabotna (10240003)	Riverton Easement Site, IA	Floodplain easement near Riverton		E. Nishnabotna Watershed, Fremont Co.
Upper Chattahoochee River (03130001)	Bethel Road site, Hall Co., GA	Tornado debris in stream	Two small independent farms in a rural area	
South Fork Shenandoah (02070005)	Rocky Run Site, Rockingham Co., VA	Streambank Repair, Hypothetical Improved Lands Easement	Residential cluster community of Rocky Run	
	Switzer Dam Site, Dry River, Rockingham Co., VA	Switzer Dam, Spillway damaged by Hurricane Fran		
Rapidan-Upper Rappahannock (02080103)	Rose River site, Criglersville, Madison Co., VA	Streambank Repair Site	Independent farm near small rural community	
Upper Saline (08040203)	Bauxite Natural Areas, AR	Tornado downed trees in sensitive habitat		
	Griffin site, Alexander, AR	Household and woody debris from tornado		
Antelope-Freemont Valleys (18090206)	Antelope Valley, CA	Drought with life-threatening sandstorms		
San Lorenzo-Soquel (18060001)	San Lorenzo River - Santa Cruz Co., CA	Soil-Bioengineering to protect streambanks		
Nolichucky River (06010108)	Plumtree, NC	Natural stream dynamics and bioengineering practices pilot project		
Upper Salt Fork Red (11120201)	Lake Clarendon Clarendon, TX	Sewage Treatment Plant on Floodplain		
Lower Missouri River (10300200)	Missouri River floodplain site, MO	Floodplain deposition site		
Lower Grand (10380103)	Medicine Creek site, MO	Floodplain easement with setback levee, Water control		
Platte River (10240012)	Platte River, MO	Floodplain easement, water control		

4.2 ECOSYSTEMS AFFECTED BY THE EWP PROGRAM

The primary objective of the EWP Program is to remove threats to life and property posed by watershed impairments resulting from natural disasters. The environment affected by the EWP Program's restoration practices and easements is comprised of the watersheds of the U.S. states and territories where life and property are potentially at risk from natural disasters. This definition of the Program's affected environment is important in two respects. First, it includes virtually all U.S. watersheds with a few exceptions. Second, it focuses on where the natural environment intersects with human uses and communities. Natural disasters can, and do, alter watershed characteristics rapidly and radically. However, where there are no human uses and communities, there is no threat to human life or property, and the Program would not be involved.

Federal lands not managed by the USFS and coastal areas subject to ocean wave action are the only watersheds not covered by the Program. These exceptions are generally the main stems of major rivers and the cities and towns on their riverbanks. Damages to these localities are routinely handled by the USACE and FEMA, although NRCS may be requested to assist when widespread Presidentially-declared disasters occur.

This chapter presents an overview of the natural environments of watersheds and of the human communities where disasters threaten life and property.

4.2.1 Watershed Characteristics

The dynamics of watersheds and their ecosystems are the subject of extensive research and management efforts by Federal, state, and local government agencies, academia, and environmental groups. The analysis of EWP Program impacts on watershed environments in this PEIS is based on current understanding of the principles of watershed science.

4.2.1.1 Watershed Identification

Hydrologic units (HU) comprise a hierarchical coding system developed by the U.S. Geological Survey that divides the United States and the Caribbean into 21 major resource regions (2-digit units), 222 sub regions (4-digit units), 352 accounting (6-digit) units, and 2,150 8-digit cataloguing units (Fig. 4.1-1). The 8-digit units delineate river basins with drainage areas usually greater than 700 square miles (USGS, 1999) and are the basis for the:

- Watershed health data compiled by EPA
- Prioritized watershed planning and management described for EWP Program Alternative 3
- Large watershed cumulative impacts analysis of this EWP PEIS (red arrows on Fig. 4.2-1).

Smaller (11-digit and smaller) watershed subunits and reaches of 8-digit hydrologic units are the context for the smaller watershed EWP Program cumulative impacts analyses.

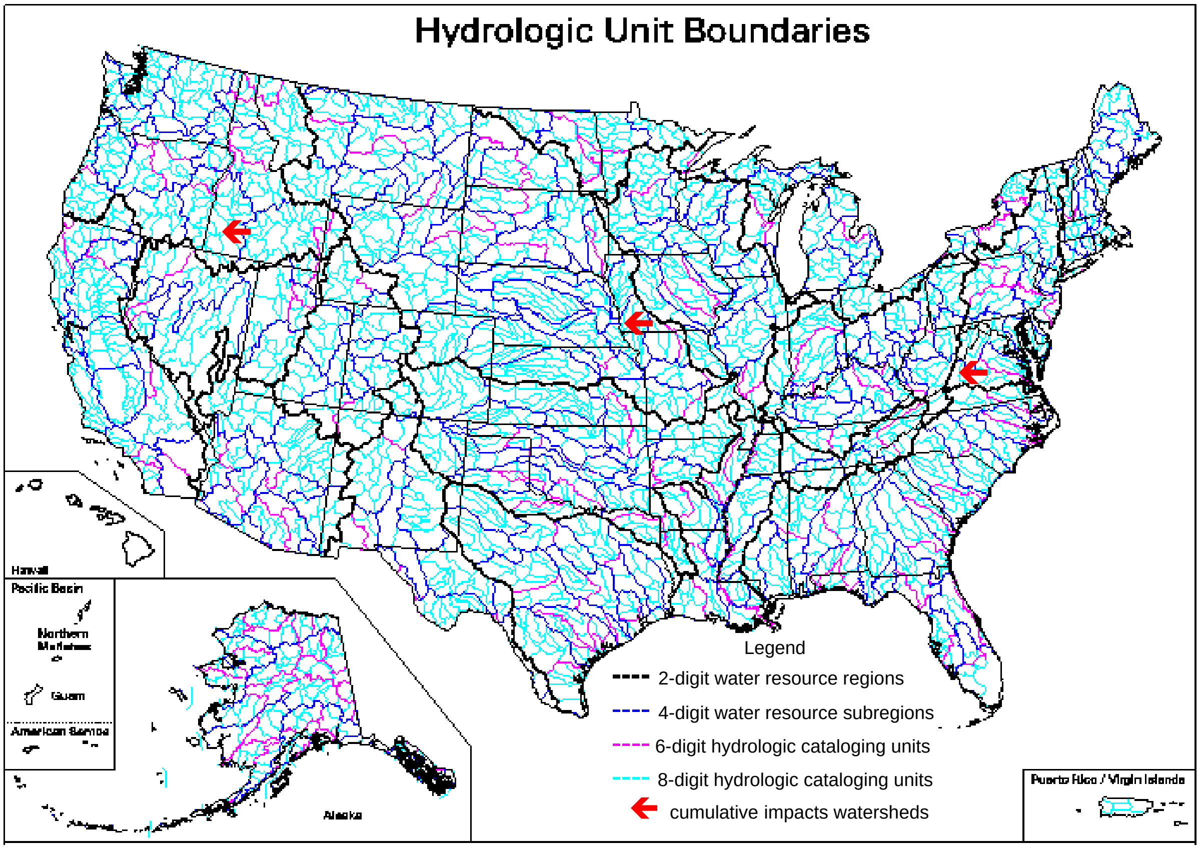


Fig. 4.2-1 U.S. Watersheds—2-digit resource regions outlined in black; 8-digit hydrologic cataloging units, the smallest shown, are outlined in light blue.

4.2.1.2 Watershed Ecosystems

This section describes the important aspects of watershed aquatic, floodplain, wetland, and riparian ecosystems that potentially would be affected by the EWP current and proposed restoration practices. It describes important aspects of watershed upland ecosystems that might be affected by certain practices such as critical area treatment and upland debris removal.

4.2.1.2.1 Watershed Aquatic Ecosystems

For the purposes of the PEIS, the NRCS Interdisciplinary Team first considered the importance of the Program interactions of components of aquatic ecosystems that are affected by disasters with EWP Program practices. Then, the team adopted a categorization scheme to evaluate and describe Program impacts. It used an impacts network adapted from the methods of the NRCS (1977) and Sorenson (1971) as described in Canter (1996). EWP Program practice components generate impacts to and among living and non-living aquatic community components as diagrammed in Appendix B. These causal flow diagrams were reviewed and revised to ensure that all of the important components and their relationships were correctly specified. Questions were formulated to serve as comprehensive checklists for the review of the impacts analysis. To focus the PEIS analysis on potentially significant impacts and to ease the presentation for the reader, the NRCS Interdisciplinary Team classified aquatic ecosystems according to their condition (Table 4.1-1). This classification allows a concise treatment of the range of different aquatic environments potentially affected by the Program. The classification is based largely on the EPA *Rapid Bioassessment Protocols for Use in Streams and Rivers* (EPA 1989). It facilitates the discussions of the before-event conditions of aquatic ecosystems, how they are affected by disasters, how they are affected by EWP Program practices, and how the changes proposed under the Program alternatives would alter those effects.

4.2.1.2.2 Riparian, Wetland, and Floodplain Ecosystems

Floodplains, terraces, and other features of stream systems are formed primarily through erosion, transport, and deposition of sediment by stream flow. Near-stream areas provide much of the energy for stream systems by contributing coarse particulate organic matter (CPOM). As outlined previously, riparian and floodplain areas serve an integral role in a stream's production of energy, especially in lower order streams. Floodplains and riparian systems also aid in controlling the sediment and nutrient loads of a system. The vegetation in these areas filters runoff before it reaches the aquatic environment.

The team addressed these near-stream ecosystems in the same way it addressed aquatic ecosystems. First, the basic components of the ecosystems and their interrelationships were identified in flow diagrams (Appendix B) and linked to activity components of EWP Program practices, with questions then prepared. Then, condition classifications using important aspects of the ecosystems (Tables 4.2-2 to 4.2-4) were created to focus and simplify discussions. Condition parameters were chosen to reflect habitat values important to maintaining these environments and, as important, the role the environments play in determining the condition of the aquatic systems in their watershed and the effects of disasters on aquatic systems.

Table 4.2.1 Aquatic Ecosystems Condition Classes

Condition	Primary In-stream Habitat		
	*Bottom Substrate (Available Cover)	*Embeddedness	*Velocity (Flow at Representative Low Flow)
Excellent	Greater than 50% rubble, gravel, submerged logs, undercut banks, or other stable habitat	Gravel, cobble, and boulder particles are between 0 and 25% surrounded by fine sediment	Cold: >0.05cms; Warm: > 0.15cms; All 4 habitats present
Good	30-50% rubble, gravel, or other stable habitat; adequate habitat	Gravel, cobble, and boulder particles between 25 and 50% surrounded by fine sediment	Cold: 0.03-0.05cms; Warm:0.05-0.15cms; 3 of 4 habitats present
Fair	10-30% rubble, gravel, or other stable habitat; habitat availability less than desirable	Gravel, cobble, and boulder particles are between 50 and 75% surrounded by fine sediment	Cold:0.01-0.03cms; Warm: 0.03-0.05cms; 2 of 4 habitats present
Poor	Less than 10% rubble, gravel, or other suitable habitat; lack of habitat obvious	Gravel, cobble, and boulder particles are over 75% surrounded by fine sediment	Cold: <0.01cms; Warm: <0.03cms 1 type of habitat present

Table 4.2.1(continued) Aquatic Ecosystems Condition Classes

Condition	Channel Morphology		
	*Channel Alteration	*Bottom Scouring and Deposition	*Pool/Riffle, Run/Bend Ratio (distance between riffles divided by stream width)
Excellent	Little or no enlargement of islands or point bars, and/or no channelization	Less than 5% of the bottom affected	5-7. Variety of habitat, deep riffles and pools
Good	Some increases in bar formation, mostly from coarse gravel; and/or some channelization	5-30% affected, scour at constrictions and where grades steepen; some deposition in pools	7-15. Adequate depth in pools and riffles; bends provide habitat
Fair	Moderate deposition of new gravel and coarse sand on old and new bars; pools partially filled with silt; and /or embankments on both banks	30-50% affected. Deposits and scour at obstructions, constrictions, and bends; some filling of pools	15-25. Occasional riffle or bend; bottom contours provide some habitat
Poor	Heavy deposits of fine material, increased bar formation; most pools filled with silt	More than 50% of the bottom changing nearly all year long; pools almost absent due to deposition; only large rocks in riffle exposed	>25. Essentially a straight stream; generally all flat water or shallow riffles; poor habitat

Table 4.2.1(continued) Aquatic Ecosystems Condition Classes

Condition	Water Quality			Pollutants	
	DO	Turbidity	Temperature	Contaminants (POLs/Metals)	Nutrients
Excellent	<7ppm	Low	Low, able to support salmonids, other cold water fish	Low – Very few occurrences	Low – moderate
Good	6-7ppm	Moderate	Moderately low, able to support some cool-water game fish	Low – Infrequent occurrences	Moderate
Fair	4-6ppm	Moderately high	Moderate, able to support game fish	Low – more frequent occurrences	Moderate-high
Poor	<4ppm	High	High. Unable to support game fish	Frequent occurrences	High – eutrophic conditions

*Source: J.L. Plafkin et al., 1989. U.S. EPA Rapid Bioassessment Protocols for Use in Streams and Rivers. Office of Water, EPA/440/4-89/001)
(Velocity habitats should include a slow, deep; slow, shallow; fast, deep; and shallow, deep categories)

Table 4.2.1(continued) Aquatic Ecosystems Condition Classes

Condition	Biota			
	Macro-invertebrates	Resident Fish	Higher Plants/ Algae	T&E Species/ Habitat
Excellent	Stoneflies, mayflies, caddisflies, present	Salmonids/ Cool water game fish present	Little vegetation; uncluttered look to stream	Excellent supporting conditions
Good	Some mayflies, caddisflies, Dragonfly nymphs, beetle larvae, damselfly nymphs, clams present	Cool-water game fish present; high diversity (Walleye Pike, etc.)	Moderate amount of vegetation	Adequate supporting conditions present
Fair	Some damselfly and dragonfly nymphs, beetle larvae present	Warm water game fish present; High diversity (Large mouth Bass, etc.)	Cluttered, weedy conditions; seasonal algal blooms	Conditions favorable for some T&E species
Poor	Aquatic worms, leeches, midge larvae present	Few or no game fish (Suckers, Catfish, Carp dominate.)	Choked, weedy, or heavy algal blooms; dense masses of algae on bottom	Inadequate temperature food, habitat conditions to support T&E species

Table 4.2-2 Riparian Habitat Condition Classes

Conditions	*Bank Stability/Erosion	*Bank Vegetative Stability	*Streamside Cover
Excellent	Stable; No evidence of erosion or bank failure; Side slopes generally < 30%. Little future potential for problem	80% or more of streambank surfaces covered by vegetation or boulders and cobble	Dominant vegetation is shrub
Good	Moderately stable. Infrequent, small areas of erosion mostly healed over; Side slopes up to 40% on one bank; Slight potential for erosion in extreme floods	50 – 79% of the streambank covered by vegetation, gravel, or larger material	Dominant vegetation is of tree form
Fair	Moderately unstable. Moderate frequency and size of erosional area; Side slopes up to 60% on some banks; High erosion potential during extreme high flows	25 – 49% of the streambank surfaces covered by vegetation, gravel, or larger material	Dominant vegetation is grass or forbs
Poor	Unstable. Many eroded areas; Side slopes >60% common; Raw areas frequent along straight sections and bends	Less than 25% of the streambank surfaces covered by vegetation, gravel, or larger materials	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings

*Source: J.L. Plafkin et al., 1989. U.S. EPA Rapid Bio-assessment Protocols for Use in Streams and Rivers. Office of Water, EPA/440/4-89/001)

Table 4.2-2(continued) Riparian Habitat Condition Classes

Conditions	Vegetative Zone Width (Least Buffered Side)	Wildlife & Wildlife Habitat	T&E Species & T&E Species Habitat
Excellent	> 18 meters with no impact from human activities	Diverse, high- density wildlife population and food source	Adequate food sources and habitat present to support T&E species, if present
Good	12 to 18 meters minimal human activity impacts	Moderate wildlife diversity; Good habitat diversity; Adequate food sources	Moderate habitat and food sources available
Fair	6 to 12 meters, human impacts substantial	Moderately low wildlife diversity; Lack of food sources to support higher-level wildlife populations	Lack of food sources to support T&E populations
Poor	< 6 meters; little or no riparian vegetation due to human activities	Low wildlife diversity. Habitat unable to support wildlife populations; (Area affected by human activity; Farming, urbanization, etc.)	Habitat unable to support T&E populations

Table 4.2-3 Wetland Condition Classes

Habitat Condition	Hydrology	Management	Vegetation
Excellent	Adequate storage for storm events; Slows peak velocities; Allows for infiltration	No management needed to maintain quality OR is being managed continuously to maintain quality	Diverse, dense. Provides an adequate nutrient filter
Good	Adequate storage for storm events; Slows peak velocities; Allows for infiltration	Little management needed to improve quality OR is being managed periodically to maintain quality	Moderately Diverse. Adequately removes nutrients, pollutants from stormwater runoff
Fair	Minimally slows peak discharge	Moderate management needed to improve quality OR is being managed often to maintain quality	Contains only a few species. Rather sparse; Minimally aids in removing nutrients, etc.
Poor	Minimally slows peak discharge	Substantial management would be needed to improve and maintain quality but is not being done	Sparse. Does not provide a great deal of aid in removing nutrients, pathogens, etc.

Table 4.2-3(continued) Wetland Condition Classes

Habitat Condition	Habitat	Wildlife	T&E Species
Excellent	Diverse. Contains diverse vegetative and structural habitat	Diverse. Adequate habitat and food sources available	Habitat and food sources adequate to support T&E species
Good	Moderately Diverse	Moderately Diverse. Adequate habitat and food sources available	Habitat and food sources adequate to support T&E species
Fair	Less Diverse	Less Diverse. Habitat and food sources lacking for some organisms	Habitat and food sources adequate to support only certain T&E species
Poor	One dimensional	Habitat and food sources inadequate for many types of wildlife populations	Habitat and food sources not adequate to support T&E species

Table 4.2-4 Floodplain Condition Classes

Habitat Condition	Land Development & Uses	Hydrology	Vegetation
Excellent	Minimal development; Extensive timber or natural grasslands; Low percentage of area is farmed, little to no impervious surface	Substantial storage for storm events; Slows peak velocities; Allows for substantial infiltration; Little or no restriction of flood waters over floodplain	Diverse, dense. Provides an adequate nutrient filter
Good	Some development. Minor amount of impervious surface; Substantial amount of natural cover; May have farming	Adequate storage for storm events; Slows peak velocities; Allows for moderate amount of infiltration	Moderately Diverse. Adequately removes nutrients, pollutants from stormwater runoff
Fair	Moderate development. Moderate area in impervious surfaces; May also have extensive farming	Minimally slows peak discharge; Restrictions on floodplain overflows along substantial portions of stream	Contains only a few species. Rather sparse; Minimally aids in removing nutrients, etc.
Poor	Substantial development. Much area in impervious surface; Farming may be moderate to major in importance	Minimally slows peak discharge. Major restrictions on floodwater flows over floodplain with levees, dikes, and dams	Sparse. Does not provide a great deal of aid in removing nutrients, pathogens, etc.

Table 4.2-4(continued) Floodplain Condition Classes

Habitat Condition	Habitat	Wildlife	T&E Species
Excellent	Diverse. Contains diverse vegetative and structural habitat	Diverse. Adequate habitat and food sources available; Native species abundant; Exotic/ Invasive rare	Habitat and food sources adequate to support T&E species
Good	Moderately Diverse	Moderately Diverse. Adequate habitat and food sources available; Native species common; Exotic/Invasive uncommon	Habitat and food sources adequate to support T&E species
Fair	Less Diverse	Less Diverse. Habitat and food sources lacking for some organisms; Native species uncommon; Exotic/ Invasive common	Habitat and food sources adequate to support only certain T&E species
Poor	One dimensional	Habitat and food sources inadequate for many types of wildlife populations; Native species rare; Exotic/ Invasive abundant	Habitat and food sources not adequate to support T&E species

4.2.1.2.3 Watershed Upland Ecosystems

As with aquatic, riparian, wetland, and floodplain ecosystems, the NRCS addressed the impacts of disasters and EWP Program practices on watershed uplands using the impacts flow diagram analysis and condition classification. (A flow diagram and question set are in Appendix B). The condition classification is presented in Table 4.2-5. Condition parameters were chosen to reflect habitat values important to maintenance of upland environments and, as important, the role uplands play in determining the condition of the aquatic systems in their watershed and in determining the effects of disasters on aquatic systems.

Table 4.2-5 Watershed Upland Condition Classes

Condition	Slope/ Stream Gradient	Soil Erosion Potential	Land use/ development	Vegetation	Wildlife	T&E Species
Excellent	Level to moderate	Low	Most land in natural cover	Extensive forest or native grass stands	Few or no introduced species; Native wildlife relatively abundant	Good habitat to support presence and recovery
Good	Low gradient to moderately steep	Low to moderate	Substantial to moderate amount of land in natural cover	Substantial forest or native grass stands with corridor farming or development	A number of introduced species; Native wildlife relatively common	Some habitat to support presence little to support recovery
Fair	Low gradient to moderately steep	Moderate	Some natural cover; Substantial land farmed or developed	Some forest or native grass stands in corridors with major farm or developed land	A number of introduced species; Native wildlife relatively uncommon	Little habitat to support presence or recovery
Poor	Moderate to steep	Moderate to high	A high proportion of land farmed or developed or naturally damaged	Few or no forest or native grass stands or extensive invasive vine growth	Many introduced species; Native wildlife relatively rare.	Little habitat to support presence none to support recovery

4.2.1.3 Watershed Health

EPA provides in-depth data on national, regional and individual watershed health. The agency analyzed a series of data layers, which include indicators such as the number of aquatic species at risk, human population change, and drinking water quality. EPA uses 16 data layers (the Index of Watershed Indicators, or IWI) to formulate a single Overall Watershed Characterization—1 for a healthy watershed, and 6 for an imperiled watershed. These watershed indicators were used to characterize the health of EWP Program example watersheds in the analysis of cumulative impacts of the EWP Program. The 16 measurements (Table 4.2-6) characterize the condition (the current health of a watershed) and vulnerability (potential impact of future stressors, such as pollutants) of a watershed. Both condition and vulnerability are described as good, moderate, or poor, or the data on a watershed may be insufficient. Detailed descriptions of each measurement are from the EPA website and are available in Appendix D.

Table 4.2-6 Watershed Measurements Used to Characterize Watersheds

Watershed Measurement	Range of Ratings	Description of Ratings
Condition Indicators		
Designated Use	Critical, More Serious, Less Serious, Better	< 20%, 20-50%, 50-80%, 80-100% Meeting All Uses, Insufficient Assessment Coverage
Fish & Wildlife Consumption Advisories	More Serious, Less Serious, Better	Monitored with No Active Advisory, One or More Advisories—Limits Fish Consumption, One or More Advisories—No Fish Consumption, No Recorded Monitoring or Advisories
Source Water Indicators	More Serious, Less Serious, Better	No Significant Source Water Impairment Identified, Partial Impairment Identified, Significant Impairment Identified, Data Threshold Not Met
Contaminated Sediments	More Serious, Less Serious, Better	Inconclusive Data, Moderate Degree of Concern, High Degree of Concern, No Data for Assessment
Ambient Water Quality-Toxic Pollutants	More Serious, Less Serious, Better	0-10%, 11-50%, <50% Observations in Exceedance of Selected Reference Level, Data Sufficiency Threshold Not Met
Ambient Water Quality-Conventional Pollutants	More Serious, Less Serious, Better	0-10%, 11-50%, <50% Observations in Exceedance of Selected Reference Level, Data Sufficiency Threshold Not Met
Wetlands Loss Index	More Serious, Less Serious, Better	Low, Moderate, High Level of Wetland Loss, Insufficient Data
Vulnerability Indicators		
Aquatic/Wetland Species At Risk	High, Moderate, Low	1, 2-5, >5 Species Known to be At Risk, No Recorded Data
Pollutant Loads Discharged-Toxic Pollutants	High, Moderate, Low	No DMR Requirements for All Discharges, No Aggregate Loads in Excess of Total, Up To 20%, More Than 20%, Average Load Over Permitted Limits, Insufficient Data for >10% of Major Dischargers or >50% of Minor Dischargers
Pollutant Loads Discharged-Conventional Pollutants	High, Moderate, Low	No DMR Requirements for All Discharges, No Aggregate Loads in Excess of Total, Up To 40%, More Than 40%, Average Load Over Permitted Limits, Insufficient Data for >10% of Major Dischargers
Urban Runoff Potential	High, Moderate, Low	0-1%, 1-4%, >4% Land Area Above 25% Imperviousness, Insufficient Data
Agricultural Runoff	High, Moderate, Low	Low, Moderate, High Level of Potential Impact, Insufficient Data
Population Change	High, Moderate, Low	Declined/No Change, 0-7% Increase, >7% Increase, Insufficient Data
Hydrologic Modification By Dams	High, Moderate, Low	Low, Moderate, High Volumes of Impounded Water, Insufficient Data
Estuarine	High, Moderate, Low	Low, Moderate, High Susceptibility, Insufficient Data/Non-coastal Watershed

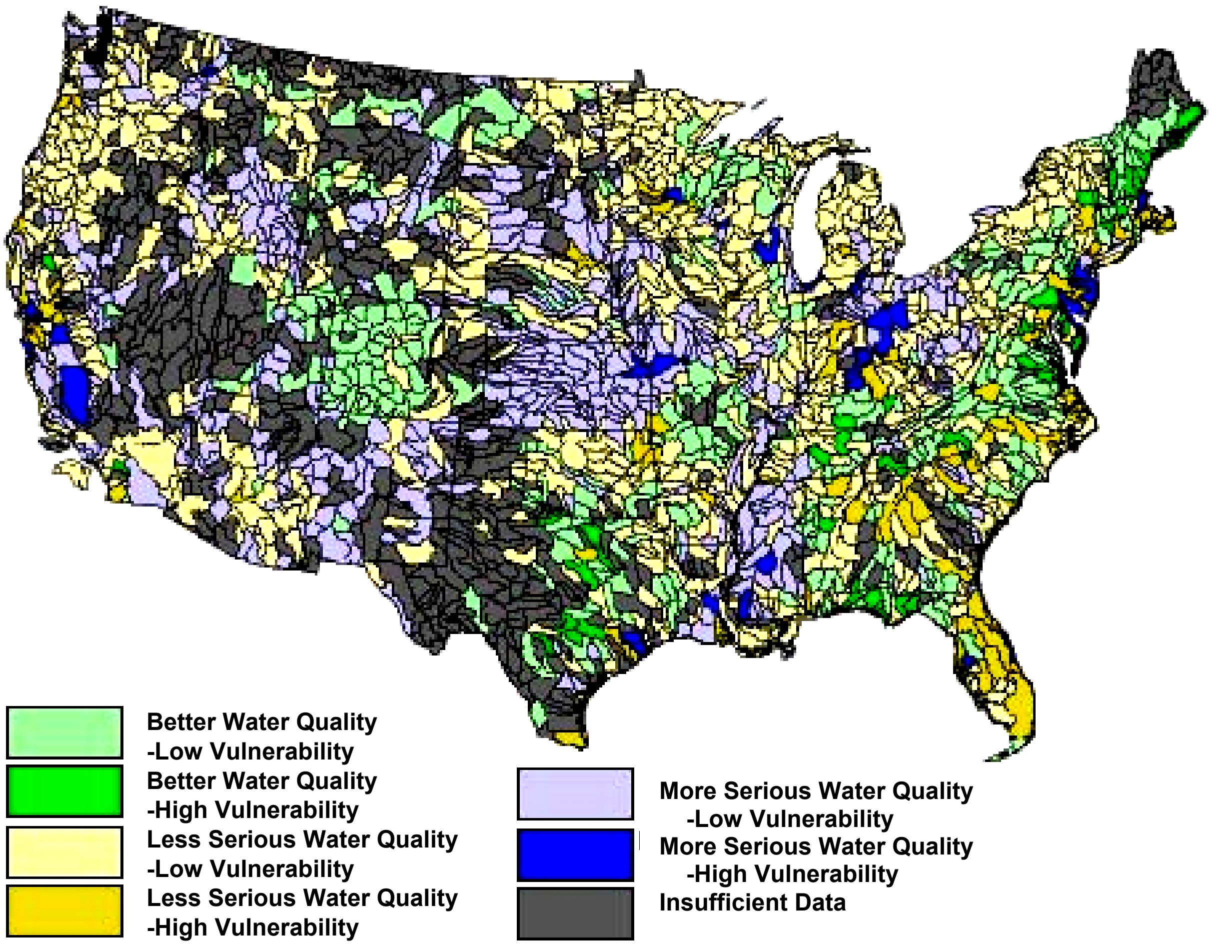


Fig. 4.2-2 EPA 8-digit HUC watershed ratings

EPA used a weighting methodology (see Appendix B) to construct the Overall Watershed characterization. The final product is a rating that accounts for 16 different variables, all of which indicate watershed health in a different way, summed into a single index of watershed health. This characterization resulted in six classes of watershed, with a seventh for insufficient data.

The classes, from healthy to imperiled watershed follow:

1. Watersheds with better water quality and lower vulnerability to stressors
2. Watersheds with better water quality and higher vulnerability to stressors
3. Watersheds with less serious water quality problems and lower vulnerability to stressors
4. Watersheds with less serious water quality problems and higher vulnerability to stressors
5. Watersheds with more serious water quality problems and lower vulnerability to stressors
6. Watersheds with more serious water quality problems and higher vulnerability to stressors
7. Watersheds for which insufficient data exists to assert condition or vulnerability

4.3 HUMAN COMMUNITIES AFFECTED BY THE EWP PROGRAM

The environment affected by the EWP Program includes those portions of the watersheds of the United States, including the 50 states and U.S. territories, associated with human communities or other human uses where life or property may be threatened by watershed impairments resulting from natural disasters. Natural disasters and their subsequent mitigation can affect a broad range of systems, structures, and activities within the human community. In addition to the immediate threat to human life and the potential for damage to land and associated property, natural disasters may have longer-term effects on the local or regional economy, infrastructure, the provision of social services to residents, or the structure, patterns, and quality of social life within a community.

The EWP Program can affect multiple aspects of a community and its social life. Immediately following a disaster (or where the threat of potential damage from a future disaster exists), a community's primary concern is to protect damaged infrastructure and housing, recover sources of employment and income, and to recover its economic structure (Vogel 1999). Although the direct effect of EWP Program installed practices is to protect these vital elements of community life, the approach the Program takes in installing practices may also have important effects (both direct and indirect) on the community.

4.3.1 Characteristics of the Affected Environment

At the program-wide level, the affected environment is a generalization of the social characteristics of the communities addressed by the EWP program. Because most of the EWP Program practices are relatively small in scale, they directly affect a localized area, normally the size of a community. Indirect and cumulative effects, however, may extend to downstream communities as well. The human communities affected by the Program are also typically small and non-metropolitan in structure and social pattern.

Larger, metropolitan communities, which are normally associated with major transportation arteries such as main stem rivers, port facilities, and transportation routes, or with large commercial, production or administrative centers, are more likely to be addressed by FEMA or Army Corps of Engineers actions. These larger metropolitan communities are not typical of EWP Program activities. Furthermore, in these larger communities, the impacts of EWP activity in terms of potential effects on their economy, social fabric, and resources would invariably be "swamped" by the impacts of other economic, social, and related factors. Thus, substantial EWP impacts are extremely unlikely to occur.

4.3.2 Characteristics of Rural Communities

In contrast to metropolitan communities, rural areas are characterized by comparatively few people living in relatively large, less densely populated areas, with limited access to large cities, and a considerable travel distance to centers of employment or market activity (Hewitt, 1989). Rural government structures are generally smaller than their urban counterparts, and have smaller financial resources per capita to address problems (Reeder, 1990). In 1990, rural areas included 83 percent of the nation's land area, 21 percent of its population, 18 percent of its employment, and contributed 14 percent of the national income (ERS, 1995). Based on data from the 1990 Census, some 2,288 individual counties in the U.S. can be classified as rural.

Program activities may also affect neighboring metropolitan areas. These larger metropolitan areas, thus, must also be considered as part of the affected environment. Metropolitan counties are defined as whole counties containing all or part of a designated Metropolitan Statistical Area (MSA). MSAs must include at least one city with a population of 50,000 or more inhabitants or an urbanized area with a total population of 100,000, or 75,000 in New England (GAO, 1993).

The rural communities affected by the EWP Program will vary in terms of their predominant economic activity, land use pattern, social structure, and administrative organization. This diversity and variation can be explained by a number of factors. Among these are the natural land forms, the relationships between physical components of the land, the political, technological, economic and social history of the region, the availability of resources and needed services, and the racial, ethnic and cultural composition of the population (McLelland, et al, 1995).

Regional variations in income level, poverty, and the size, density, and structure of the population are also important. Variations among communities may also depend on the proximity of the community to larger urban centers and the degree of economic and social integration between these centers and the rural community (ERS, 1995, Hewitt, 1989, Cromartie and Swanson 1996). As a result, the susceptibility of individual communities to the effects of a natural disaster, and the importance of EWP activity to the continued maintenance and future development of the community, will be unique in each circumstance.

Several other important characteristics of the rural communities potentially affected by the EWP Program are important to the analysis of impacts. In recent years, rural communities have undergone what is frequently characterized as an economic restructuring (Reeder, 1990). Where agriculture was once the dominant defining rural characteristic, a single industrial mode, residential configuration, or lifestyle no longer defines the socioeconomic patterns of contemporary rural communities. Communities remain strongly influenced by their predominant economic activity, but manufacturing and service industries are now more important sectors of the rural economy. Rural communities have also become more popular as tourist and recreational centers and as residential areas for retirees and families (ERS, 1995).

One result of this restructuring process has been an increasing difficulty in maintaining the current residential and employment base and the attraction of new residents or business investment to the community. These communities have also experienced a drop in per capita income during the past two decades. As Leistritz (1998) notes, this significant loss of purchasing power through out-migration (and a general decline in employment opportunity resulting from productivity increases in primary sector industries such as agriculture and manufacturing) have reduced the communities' ability to mobilize residents and resources to address critical problems.

4.3.3 Socioeconomic Factors Identified for the Affected Environment

Rural communities are characterized by social and lifestyle patterns distinctively different from their metropolitan counterparts. The predominately rural character of the communities in the PEIS indicates that in addition to population, employment and economic effects, factors such as community history and social characteristics may also be important in the identification of potential impacts. The social environment of rural communities includes important emphasis on a sense of place and community.

Specific socioeconomic factors that may be considered important in such an analysis (Burdge 1995, ICGP, 1994, Leistritz, 1994) include:

- The structure of the local economy including existing employment levels, the dominant economic activity of the area, and the value of potentially affected property
- Community Resources, including the patterns of natural resource and land use, the availability of housing and other land for production or investment purposes, and future community development plans
- The demographic characteristics of the local community, including population size, and composition as well as any socioeconomically sensitive population clusters
- Community/institutional arrangements, including provision of necessary services, organization of local government, and linkages to external systems
- Individual and neighborhood level characteristics such as residential stability, age of the built environment, residential networks, level of identification with the community, and the presence of significant cultural or religious institutions

These variables are used to assess the potential for impact to the social environment from EWP programs and are grouped in four categories
Effects on Economic Structure (Business and the Local Economy)
Effects on Infrastructure, Public Health and Safety, and Community Resources
Effects on Community Structure and Social Patterns
Environmental Justice considerations

Impacts are presented in Chapter 5. A summary description for each of the impact areas is provided in Table 4.3-1 below.

Table 4.3-1 Summary of Human Community Impact Areas

Community Aspect (Impact Area)	Description
Economic Structure	
Employment and Income	Critical to the continuing viability of a community and its residents, sources of employment and income include business and commercial establishments that employ local residents and provide necessary services and products to the community, as well as individual farms and related agricultural industry, recreational or other economically productive resources. These may be affected either by the threat of potential damage due to a natural event or by project related expenditures for protection or restoration following the event.
Value and Quantity of Natural Resources	Defined economically as the stock of environmentally provided assets (land, soil, forests, minerals, water, fauna, wetland areas, etc.), natural resources represent the useful materials that are the raw input or consumable products of human production. Quantity and condition of natural resources are both important. Both are a source of investment income to the current owner and future investment in the community from outside sources. These assets may be damaged either by the natural event itself or by implementation of the proposed EWP practice.
Infrastructure, Public Health and Safety, and Community Resources	
Infrastructure	The basic and essential elements that support the modern community (i.e. water supply, waste treatment, transportation, or power systems). The existing supply and current or future demand for infrastructure elements may be affected both by the consequences of a natural disaster or the requirements of the EWP proposed practices implemented in the community or in the surrounding region.
Property	Residential housing, other important economic or culturally significant buildings or other structures may be important to the quality of life in the community. In the event of a natural disaster, the utility, or setting of these structures may be damaged. Similarly, the implementation of EWP practices would be expected to have a beneficial effect, but may in some instances alter the desired characteristics of these structures.
Public Health and Safety, and other Community Resources	The range of public revenue supported and other valued resources that may be required to support and maintain the quality of social life of the community, community resources can include public health, safety, and emergency response, social assistance, and educational and cultural facilities, as well as recreation and aesthetic facilities and landscapes, and basic services such as shopping, food, entertainment, etc. Disruptions resulting from a natural disaster, from the requirement to expend resources for disaster recovery, or during the construction of EWP installed practices may impair the quality of life for community residents.
Social Pattern and Structure	
Population Characteristics	The size and composition of the local population and any indication of its stability racial and ethnic composition, poverty and income levels or residence patterns may serve to define the community or influence the community's response to the proposed practice or to a given program alternative.
Land Use	Existing and planned future uses of the land area available to the community and the potential aesthetic quality or suitability of the land for certain community uses. The protection of existing land uses may be critical to a community affected by a natural disaster, whereas, a more pro-active land use and growth management policy supported by EWP program alternatives may prevent or diminish losses as an alternative to simply reacting to the crisis resulting from the effects of a disaster.

Table 4.3-1 Cont'd

Community Aspect (Impact Area)	Description
Social Pattern and Structure	
Community & Neighborhood Social Patterns.	The sense of community and prevailing attachment to culturally valued places may be significantly affected both by the natural disaster itself and in the implementation of the proposed EWP practice. Also important is reliance within the affected community on clubs or informal groups that provide support to residents, either economically or socially. This may also include important facilities such as churches, schools, community centers, etc, as well as commercial and retail outlets for basic services.
Environmental Justice	
Impact Equity	Executive Order 12898 requires that federal programs, including the EWP program, determine whether a proposed alternative would have a disproportionate impact on socioeconomically deprived or minority populations in the affected community. Impact may result from the specific EWP activity itself, or may be the result of denying access to program benefits or information about the proposed practice or contracting opportunities that may arise during the during the construction phase of the program implementation.

4.3.4 Rural Community Types used in the Analysis

In order to describe the potential socioeconomic effects of EWP projects, five rural types have been extrapolated to illustrate the typical structures of EWP project communities. For each of the five types, a specific community was selected as an example for characterizing socioeconomic impacts in Chapter 5. Results of the analysis of example communities can be generalized to other communities of the same type, under similar circumstances.

The rural community types identified for the socioeconomic analysis include:

- Individual or multiple farms in less densely populated agricultural areas (not defined as a community itself, but considered as a part of the larger community for purposes of evaluating non-physical effects)
- Rural, unincorporated, enclaves in predominately metropolitan counties (may include either communities or individual properties)
- Residential housing clusters in areas defined as rural, with populations under 500
- Census defined places including unincorporated villages and small communities in non-farm areas with populations of less than 5000
- Incorporated cities in areas defined as rural, with populations over 5000.

Six communities where EWP projects have been undertaken recently were identified for analysis as examples for the impacts analysis. These communities were selected to reflect important characteristics associated with each community type while also representing a varied sampling of EWP installed practices. Three of the six communities are also presented as a part of the cumulative effects analysis. Because floodplain easements represent a categorically distinct option that would not be appropriate in all settings, a separate analysis was conducted for three of the communities where easements would be considered likely possibilities. Similar to the impact analysis, the results can be generalized to other communities under like situations. A summary of the socioeconomic characteristics of each of the six communities is presented in Table 4.3-2.

Table 4.3-2 Socioeconomic Characterization of the Six Communities Identified for In-depth Analysis

Community (1) / Characteristic	**Hall County, GA Bethel Rd., Community**	**Buena Vista City, VA**	**Boise, ID 8th St. Burn Area**	**Shenandoah IA Walnut Township Community**	**Rocky Run, VA**	**Rose River, VA**
Community Type	Multiple Farms	Independent City in rural area	Rural portion of metro county	Incorporated rural community	Residential Cluster	Multiple Farms
EWP Practices	Debris Removal	Debris/ Cobble Removal	Critical Area Treatment	Levee Repair	Gabions & Rip-rap	Debris Removal
Population size	2487	6406	14,579	1071	1181	5,672
Land Area (sq. mi.)	16.9	6.8	118.7	115.0	51.7	(1)
Rural population (%)	2487 (100%)	0.0	12.2	100	100%	100
Minority Composition (%)	19 (0.8%)	4.9	4.3	0.4	2.2%	13.6
Poverty (% at or below)	236 (9.7%)	14.4	6.5	14.2	10.3%	14.1
Per capita income	12198	$10,241	$22,200	$10,962	$11,088	$11,751
Total employment	1268	3149	7,764	474	658	2,660
Principal Economic Sectors	Service	Manufacturing, Trade, Construction	Trade, Services Manufrg.	Agriculture, Services, Trade	Manufrg, Trade Agriculture	Manufrg, Services, Trade
Housing – Median Year Constructed	1978	1957	1971	1939	1969	1966
Housing – Median value	$88,600	$43,300	$97,600	$32,500	$55,700	$70,200
Housing – Lived in same house since 1985	50.00%	62.6	47.0	73.0	71.7%	62%

Sources: U.S. Bureau of the Census: Census of Population and Housing, 1990, 1992 Economic Census, and 1992 Census of Agriculture

Notes:

(1) Represents the immediate community or a portion thereof that was directly affected by EWP action.

(2) Not determined for this community

4.4 WATERSHEDS EVALUATED FOR EWP CUMULATIVE IMPACTS

EWP Program practices carried out on sudden impairments in three example watersheds – the Buena Vista-Maury in Virginia, the Eighth Street Burn Area-Lower Boise in Idaho, and the East Nishnabotna in Iowa –were chosen for cumulative impact analysis (Table 4.4-1). They were selected because they illustrate the range of possible EWP Program practice and easement situations. Therefore, an intensive analysis for cumulative impacts was preferable to a more cursory examination of all 14 example-site watersheds. Buena Vista and Boise represented the use of Program practices in areas of potentially high interaction with a variety of land uses because of their urban settings and steep-slope environments. East Nishnabotna represented an almost totally agricultural land use context. (See Appendix D for a detailed description of each EWP practice site and the impacts of relevant disasters)

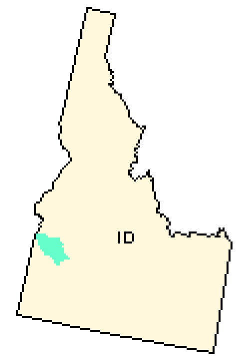
Table 4.4-1 Watersheds evaluated for EWP cumulative impacts

Watershed (8-digit code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities Analyzed	Cumulative Impacts Affected Area
Lower Boise (17050114)	8the Street Burn Boise Foothills north of Boise, ID	Critical Area Treatment of Major Burn Area in outskirts of Boise	Rural area located in a metropolitan county	Lower Boise River Watershed Ada Co.
Maury River (02080202)	Buena Vista, VA (small city on the Maury River)	Debris removal in 4 streams flowing through city	Independent city of Buena Vista in predominantly rural region	Buena Vista and Maury River Watersheds Rockbridge Co.
	4 conservation practice locations in watershed	Enduring conservation practices		
East Nishnabotna (10240003)	3 East Nishnabotna restoration sites, IA	Riverton Easement Debris, bank and levee damage on 3 sites on river and tributaries	Incorporated rural community of Shenandoah, IA and nearby farms	E. Nishnabotna Watershed Fremont Co.
	Riverton Easement Site, IA	Floodplain easement near Riverton		

In the Virginia and Idaho watersheds, both the immediate watersheds in which the EWP Program practices were carried out (USGS 12-digit watersheds) and the larger (8-digit) watersheds evaluated by EPA were considered relevant contexts for evaluation. The importance of setting watershed and resource boundaries in the cumulative impact analysis is discussed in Appendix B.

4.4.1 Boise, ID--Eighth Street Burn Area-Lower Boise River Watershed

4.4.1.1 Disaster Event



In the late summer of 1996, a wildfire burned 15,300 acres of the Boise foothills, severely impairing the area's ability to retard runoff. In the aftermath, it was estimated by the NRCS that little precipitation was needed to cause severe erosion and flooding in the floodplain within the City of Boise. (BLM et al, 1996)

4.4.1.2 Brief Site Description

The fire occurred in the region known as the Boise Front and was dubbed the "Eighth Street Burn". It contains approximately 15,300 acres of land in the Lower Boise watershed (HUC 17050114). Of that land, 4,180 acres is Bureau of Land Management (BLM) administered public land, 2,120 acres is state of Idaho land, 3,160 acres is Boise National Forest land, and the remaining 5,840 acres is split between private ownership and City of Boise and Ada County lands. (BLM, et al., 1996)

4.4.1.3 Human Community

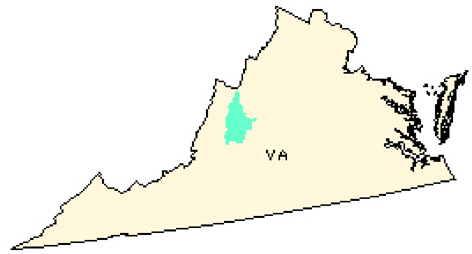
The Boise Hills community is essentially rural in character (approximately 77% of the total acreage), but is located in a predominately metropolitan county (Cook, P. and K. Mizer, 1989). A substantial rural population is contained in the areas surrounding Hulls Gulch and Crane Creek. This portion of the affected community has a considerably lower population density than other portions of the Boise Hills community. Median property values and per capita income are also noticeably lower than for the more suburban areas. Land uses include low to medium density residential, rural agricultural, and open space. Some commercial/industrial and mixed uses are also present in suburban areas closer to the City of Boise.

The northern neighborhoods and the downtown corridor within Boise are expected to benefit from EWP activity. These sections of the City include a combination of residential, commercial and some industrial properties, as well as a number of structures important to the social life of the community that might be affected in the event of a flood. Median values for housing differ substantially between the city and the surrounding region and are greatly influenced by location (NRCS, 1996). Both the City of Boise and the area affected by the 8th St. Fire have a stable population base with over 40% of residents living in the same house for more than five years (Census, 1992).

The regional community represented by the Lower Boise Watershed has a population base of approximately 144, 836 and includes all of Canyon and Ada counties, plus small portions of Boise and Gem Counties. The regional economy is predominately farming and manufacturing based.

4.4.2 Buena Vista, VA-- Maury River Watershed

The City of Buena Vista is located in eastern Rockbridge County between the east bank of the Maury River and the west slope of the Blue Ridge adjacent to the George Washington and Jefferson National Forests. Through these forests drain four streams, eventually reaching the Maury River after passing through Buena Vista. These streams (from north to south) are Chalk Mine Run, Indian Gap Run, Noels Run, and Pedlar Gap Run.



4.4.2.1 Disaster Event

Downpours resulting from Hurricane Fran in September 1996 caused considerable damage along the streams mentioned above. Debris clogged stream outlets, resulting in the flooding of several areas of the City. Severe erosion along streambanks also threatened many homes and businesses.

4.4.2.2 Buena Vista Small Watershed and Maury River Watershed

The watershed comprises 11,850 acres: 8,900 acres of forestland (most of which is in the George Washington and Jefferson National Forests), 2,850 acres of urban land, and 100 acres of grassland (there is no cropland in the watershed). Ownership of land in the watershed is 74.3% federal, 24.2% private, and 1.5% City. There are no dams on these four streams. No wetlands or threatened and endangered species have been identified in the watershed.

The Buena Vista watershed is a sub-basin of the Maury River Watershed (USGS HUC 02080202), which originates about 40 miles north of Buena Vista on the eastern slopes of the Appalachian Mountains. The Maury River has a drainage area of 835 square miles, of which 649 square miles are above Buena Vista and 184 square miles are downstream of the City (Rockbridge County, 1996).

4.4.2.3 Enduring Conservation Practice Sites in the Maury Watershed

The four enduring conservation practices represented are: a diversion, a waste storage pond, an embankment pond, and a grassed waterway. Each of these sites is fully functional and has not failed during their lifespan, even in the heavy rains that caused the severe flooding in Buena Vista. Therefore, hypothetical failures have been analyzed with available information about the sites and the possible environmental effects (Flint 1999).

4.4.2.3.1 Diversion Site

The diversion is found on the Goodbar farm just to the south of the town of Denmark. The area is moderately steep, as it is part of the downward slope from Big House Mountain to Kerr's Creek below. The diversion is located away from existing stream channels and protects the downslope croplands from overland flow of rainfall and subsequent erosion. The water is channeled into a waterway and routed around the croplands.

4.4.2.3.2 Animal Waste Storage Site

The waste storage pond is found on the Martin farm, to the north of the town of Fairfield. The waste from the dairy on-site is collected and dried within the pond before eventually being applied to agricultural fields. There is no outflow from the pond and no stream channels are located nearby, although intermittent portions of Marlbrook Creek are a quarter of a mile away.

4.4.2.3.3 Embankment Pond Site

An embankment pond is located on the Hickman farm, east of Horseshoe Bend in the Maury River. It is in an upslope area that drains into an unnamed intermittent stream and eventually into the Maury River approximately two miles below. It was built where two hills converge and serves to collect the runoff from each, preventing excessive runoff in the pasture and residences below.

4.4.2.3.4 Grassed Waterway Site

The grassed waterway site is found on the Moore farm to the southwest of the town of Raphine. The waterway routes runoff waters around agricultural land to prevent erosion. The grassy vegetation, a tall fescue, is used to slow flow velocities and prevent erosion of the waterway. The site drains into an unnamed tributary and eventually into Moore's Creek approximately a half mile downstream.

4.4.2.4 Human Community

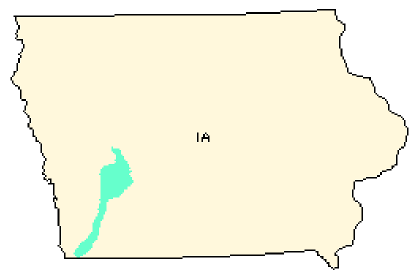
Buena Vista is an incorporated, independent city, population of 6406 (Census, 1992). It is located in an area that is otherwise defined by its predominately rural character. The City of Buena Vista displays typical small community land uses that are primarily residential, with additional commercial and manufacturing sites evident throughout the City. There is a strong tendency toward residential stability, with over half of the residents living in the same house for more than five years. However, the city is also experiencing an overall decline in population estimated to result in a 7% decrease by the year 2010 (Census, 1997). A portion of its industrial base has been lost due to the effects of the national shift in economic production, but also due in part to the effects of the flood of 1985 (Buena Vista, 1999).

The County of Rockbridge, apart from the two independent cities of Buena Vista and Lexington, is almost completely rural by population. The economy of the county is non-specialized by industry type and is characterized by a significant population of workers (at least 40%) who commute to employment outside of the county (Cook, P. and K. Mizer, 1989). This reflects a strong reliance on outside sources of employment for many of its residents.

The regional area represented for the Maury Watershed includes all of Rockbridge County, as well as portions of Augusta and Bath Counties. It population of the region is approximately

34,576 persons. The specific portions of the counties that are contained by the watershed region are more rural in character, reflecting land uses that range from rural residential to more remote, sparsely populated agricultural areas and forested areas. Although the region is predominately rural in character, the primary economic activity is concentrated in wholesale and retail trade, manufacturing, and personal and professional services. Agricultural employment accounts for approximately 1,826 jobs, or 10.8% of the total regional employment.

4.4.3 East Nishnabotna River Watershed, Iowa



4.4.3.1 Disaster Event

The East Nishnabotna River originates between the towns of Manning and Templeton in Carroll County, Iowa. It flows south-southwest for 90 miles through Montgomery, Page, and Fremont counties to its confluence with the West Nishnabotna River, ten miles before they join the Missouri River. Heavy rains in 1998 resulted in flooding throughout both Freemont and Montgomery Counties. Streams and levees were impaired by the deluge in both counties.

4.4.3.2 Site Description

The East Nishnabotna River watershed has an area of 1,133 square miles. The river flows through a gently rolling portion of the Great Plains ecoregion, with nearly 100-150 feet of terrain relief from the river valley floors. The watershed is almost completely agricultural and crops occupy almost all of the land, except for some 11% that is covered by forest vegetation (EPA, 1999c). The watershed is not characterized as an urban one, although, several small cities are scattered throughout its area.

The appropriate watershed for cumulative impact analysis in this case was the entire East Nishnabotna River (8-digit HUC) watershed, since the EWP practices under analysis were performed on the main stem of the river itself. Particular attention was given to the specific reaches of the river on which the EWP practices took place, as well as actions affecting the river floodplain in the reaches above and below the EWP practices.

4.4.3.3 Human Community

Located near the southeast border of Walnut Township in Fremont County, the site of the EWP levee repair practice is an unincorporated rural community with a population of 1071 persons (Census, 1992). The community is almost entirely rural, however, portions of the affected area lie near Shenandoah City. The city extends across the border from Page County into Fremont County. This area includes retail and commercial facilities (shops, hotel, airport, and entertainment), as well as some individual residences that would be affected, at least indirectly, by potential flooding in the East Nishnabotna area. Land uses are predominately agricultural with some commercial and residential areas represented in the cities.

Fremont County is classified as a completely rural county with an economy predominately influenced by agriculture (Cook, P. and K. Mizer, 1989). Page County, with a larger urbanized population, is characterized by a non-specialized economy. (Cook, P. and K. Mizer, 1989). Although manufacturing and trade represent the dominant sectors of employment, much of this economy is agriculture dependent. Housing in the immediate vicinity of the affected community and the two surrounding counties is generally older, with more than half of the units having been constructed prior to 1950. The area population is very stable with more than 60% of residents living in the same house for more than five years. However, both Fremont and Page Counties have also experienced a slight decline in population during the past decade.

The East Nishnabotna watershed regional area includes portions of Fremont, Page and Montgomery Counties. The defined region contains a population of approximately 20,424. Reflecting the influence of the more urbanized areas of Montgomery County that are included in the region, somewhat less than half of the regional population (42%) is rural by residence.

4.4.3.4 Riverton Easement Site

The Riverton floodplain easement site is located just to the east of the town of Riverton, Iowa, along the East Nishnabotna River. The tract is approximately 655 acres of lowland and subsequently must be protected by levees. Historically, the land has been exclusively in crops but has faced levee breaches on the order of every three years, causing the landowner to spend more that a quarter of a million dollars in repairs in addition to substantial NRCS expenditures (Hanson 1999).

Due to the repeated damage to the property, the site was a good candidate for the easement program. The property retains water each spring because it is lower in elevation than the surrounding area, so it will be restored as a wetland. There is an existing forested wetland on the northern portion of the property along the river. Runoff from the town of Riverton also contributes to the wet conditions (Hanson 1999). Once the easement is purchased, the land will be sold to the Iowa Department of Natural Resources via a third party organization to assist in the transfer. The easement will then become part of the Riverton State Game Management Area, a large reserve with several hundred acres of wetland just upstream on the opposite bank. The contiguous area of managed lands will create a large floodplain area and substantial habitat for migratory waterfowl and other species, such as reptiles, amphibians, songbirds, and some fish (Priebe 1999).

4.5 OTHER RURAL COMMUNITIES EVALUATED FOR EWP PROJECT IMPACTS

In addition to the human communities analyzed for EWP impacts in the preceding cumulative impacts watersheds, three other communities (Table 4.5-1) were evaluated in Georgia and Virginia. Rose River, Switzer Dam, and Bethel Rd. are highlighted in table 4.5.1 below. Detailed statistics for selected characteristics of the affected environment at the immediate site and county levels are presented in Appendix D below.

Table 4.5-1 Other communities evaluated for EWP Program impacts.

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements	Affected Human Communities Analyzed
Upper Chattahoochee River (03130001)	Bethel Road site, Hall Co., GA	Tornado debris in stream	Two small independent farms in a rural area
South Fork Shenandoah (02070005)	Rocky Run Site Rockingham Co., VA	Streambank Repair, Hypothetical Improved Lands Easement	Residential cluster community of Rocky Run
Rapidan-Upper Rappahannock (02080103)	Rose River site, Criglersville, Madison Co., VA	Streambank Repair Site	Independent farm near small rural community

4.5.1 Bethel Road - Hall County, Georgia-- Debris Removal Site

Hall County is located in northeastern Georgia and lies in the foothills of the Blue Ridge Mountains. The predominant geographic feature in this moderately hilly area is the Chattahoochee River.

4.5.1.1 Disaster Event

Tornadoes destroyed homes and caused widespread damage in the forested watersheds when they struck in 1998.

4.5.1.2 Site Description

The land area is just over 80% rural in character. Although significantly rural, the county is also the regional center of northeast Georgia for shopping, medical services, and education. It is made up of six incorporated cities important for manufacturing, retail, and agriculture.

4.5.1.3 Human Community

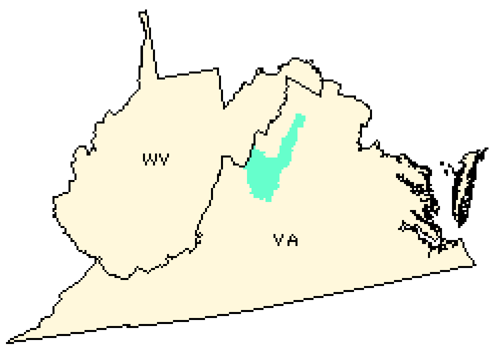
The Bethel Road site is located in a less densely populated area of Hall County that is almost entirely rural in character. The EWP site itself represents an example of multiple farms in a less densely populated agricultural area. The affected site includes two farms, associated structures, and two local roads (DSR 001-139). Defined by census block, the area contains a population of 2487 persons, of which an estimated 131 are classified rural by residence (Census, 1992). Minorities represent less than 1% of the population of the community in contrast to Hall County as a whole, which is just less than 15% minority.

An estimated 1268 residents were employed during 1990, with the service sector representing the primary source of income. However, manufacturing represents the largest single sector of employment accounting for 27.4% of all jobs. Agriculture-related employment accounted for 4.9% of the total. Of the 892 housing units in the community, 57.3% were built prior to 1980.

The median year for house construction is 1978 as compared with 1975 for the county as a whole. Over fifty percent of the population has lived in the same house for over five years, indicating a degree of residential stability that is reflected in both the Bethel Road community and in surrounding Hall County as well. The median value of housing in the Bethel Road community in 1990 was $88,600, slightly higher than that for the county. Approximately 10% of the residents of both the Bethel Road community and the county as a whole are living at, or below, the poverty level.

4.5.2 Rocky Run, VA

Rocky Run is a stream located in Rockingham County, Virginia and is a tributary of the Dry River. Flow in the lower reaches of Rocky Run ceases during dry periods, but pools with fish remain.



4.5.2.1 Disaster Event

The stream channel originally meandered through a residential development, but was redirected by landowners years ago. The redirected channel, which wraps around 15 homes, contains several 90-degree bends that have blown out during storm events.

In 1992, stormflows eroded banks and deposited large amounts of cobble and debris in the floodplain. Eleven homes were threatened by the destabilized system.

Riprap and gabions were placed on streambanks to stabilize the channel and to protect life and property from future damage. However, in September 1996, heavy rains from Hurricane Fran swelled Rocky Run and the existing practices protecting the community failed. Rather than following the constructed channel, the stream overflowed its banks and created a new channel, which cut directly through the residential areas and emptied into the Dry River. Five homes were flooded and others endangered, while large volumes of cobble and woody debris were deposited in the floodplain.

4.5.2.2 Human Community

The community directly protected by the EWP practice at the Rocky Run site consists of 15 single-family dwellings and associated service buildings. This is an example of a residential cluster located in an unincorporated rural area. Estimated on the basis of average household size for the census block group containing the site, the population of the Rocky Run community is approximately 42 persons. The community is located in Rockingham County. The county is classified by ERS typology as having a non-specialized economy with the Federal Government representing a substantial source of income to residents (Cook and Mizer, 1989).

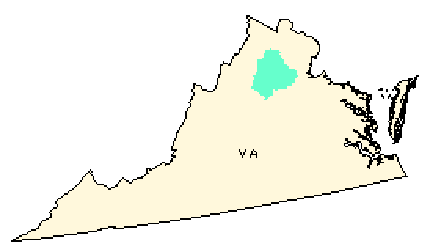
The community immediately surrounding the Rocky Run site is defined by census block and has a population of 1181. Minorities comprise approximately 2.2% of the total population, a substantially lower figure than that for the State of Virginia, which is approximately 22.5% minority. A total 658 residents were employed in 1990. Manufacturing represented the single largest sector of employment accounting for 27% of all jobs, followed by retail and agriculture. Of the 479 housing units located in the larger community surrounding Rocky Run, 78% were built prior to 1980. The median year for unit construction for both the Rocky Run community and the surrounding county was 1969. The median value of owner occupied units in the community defined by the census block was $55,700, a figure comparable to that for the houses in the immediately affected area at the Rocky Run site (DSR RC-01), but significantly lower than the State median of $90,400. Approximately half of the residents have lived in the same house since 1970, indicating a very stable residence pattern for the site area and surrounding community.

4.5.3 Rose River – Madison County, Virginia

The Rose River site is located in Madison County just up-stream from the town of Criglersville. At its headwaters, the Rose River is a high gradient stream that supports naturally reproducing brook trout.

4.5.3.1 Disaster Event

This area had 4 major flood events from June 1995 to December 1996. Floodwaters from these large storm events led to severe erosion, channel movement, and the heavy deposition of cobble and woody debris. The homeowner's access road was threatened, as well as some other features on the property. EWP stream restoration practices, including rock weirs, riprap, rootwads, and vegetative techniques were used to repair and protect the disturbed area.



4.5.3.2 Site Description

The floodplain surrounding the EWP site is nearly void of vegetation from heavy grazing and the disruptive floodwaters. Several marginal wetlands are located downstream of the project area, which most likely would have been inundated with sediment if the EWP work had not been completed.

4.5.3.3 Human Community

Located in an almost completely rural county, the site immediately affected by EWP practices is a sparsely populated, agricultural area that includes at least two single family dwellings, farm buildings, other structures, and pasture land (DSR MA-200). Near the site lie multiple farms in a less densely populated agricultural area. The area immediately surrounding the site is defined by census tract and contains a population of 5,672 persons (Census, 1992). Of these, an estimated 78 households (209 persons) are classified rural by residence. Manufacturing represents the single largest sector of employment accounting for 21%, while agriculture accounted for 8.3% of the total. Of the 2301 housing units located in the tract, 69% were built prior to 1980. Nearly half of the residents (46%) have lived in the same house since 1970. Sixty-two percent of the residences in the community have been occupied by the same householder for more than five years. This would indicate a stable residence pattern for the area surrounding the Rose River site.

Madison County, with a population of 11,949, is characterized by the ERS typology as having a nonspecialized economy that is commuter dependent (i.e. at least 40% of the workforce commutes to employment outside of the county) (Cook and Mizer, 1989). This would indicate a relatively small local economy. The median age and median values for housing in the county are similar to that for the Rose River tract. However, the county as a whole has a somewhat less stable population base, with only 38.3% of residents having lived in the same house for five years or more.

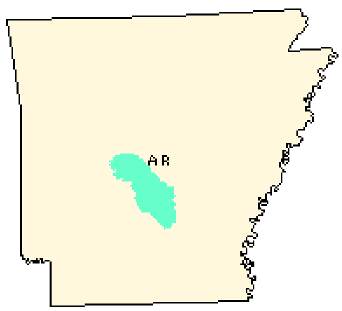
4.6 OTHER EWP PRACTICE AND EASEMENT SITES EVALUATED

A number of additional example sites (Table 4.6-1) were included in the EWP analysis to address the effects of specific EWP practices or purchase of easements. See Appendix D for detailed site and disaster descriptions of the additional sites.

Table 4.6-1 Additional EWP Restoration and Easements Sites

8-digit Watershed (code)	Site(s)/Location	Restoration Practices or Easements
Upper Saline (08040203)	Bauxite Natural Areas AR	Debris Removal--Tornado downed trees in sensitive habitat
	Griffin site, Alexander, AR	Debris Removal-Household and woody debris from tornado
Antelope-Freemont Valleys (18090206)	Antelope Valley, CA	Critical Area Treatment --Drought with life-threatening sandstorms
San Lorenzo-Soquel (18060001)	San Lorenzo River site Santa Cruz Co., CA	Soil-Bioengineering to protect streambanks
Lower Grand (10380103)	Medicine Creek site, MO	Floodplain easement with setback levee
Lower Missouri River (10300200)	Missouri River floodplain deposition site, St. Charles Co., MO	Floodplain deposition removal/ disposal
Platte River (10240012)	Platte River, MO	Floodplain easement
Nolichucky River (06010108)	Plumtree, NC	Natural stream dynamics and bioengineering practices pilot project
Upper Salt Fork Red (11120201)	Lake Clarendon Clarendon, TX	Sewage Treatment Plant on Floodplain
Rapidan-Upper Rappahannock (02070005)	Switzer Dam Site, Dry River, Rockingham County, VA	Switzer Dam, Spillway damaged by Hurricane Fran

4.6.1 Bauxite Natural Areas, AR, Upland Disaster Debris



The Alcoa Corporation manages bauxite mining in central Arkansas in the vicinity of the towns of Benton, Bryant, and Bauxite, all southwest of Little Rock. In 1996, Alcoa entered into an agreement with The Nature Conservancy (TNC) to implement conservation and ecological management on 1400 acres of land within the Bauxite Natural Areas on Alcoa lands. The region is home to several rare ecological communities and contains several federally listed species (TNC 1998).

In March 1997, tornados ravaged central Arkansas and swept through the Alcoa/TNC managed area. The tornado was classified as category four with winds exceeding 200 miles per hour. An estimated 500 acres of woodlands were damaged and woody debris was widespread. Much of the debris was gathered into brush piles. The piles resulted in a threat to the rare herbaceous species and an increased danger of wildfire due to the ready supply of fuel. Invasive species (kudzu and Japanese honeysuckle) also posed a threat to plant communities (TNC 1998).

The Nature Conservancy acted in place of NRCS for this EWP project and drafted a plan to remove the debris and reduce the threats in the most environmentally sensitive manner possible. TNC staff and volunteers executed a series of prescribed burns and a large amount of hand clearing was done over an area of 265 acres. Follow-up monitoring has shown very positive results, as T&E species are thriving, exotic species have been suppressed, and re-growth is progressing (TNC 1998).

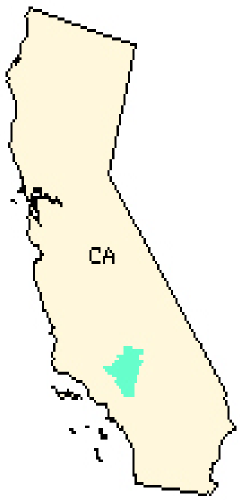
4.6.2 Griffin Site Alexander, AR, Tornado Household Debris Site

This site is in the same watershed as the previous site. The 5-acre plot near Alexander, Arkansas is privately owned and is a single dwelling residential plot. The land is heavily wooded.

Tornados struck in March 1997, and many households were damaged. The NRCS Chief granted an exemption from the EWP regulations that prohibit such work for NRCS to assist with the recovery from the tornado. At the Griffin site, there were approximately 4 acres of heavy woody debris, as well as a significant amount of household debris, such as construction materials (fiberglass insulation, shingles, etc) and personal belongings. Additionally, there was a danger to human health, as the debris piles can harbor rats, mosquitoes, and other disease vectors.

The EWP practice consisted principally of woody and household debris removal. Most debris was transported off-site to a landfill and burned. There was no on-site burning due to the close proximity of an airport. Additionally, the project area was re-vegetated and mulched.

4.6.3 Antelope Valley, Los Angeles Co, CA Critical Area Treatment Site



The Antelope Valley site is a broad, low relief area in southern California north of the City of Los Angeles. Consisting of approximately 7700 acres of abandoned desert farmland, the site had little remaining vegetation and is regularly subjected to high winds. Successive droughts in the late 1980s resulted in desert conditions within the region.

The site is located less than a mile from Antelope Acres, a residential development of approximately 350 homes. Numerous problems from the high winds, including multi-vehicle accidents, reductions in air quality, and sight reductions during aircraft landings at Edwards Air force Base, have occurred. The lack of vegetative cover and high wind conditions have led to a high volume of topsoil being eroded and the necessity to re-vegetate the area and enact soil management techniques to minimize future wind-erosion losses.

EWP practices that were utilized to combat the erosion conditions included aerial seeding, installing sand fences, seed drilling, furrowing, and tumbleweed disposal.

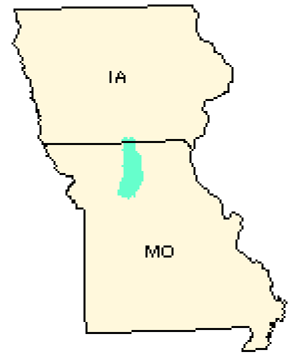
4.6.4 San Lorenzo River, Santa Cruz County, CA-Soil Bioengineering Site

The California soil bioengineering site is located on the banks of the San Lorenzo River, near the community of Glen Arbor, in Santa Cruz County.

A rainstorm on February 3rd, 1998 caused severe bank erosion spanning 450 feet on one side of the channel. It endangered 6 homes, while a landslide on the opposite bank endangered roads and businesses.

The EWP repair work involved the removal of debris from the channel, bank restoration with large riprap, and the revegetation of both banks.

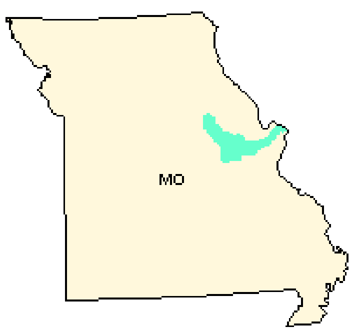
4.6.5 Medicine Creek Site, MO, Floodplain Easement & Setback Levee



The Medicine Creek site is a tract of 517 acres located in Livingston County in northern Missouri. The property is just southwest of the town of Wheeling and is located between Medicine Creek and Muddy Creek, approximately 2.5 miles north of their convergence before they empty into the Grand River. The site, previously used for intensive cropping by tenant farmers, falls within the historical floodplain for both creeks and is subject to frequent flooding—seven floods in the last 10-12 years (Young 1999).

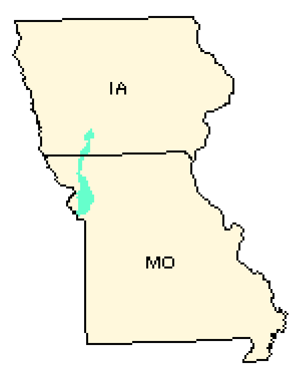
In 1993 and 1995, the levees protecting the site were breached. Subsequent repairs were then made. Under the EWP Floodplain Easement Program, the landowner was offered an easement allowing for the construction of a setback levee. The newly created floodplain would then be restored as a managed wetland using water control structures and ditch plugs to maintain wet conditions and a limited amount of vegetative planting (Young 1999).

4.6.6 Missouri River Floodplain Deposition Site



During the floods of 1993, the Missouri River carried heavy sediment loads, depositing large volumes of sand and silt in floodplain areas. The EWP site in St. Charles County, located to the west of St. Louis, Missouri, in the Lower Missouri watershed (HUC 10300200) suffered a levee break. Cropland was subsequently buried under a layer of sediment several feet thick, rendering the land impossible to farm. Deep plowing was used to reclaim these farmlands, with large equipment plowing 4 to 5 feet into the earth to bring the land back into production (Cook 1999).

4.6.7 Platte River Floodplain Easement Site

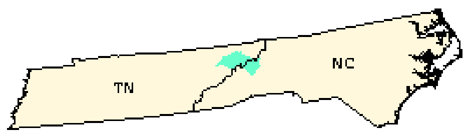


The Platte River floodplain easement site is located in western Missouri, north of Kansas City at the confluence of the Platte River (HUC 10240012) and the Little Platte River. The easement property is greater than 100 acres and the historical use of the property is agricultural, primarily tenant farming. Flooding is very frequent in this area, with 3 to 4 short duration floods per year in the spring (Berka 1999). Traditionally, maintaining the levee at this site has been difficult (Howard 1999).

During the rains leading to the 1995 flooding, a breach formed along the Platte River portion of the privately constructed levee on the northern edge of the property. Existing crops were lost and damage to the levee was substantial. NRCS determined that the levee repairs would only protect one landowner and were therefore not eligible for EWP repair funds. However, NRCS was able to offer a floodplain easement. The new floodplain resulting from this easement will be managed for the creation of wetlands (Berka 1999).

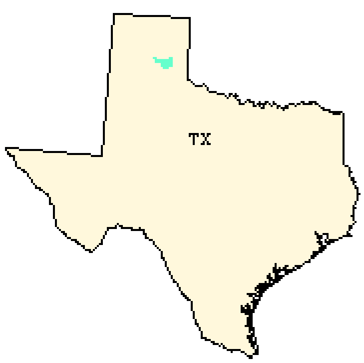
4.6.8 Plumtree NC, Debris and Streambank Damage Site

The Plumtree site is an approximately 9-mile section of the North Toe River in Avery County, North Carolina. The site is located north of the town of Plumtree and is bordered on the west by Doublehead Mountain and on the east by Mill Ridge and the Pisgah National Forest.



In 1998, heavy rain, in excess of 17 inches, caused flooding and debris blockage in portions of the North Toe River. Under the EWP Program, rock, woody debris, and trash were removed from the damaged portion of the river. The principles of natural stream dynamics were used to restore the stream profile, restoring eroding stream banks and improving trout habitat. The natural stream design included rock vanes, rootwads, log sills, point bars and re-vegetation. Materials needed to conduct the restoration were either gathered on-site or from Roaring Creek, located north of the site. A reference reach from the Toe River upstream of the site was used to best duplicate the natural stream structure.

4.6.9 Clarendon TX, Floodplain Structure Protection

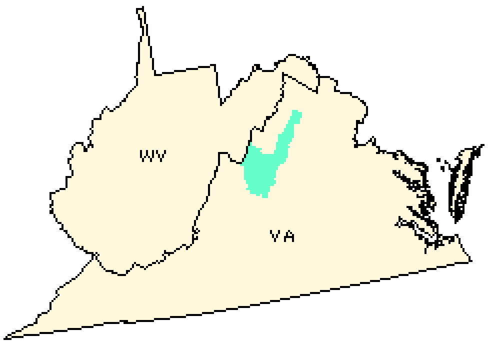


Clarendon is a town of approximately 2000 located in the panhandle of northern Texas and is the county seat of Donley County. Just to the northeast of the city lies Clarendon Lake, a playa lake. Also located there is the municipal sewage plant, separated from the lake by a berm. Sewage is treated in holding ponds and then released into the lake.

The playa lake was rapidly filled after heavy rains struck the area in April 1997. Rainfall exceeded the 100-year rainfall event limits and the lake swelled to almost 10 times its normal area (Sears 1999).

The EWP project used a diversion/berm to close off the plant and halt the flow of untreated sewage into the lake. This berm repair/diversion then allowed for the dewatering of the lagoon system and a return to normal operations.

4.6.10 Switzer Dam, Rockingham Co., VA, Dam Spillway Repair



Flooding resulting from Hurricane Fran in September 1996 caused the destruction of two spillways on three dams located in the North River Watershed. The first earthen dam (Switzer Dam) is located at the confluence of Skidmore Fork and the Dry River Tributary. The second is located on the Dry River. The third dam is located on Dry Run, a tributary to the Dry River. The Dry River is a tributary to the North River, and the North River is a tributary to the South Fork Shenandoah River. All three dams suffered a high degree of erosion in their emergency spillways causing large amounts of sediment, cobble, and woody debris to be expelled into the Dry River. The damaged spillways caused an immediate threat to life and property should they fail and the dam suddenly breach.

The repair of the spillways involved excavating 2,100 cubic yards of storm deposited material; placing 6,000 cubic yards of fill in severely eroded areas; and grading, seeding, and fertilizing approximately 6 acres at the sites.

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Chapter 5
ENVIRONMENTAL CONSEQUENCES

Environmental Consequences—This section forms the scientific and analytic basis for the comparisons under 1502.14(Comparison of Alternatives). (40CFR1502.16).

This chapter describes the direct, indirect, and cumulative environmental impacts of the EWP Program alternatives. The chapter analyzes impacts of current and proposed EWP restoration practices and easements, and the EWP Program alternatives in which they would be employed, on watershed aquatic, wetland, riparian, floodplain, and upland ecosystems. It analyzes EWP Program alternative effects on human communities and the cumulative impacts of the EWP Program on the natural and human aspects of watersheds.

5.1 ANALYSIS APPROACH & CHAPTER ORGANIZATION

This section describes how the analysis of EWP Program impacts was conducted and how this environmental impacts chapter is organized.

5.1.1 Impacts Analysis Approach

The NRCS interdisciplinary team analyzed the environmental consequences of the EWP alternatives using a stepwise process to ensure that all relevant impacts were considered in their appropriate contexts. The details of the methodology are presented in Appendix B.

The steps in the process to address impacts on watershed ecosystems were:
1) Specify EWP practices, typical techniques, and practice components
2) Determine contexts for evaluation of direct and indirect impacts
3) Develop flow diagrams linking practice components with ecosystem components
4) Review the scientific literature for impacts studies of effects of disasters and effects of EWP practices or similar practices and construction projects
5) Adapt an ecosystem condition classification as the basis for evaluating disaster and EWP project impacts
6) Analyze impacts generically using scientific studies and using field data on recent typical techniques at example EWP sites
7) Compile impacts of EWP work in example watersheds to address cumulative impacts
8) Document analysis details in Appendices
9) Document principal findings in Chapter 5 covering practices, easements, and Alternatives
10) Compare impacts of the alternatives in Chapter 3.

The steps were similar for addressing impacts to human communities, except the analysis did not focus on specific practices but rather on how EWP work, which could be comprised of different practices to deal with the aftermath of a disaster, would affect various aspects of community life.

A range of affected community types was represented by example communities that had recent EWP restoration work.

Specification of the practices, typical techniques and practice components of current practices is documented in Chapter 2. Components of proposed practices are described in Chapter 3 under the description of the elements of the Proposed Action.

The NRCS interdisciplinary team evaluated the impacts of the EWP current and proposed practices and the EWP Program alternatives in three applicable contexts:

- Individual practices were evaluated at the location of, and immediately adjacent to and downstream of, a series of typical EWP projects
- Multiple EWP projects were evaluated in a set of typical rural communities
- Multiple EWP projects and other NRCS, Federal, State, and local actions were evaluated in three typical rural watersheds.

In the first context, the focus of analysis was to evaluate the impacts of EWP restoration practices and easements on aquatic, wetland, riparian, floodplain, and upland ecosystems, and human activities (such as sport fishing) that rely on those resources. In the second context, the focus broadened to address how groups of different EWP practices employed to repair watershed impairments would affect the rural communities struck by a disaster event. The third even broader context took into account the fact that individual EWP projects, and groups of projects responding to a disaster event, would be undertaken while other NRCS actions and other agencies, organizations, and individuals also act in and affect the locality and larger watershed in question. In each context, the team first defined the baseline of impacts as one that had been just recently disaster-struck. The Team recognized that the sites, rural communities, and greater watershed contexts, were not ecological or human systems simply undergoing minor day-to-day adjustments to environmental inputs. Rather, they were disrupted systems responding to major environmental disturbances.

Determining what types of environmental impacts the EWP practice components are likely to have, what environmental resources might be affected, was accomplished by developing network diagrams depicting the basic components and causal connections of affected watershed freshwater aquatic, riverine wetland, floodplain, riparian, and upland ecosystems. All major ecosystem components and their linkages were defined. Similar impact flow diagrams were created for the elements of human communities likely to be affected by EWP projects. The network diagrams were then used to develop comprehensive lists of questions that needed to be answered to evaluate the likelihood of occurrence, frequency, and magnitude of the impacts. Flow diagrams and question sets are presented in Appendix B. The method is comprehensive in identifying the range of impacts likely to occur in a situation, so that all are demonstrably considered. The method then focuses on the more important impacts as required under NEPA.

The ID Team reviewed relevant scientific literature to determine the characteristics and intensity of the potential impacts identified in the questions and to determine which impacts were potentially significant and should be the focus of the analysis. The relevant findings of the literature review are presented in Appendix E.

The basis for addressing ecosystem impacts generically on a programmatic level was facilitated by use of condition classifications of aquatic, wetland, riparian, floodplain, and upland watershed ecosystems. The classifications are described in Chapter 4.

The literature review findings and condition classes were then used to evaluate and document the impacts of current and proposed EWP practices and floodplain easements and, based on those findings, to evaluate the impacts of the alternatives in this chapter. Example sites were used as "case studies" to supplement the broader impacts discussion by addressing the effects of typical applications of EWP practices and easements in recent disaster situations. Summarization of analysis of the impacts of the Alternatives is presented in comparative form in Chapter 3. As part of the analysis of Program alternatives, the team evaluated what would likely have occurred under the proposed action and other alternatives in the same circumstances at the example sites.

No attempt was made to analyze the impacts to specific Federally-protected T&E species or cultural resources or to specific wetlands because these resources are site specific in nature and a specific analysis at this programmatic level would be neither feasible, considering the massive data and analytical requirements, nor credible. These resources are addressed in terms of the "case study" analyses of the example sites, which bring into focus what has been done at these particular sites to assess the presence and evaluate the need to protect T&E species, cultural resources, and wetlands. Wetland resources are addressed generically in terms of likely effects of practices and easements on their general condition where they may be present. Wetlands, T&E species, and cultural resources are key resources that are highlighted in the DSR evaluation of defensibility of proposed EWP work and in agency coordination and they would continue to be so regardless of which alternative is selected.

The cumulative impacts analysis focused on three example watersheds – the Buena Vista-Maury in Virginia, the Eighth Street Burn Area-Lower Boise in Idaho, and the East Nishnabotna in Iowa. These were the best examples of the range of possible EWP practice situations in an acceptable range of terrain, ecological, and human community contexts. Buena Vista, VA and Boise Hills represented the use of EWP practices in areas of potentially high interaction with a variety of other land uses because of their fringe-urban settings, steep-slope environments, and respective high-rainfall and low-rainfall climates. East Nishnabotna represented an almost totally agricultural land use context. At the same time, the watershed also provided the opportunity to compare agricultural land use impacts with land use impacts from a group of different sized human communities along the river. Taken as a whole, these three watersheds were considered to present the best set of contexts for cumulative impact analysis because these representative interactions were present.

With this comprehensive approach, the PEIS should fulfill its purpose as the Program overview analysis, with any additional NEPA analysis to be done as appropriate and tiered to the PEIS.

5.1.2 Organization of the Chapter

This chapter has three major analytical sections. The first section describes the impacts of the individual EWP practices on the biotic environment, the second the socioeconomic and related human resources impacts of multiple EWP projects responding to natural disasters in rural communities, and the third, the cumulative impacts of EWP projects and other actions in whole watersheds.

The next section (5.2) describes the effects of the EWP practices dealing with debris removal, streambank protection, dam, dike, and levee repair, protection of floodplain structures, critical area treatment, and easements. Each subsection briefly describes the general impacts of the practices on aquatic communities, wetlands and floodplains, and upland biotic communities. These discussions are based on a review of the most recent scientific studies of watershed restoration methods and construction activities in floodplain environments. A more detailed review of these studies is presented in Appendix E. Because impacts on cultural resources are site-specific, they are discussed in this section as well. Then two sets of tables are given: the first lists the effects on the biotic communities of the natural disasters that cause the watershed impairments at issue; the second, the environmental impacts of the EWP practices that are employed to deal with the impairments.

Because socioeconomic effects are based on one or more EWP projects that combine a number of different techniques practices, Section 5.3 describes overall EWP project impacts on rural communities.

Section 5.4 addresses the cumulative impact of EWP projects when considered with other NRCS actions, actions of other agencies, and other government entities and private entities and citizens. Section 5.5 describes the unavoidable impacts of the Proposed Action, Section 5.6 effects on productivity, resources, and energy.

5.2 IMPACTS OF EWP PRACTICES AND EASEMENTS ON WATERSHED ECOSYSTEMS

This section addresses the adverse and beneficial effects of the EWP practices and easements on aquatic, riparian, wetland, floodplain, and watershed upland environments.

5.2.1 Section Organization and Assumptions

For the practices that apply to impaired watercourses directly, such as debris removal, streambank protection, and dam, dike, and levee repair, the impacts on upland watershed communities are expected to be absent or negligible. Creating access to the impairment site might affect some minor acreage of uplands, but only in the case of endangered and threatened species or cultural resources is there reason for concern about upland impacts in these cases. Because EWP project teams would coordinate on these sensitive resources with the USFWS and SHPO as a matter of course in conducting their projects, they would still be considered. Thus, upland impacts are not evaluated for those practices here. Upland community impacts are evaluated for the practices that are employed in impaired upland situations, critical area treatment, upland debris removal, and reconstruction of enduring conservation practices.

The current EWP watershed restoration practices evaluated in this section include practices that:
- Restore stream channel capacity
- Stabilize and protect streambanks
- Repair or remove damaged dams, dikes, and levees
- Protect structures located in floodplains
- Protect damaged critical upland areas of watersheds

Effects of agricultural easements under the current Program are assessed.

EWP practices proposed under the Proposed Action include:
- Restoration of floodplain deposition sites
- Removal of disaster debris from watershed uplands
- Repair of damaged conservation practices

Effects of the changes in agricultural easements under the Proposed Action and of purchase of easements on improved lands are also assessed.

5.2.2 Impacts of Current EWP Watershed Restoration Practices

This section evaluates the effects of disasters on stream, floodplain and associated environments, and uplands in the context of the watershed impairment situations in which EWP is involved. It evaluates the impacts on these ecosystems of current EWP practices that address debris impairments, streambank damage, dam, dike, and levee damage, threats to structures in the floodplain, and damage to critical upland areas.

5.2.2.1 Practices that Restore Channel Capacity (Debris Removal)

This section evaluates the effects on aquatic, floodplain, wetland, and riparian ecosystems of disaster-caused debris impairments and the impacts of current EWP practice of removal and disposal of debris.

5.2.2.1.1 Effects of Disaster Debris on Stream and Related Ecosystems

Accumulation of large amounts of debris is a common result of natural disasters. Debris jams of downed trees and branches, channels clogged with sand, gravel, or cobble, and widespread floodplain deposits are typical in the aftermath of major flood events. Tornados leave widely dispersed household debris and downed trees. Debris remaining in these situations can have a wide range of effects, from blocking stream channels and altering stream flows, drastically altering stream substrate and structure, burying cropland in a thick layer of sediment, or creating public health and environmental hazards in watershed uplands.

Effects of Disaster Debris on Aquatic Ecosystems

During flood flows, debris can cause heavy damage to in-stream and riparian areas, including scouring the streambed of benthic habitat, structurally weakening streambanks, and damaging riparian and aquatic vegetation. Debris jams can cause the water to pond behind the newly created dam, leading to saturation and destabilization of streambanks, accelerated erosion, and secondary flooding along the banks. When floodwaters recede, debris left in-stream may cause sedimentation and smothering of bottom habitat by slowing water velocities and may redirect flow to more erodable areas forming new channels and abandoning old ones (see Cooper 1997, Darnell 1976).

Stream systems are naturally dynamic systems forming and reforming channels with scour and fill areas, riffles and pools, and rapids and backwaters, in response to the erosive force of stream flow and the resistance of bottom substrate and debris. These dynamics vary depending largely upon a stream's gradient and flow volume and the geology of the bedrock material.

Stream habitats can benefit or be damaged by debris; both may occur simultaneously. This section focuses on the adverse and beneficial ecological effects of in-stream debris and EWP practices to remove debris. Floodplain deposition removal and watershed upland debris removal are addressed in the proposed practices sections later in this chapter.

The benefits of debris deposition include creation of new habitat for fish and wildlife with the introduction of submerged woody cover, release of nutrients from woody and other biodegradable debris, and sediment deposition along sandbars, spits and streambanks. Gravel deposits may provide spawning habitat for anadromous salmonids, as well as provide stream channel stability (Kondolf and Swanson 1992).

Rocky debris tends to scour the substrate, fill pools, and alter stream morphology by collecting in the stream channel. Finer debris materials may smoother gravel habitats. The impacts of debris on the aquatic community depend on the characteristics of the debris involved; whether woody debris, finer sediments, sand, gravel, cobble or some combination.

The impact of disaster debris on aquatic communities is evaluated here in terms of the parameters outlined in Chapter 4. *Sedimentation and turbidity* may be affected positively or negatively. Debris may be positioned such that previous areas of high turbidity are now sheltered or sediment is trapped along streambanks. Conversely, debris may be located such that sediment is trapped and covers benthic habitat or fills pools. *Temperature and dissolved oxygen* may benefit if debris creates in-stream structure that provides shade or creates turbulence. However, debris may damage riparian and aquatic vegetation or block turbulence-causing structures that previously provided environmental benefits. When flooding due to debris jams inundates agricultural or other improved lands that contain fertilizers and other compounds, it may increase the occurrence or concentrations of *pollutants, nutrients and other chemicals*. Effects on *habitat structure* can vary greatly with the positioning of debris; some debris may improve existing cover or introduce habitat elements that were not there prior to the disaster. However, aquatic habitat may also be covered, damaged, or destroyed by the influx of debris. *Channel structure* may similarly be improved or damaged, depending on debris-induced changes in the course of the stream or in the substrate. Either situation could negatively affect biotic resources in the stream by altering stream-flow or position or changing the available habitat. Benefits might include the creation of new channels or expansion of previously minor habitats, which may increase some aquatic species populations (see Cooper 1997, Darnell 1976).

Effects of Disaster Debris on Riparian, Floodplains and Wetland Ecosystems

Nearby riparian areas, floodplains, and wetlands may be affected by debris in the current flood situation or by subsequent flooding resulting from debris jams, by channel course alterations and sediment deposition. Flooding from debris jams may affect habitat, vegetation, and hydrologic function in some wetlands and floodplains communities, depending on flood frequency and duration (see Keller and Swanson 1979, Marzolf 1978, and Cooper 1997). Additional or sustained flooding may change species composition or hydrologic function. Channel course alteration could have substantial effects on streamside communities, as the former floodplain may become drier if the stream moves further away from its previous course. Wetlands and riparian zones that depend on continual or periodic exposure to streamflow will be negatively affected. Lastly, sediment deposition due to in-stream debris may improve habitat conditions, as streambank rebuilding may provide new habitat for riparian vegetation.

Variability of Debris Impacts across Watersheds

The specific characteristics of debris impairments will also vary regionally. Different watersheds will exhibit different levels and types of debris based on the type and amount of material present in the watershed and the type and destructive capacity of the disaster event. For example, a mountainous, forested watershed would have an ample cover of trees and a rocky substrate. Disaster debris in such a watershed would be predominantly woody, with an additional component of cobble, gravel or other rocky materials. The high gradients and fast moving waters of mountain streams create conditions for intense erosive force and rapid, long-distance movement of relatively massive pieces of debris. In contrast, low-gradient agricultural watersheds are affected by large amounts of finer grain sediments, with a substantial component of suspended sediments and a relatively smaller contribution of woody debris. Low-gradient rivers are slower flowing and unable to move rocky debris long distances. However, their high volumes of floodwater can severely damage levees and streambanks, eventually overwhelming streamside environments. Debris in these rivers is often floating woody debris from uprooted riparian vegetation, material from damaged levees, and material from man-made structures in the floodplain.

The creation of debris is also highly dependent on the type of disaster. Floods are the most typical example of a disaster where debris impairments are prominent. Floodwaters carry rocky and woody debris, as described above. Tornados usually leave a narrow swath of damage with multiple types of debris, because they are not generally confined to prescribed paths analogous to floodplains. Damage occurs in any type of environment, from wooded areas to urban centers.

Debris Damage at Example EWP Sites

The general discussion of impacts is supported with specific recent examples of EWP debris removal projects. In-stream debris example sites are located in Rockingham County, VA, Hall County, GA, and Montgomery County, IA. Each site is briefly described below, including an assessment of the pre-disaster and post-disaster natural conditions. More detail on the impacts of the disaster and of EWP practices at these sites is presented in Appendix D.

The Buena Vista EWP site in Rockingham County, VA, comprises four streams that originate in a high gradient National Forest area above the city, flow through the city, and empty into the Maury River. The streams are intermittent or perennial and support a variety of fish species including dace, chub and suckers. Two are cold-water streams with self-sustaining populations of brook trout in the upper reaches. No T&E species are known to occur in the area (Mohn 1999). The nearest wetland is approximately 800 feet downstream and is classified as PFO1A, a forested wetland (NWI 1999). The Buena Vista, VA site experienced heavy rain in 1995, leading to severe floods in these high gradient streams. Cobble, and to a lesser extent woody debris, were carried in large volumes, blocking the streams' channels and causing secondary flooding of the city.

The Bethel Road site, in Hall County, Georgia is a heavily wooded site with a section of the West Fork of the Little River composed primarily of riffle and pool habitat, with invertebrates and some common fish species. Woody debris in-stream serves at least a minor role in the ecosystem, providing habitat, nutrients and slowing water velocities. No game fish populations, such as trout or other salmonids, are known to be present. No T&E species are known to occur onsite, although the red cockaded woodpecker and the bald eagle are found elsewhere in Hall County. No wetlands are onsite; the nearest downstream wetland would be in the headwaters of Lake Sidney Lanier, approximately 5 miles downstream. (Cooper 1999) When the site was struck by the tornado, a large numbers of trees were uprooted along the West Fork of the Little River. Large woody debris predominated the site, damaging streambanks and clogging the channel.

The Montgomery County, Iowa site is located in a predominantly agricultural watershed. Riparian and aquatic vegetation and habitat in the area are generally poor, as agricultural use and previous flooding has degraded these resources over time. Fish populations are typical of fair to degraded streams, comprised of hardy fish such as catfish, carp and some bass (Priebe 1999). No salmonids or T&E species are known to be present onsite or in the near vicinity. The federally endangered Indiana bat is listed in Montgomery County but would not normally reside in this area. A mapped riparian area (classified as R2USA) and a forested wetland (PFO1A) are located immediately downstream (NWI 1999). The EWP project site is located on a tributary of the East Nishnabotna River, where heavy rain transported a large volume of woody debris, blocking a culvert and creating secondary flooding.

5.2.2.1.2 Effects of Current EWP Practices to Restore Hydraulic Capacity (Debris Removal)

This section describes the environmental impacts of the current EWP practice of debris removal. Chapter 2 describes the practice of debris removal, and the specific activities involved in removal, such as access creation. As with all EWP projects, the primary goal of debris removal is to reduce or eliminate threats to life and property. Threat reduction may require removing blockages in streamflow to restore the stream's hydraulic capacity and removing debris that could pose a threat to downstream areas in future disaster events.

Impacts of Debris Removal Project Activities

As described in Chapter 2, debris removal may involve a number of related activities: access creation, dewatering, heavy equipment use, establishing a low flow channel, grading and shaping, and debris disposal. Site conditions determine which of the activities are required to execute a specific project.

To reach the stream and debris, vegetation may be removed to *create access* for equipment and workers. This may be as simple as removing a small amount of vegetation along well-established roads, or may be as complex as clearing a new road. For example, at the Bethel Road site, the project location was not easily accessible, necessitating the creation of a road, substantial removal of large woody vegetation along the streambank, and creation of an in-stream crossing point for machinery to reach the opposite bank and complete the work. Access creation can have several adverse effects, including soil compaction and decreased infiltration, increasing the potential for soil erosion, decreased streambank stability through vegetation removal, and direct impacts such as increased turbidity, particularly in cases where machinery operates in-stream (USACE undated).

Dewatering, the process of rerouting streamflow away from the project site so that the debris can be cleared, may be used if a debris jam impounds water behind it, including a large volume of sediment, which may need to be removed. Removal of the debris dam without dewatering could release a plug of sediment that would be detrimental to downstream resources, so this is avoided if possible. Dewatering allows for a more controlled removal of the debris jam and sediment. Diverting water can have substantial effects on aquatic life residing at the dewatered site, which depend on continual flow, such as increased mortality in salmonid embryos (Becker et. al 1983). There may also be an increase in turbidity when the streamflow is returned to its original channel. (Dewatering is discussed further in the section on streambank protection practices, which require a relatively dry work area to ensure proper installation and stability.)

In-stream work may cause a number of other effects. Operation of *heavy equipment* in-stream or along the bank can disturb bottom sediments and increase turbidity, leak pollutants in the form of petroleum, oil and lubricants (POLs) or other substances, alter channel morphology by compaction from the weight of the vehicle, and directly harm aquatic biota such as vegetation, and immotile or slow moving species (USACE undated). Working in-stream is often the most expeditious way to remove debris, but tends to have greater direct aquatic impacts. Of the effects listed above, all would come into play. Working from the streambank, on the other hand, reduces the level of impact but could increase the duration of impacts, as the work generally takes longer. See the summary of impacts to aquatic ecosystems below for more details on biotic impacts.

It is worth noting that the more important debris removal efforts, in terms of fully restoring hydraulic capacity and stream morphology, occur in-stream. This serves to magnify the importance of those removal efforts. In-stream debris may be the most urgent to remove a threat, yet it may also poses the greatest environmental risks.

Following debris removal, *grading and shaping* may be necessary to restore more natural streambank conditions, repair any damage done during the EWP work, and help reestablish riparian vegetation (see Beeson and Doyle 1995, Karr 1977, Sweeney 1993, FISWRG 1998). This work is generally done with heavy equipment and would produce similar impacts to debris removal efforts conducted from the streambank as discussed above. Re-vegetation is normally accomplished through seeding, but may occasionally involve tree plantings. Restoring the riparian vegetation that was damaged of removed during the process of debris removal will reduce erosion, improve turbidity levels, and reduce temperatures in the stream.

Once the debris is removed it must be disposed. *Disposal* methods vary regionally and within individual watersheds. Woody debris may be hauled away to landfills or incinerators, burned onsite, chipped and left onsite, or used in EWP practices such as rootwads or tree revetments. Some landowners may wish to keep some debris as firewood or chipped as mulch. It has been suggested to use cobble and other rocky debris to create low berms to alleviate future flood effects or for streambank stabilization practices, but these uses conflict with natural flood regimes and create an onsite supply of cobble for future disasters (Darnell 1976). Gravel removal, if excessive, may lead to downstream streambank damage as sediment is deposited to fill the voids left by removal, thus creating flows with a greater erosive potential (Kondolf and Swanson 1992).

Disposal by burning, whether onsite or at a central location, contributes to air pollution and can create problems for sensitive areas downwind, such as homes or airports. Local burning ordinances may prohibit burning or restrict the amount and timing of burning allowed. Leaving debris onsite allows for slow release of important nutrients into the local ecosystem but can pose problems in future disaster events, as this material would again be available for transport downstream. Use in other EWP projects is an environmentally sound method, as it generates relatively little environmental impact and restores many natural functions to the stream. The volume and type of debris would determine its appropriateness for such use at the site or a nearby site. Berm creation may have both positive and negative impacts, as these structures may protect the floodplain and adjacent areas during smaller floods. However, they may also provide additional debris for larger floods, as well as altering the natural flood cycle, which may adversely affect wetlands and other flood sensitive areas. The use of cobble in streambank protection practices is virtually identical to loose rock riprap and other practices, which are discussed in greater detail later in this chapter.

Summary of Impacts on Aquatic Ecosystem Parameters

Sedimentation and turbidity: Short term increases in sedimentation and turbidity may result from operation of equipment in or near the stream. Removal of debris may remove structures that reduce flow velocities and increase sedimentation. Removal of vegetation may increase runoff and erosion, introducing additional sediment to the stream.

Temperature and dissolved oxygen: Areas that were previously shaded or covered by debris may experience increases in temperature. Riparian vegetation removed or damaged in creating access or in completing the debris removal, may reduce vegetative cover and increase temperature. The removal of debris may alter or eliminate in-stream structures that create turbulence and/or direct flows that increase oxygen content.

Pollutants. Heavy equipment use in and around the stream may result in leaks of POLs and other mechanical fluids into the stream. Changes to the streambank structure, such as creating gullies, steep slopes, or denuded slopes, may decrease infiltration capabilities for rainfall and encourage runoff and erosion of fertilizers, pesticides, urban runoff or other chemicals found on the lands nearby.

Habitat structure Debris removal can remove or alter habitat structure, adversely affecting aquatic organisms. Sedimentation caused during removal can fill or bury benthic habitats and organisms. Woody debris can comprise a substantial portion of invertebrate biomass, secondary production, and prey species for fish (Benke et. al 1985).

Channel structure: Removal of woody debris can either increase or decrease the potential for bank erosion, depending on how the debris was arranged and pre- and post-removal flows are directed (either towards the bank or the stream center, see Keller and Swanson 1979). Removal of debris can increase flow velocities, increasing bed erosion. Removal efforts may change the location of the low flow channel and have significant impacts on plant and animal communities.
Biota: Increased sedimentation and turbidity can result in decreased spawning success, gill abrasions, migration barriers, lower dissolved oxygen, and the filling of downstream riffle areas (see Berkman and Rabini 1987, Koonce and Teraguchi 1980, and McCabe and O'Brien 1993).

Debris Removal at Example EWP Sites

The Buena Vista, VA debris removal efforts primarily involved cobble removal in three of the four streams. *Sedimentation and turbidity* may have been problematic, as equipment was used in-stream and from the streambank. However, the brook trout populations reside well up-gradient from these particular sections of the streams as they enter the city, so the debris removal would not affect their habitat. *Temperature and dissolved oxygen* was likely only minimally affected. Riparian vegetation is in moderate to poor condition, as urban land uses are prevalent and most work was done without creating access by removing streamside vegetation. *Pollutants* may have been introduced with equipment operation at these stream stretches, which might add to what is already affected from similar urban runoff sources. Effects to *habitat structure* would have been both positive and negative, as cobble was removed to reopen habitat for fish but may have removed some of the original rocky substrate with resident benthic species. *Channel structure* was improved with the creation of low flow channels and removal of flow impediments. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

At the Bethel Road site, large volumes of woody debris were removed from the stream, chipped and left on-site. *Sedimentation* increased in the short term, as equipment use occurred in-stream, vegetation was removed to create access to the site, and soil was compacted. *Temperature* may have increased with the removal of vegetation and increase in turbidity. *Pollutants* may have been introduced during in-stream work. *Habitat structure* may have been affected positively or negatively, as debris removal would reopen aquatic habitat, but some debris present in the stream before the disaster was likely removed as well. Future rainfall events may have washed chipped material into the stream, possibly burying benthic habitat or possibly providing organic material input for organisms. *Channel structure* could been positively or negatively affected, as storm debris may have been blocking flow channels or may have been directing flow away from streambanks. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

At the Montgomery County site, pooling of water behind the debris jam led to secondary flooding. Increased *sedimentation* may have occurred during removal and the sudden release of the sediment trapped behind the debris jam may have filled benthic habitats downstream. Turbidity is an existing problem in this watershed, to which debris removal would have contributed to a negligible to minor increase. *Temperature* increase also would have been negligible, as riparian vegetation is sparse and turbidity was already high. *Pollutants* may have been introduced by equipment and deposition or erosion of adjacent agricultural lands, or during the burning of the debris. *Habitat structure* and *channel structure* would not have been affected, as the existing stream channel has marginal habitat and tends to be wide and flat, with a silty bottom. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

Effects on floodplain, wetland, and riparian community parameters

Bank stability and erosion: Removal of vegetation to create access to site may increase runoff and erosion. Removal of debris that is protecting a bank from direct exposure to flow will likely increase streambank erosion. Debris jams that divert flows into wetlands may adversely affect the wetland hydrology.

Vegetative cover and habitat: Removing vegetation to create site access will decrease cover and may reduce habitat quality. Equipment use from the bank may damage riparian vegetation through leaks, soil compaction or direct damage from equipment operation (Darnell 1976).

Hydrology and water quality: Removal of debris may decrease pooling and subsequent flooding caused by debris jams, which may adversely affect floodplain and wetland ecosystems.

Removal of vegetation may increase erosion from floodplain areas, increasing turbidity and input of nutrients from agricultural or other lands.

Biota: Destabilization of streambank may adversely affect riparian vegetation. Effects to wetland hydrology may decrease wetland function, adversely affecting plant and animal life.

Wetlands: Changes in hydrology, bank stability or biota may adversely affect any wetlands on-site or downstream.

Debris Removal at Example EWP Sites

At the Buena Vista, VA site, some riparian vegetation may have been removed while creating access, reducing *bank stability*. *Vegetative cover and habitat* may have been adversely affected, as riparian shade, cover and source material for carbon and other nutrients may have been removed. *Hydrology and water quality* may have been slightly affected, as equipment use and access creation may have increased erosion near the site. *Biota* may experience some negative effects due to the removal of riparian vegetation. The Maury River channel does have some riparian and *wetland* vegetation, according to NWI maps of the area, but adverse effects were likely minimal, as the effects to hydrology and vegetation were localized.

The Bethel Road debris removal efforts required a more substantial amount of heavy equipment use and access creation. *Riparian vegetation* may have been removed and equipment use along the bank may have reduced bank stability. Similarly, *vegetative cover* was likely reduced in both quality and quality. *Hydrology* may have been slightly impacted, as equipment use along the bank may have increased soils compaction, overland runoff, and erosion. *Biota* may have experienced some adverse effects from the removal of vegetation. There are no *wetlands* near the site, removing any possible impacts to wetland ecosystems.

The Montgomery County site is located in an area of highly erodable loess soils, which are highly susceptible to increases in *erosion* and *turbidity*. The area also has very little riparian *vegetation*, reducing the impacts from equipment use and removing the need for creating access. There are *wetlands* along the East Nishnabotna, however, that may have experienced a decline in water quality or an alteration in hydrology.

5.2.2.1.3 Comparison of the Impacts of Debris Disposal Practices

Table 5.2-1 summarizes the impacts of the various methods used to dispose of disaster debris. On-site methods may have adverse effects to the local ecosystem, over either the shot or long term. Off-site methods benefit the ecosystem at the site by transferring adverse effects to the new disposal site, which may or may not be more sensitive to these effects.

Table 5.2-1 Impacts Comparison of Debris Disposal Techniques

Use On-Site	Haul Off-Site	Burn On-Site	Burn Off-Site	Bury On-site	Bury Off-Site
Water Quality[1]					
Onsite use could allow material to re-enter the stream.	Hauling offsite could increase site disturbance by heavy equipment, increasing compaction and erosion. Removes debris from future threats to the site.	Burning onsite could cause short-term increases in pH and stream temperature. Runoff from ashes could increase turbidity.	Burning offsite could increase site disturbance by heavy equipment during removal.	Burying onsite would cause short-term site disturbance.	Burying offsite could increase site disturbance during removal by heavy equipment.
Habitat and Channel Structure					
Using the material onsite could cause runoff, which could cover or create habitat.	Hauling offsite would decrease the potential for debris to re-enter the stream and affect habitat.	Burning onsite could increase pH and temperature, decreasing habitat quality.	Burning offsite should decrease the risk of onsite chemical and biological effects.	Burying onsite would cause short-term increases in erosion.	Burying the material offsite would decrease effects on benthic habitat.
Biota					
Using the material onsite could cause the debris to reenter the stream and cover organisms or habitat.	Hauling the debris offsite should decrease the potential for debris to re-enter the stream and affect habitat.	Burning the material onsite could affect pH and temperature regimes, adversely affecting fish and invertebrates.	Burning the material offsite should decrease onsite chemical and biological effects.	Burying the material onsite could cause short-term increases in erosion, which may affect habitat.	Burying the material offsite should decrease onsite impacts to habitat.
Riparian, Floodplain and Wetland Ecosystems					
Onsite use could cause wetland filling during future disaster events or other damages from remaining debris.	Hauling offsite would minimize onsite impacts.	Burning the material onsite could cause runoff to enter wetlands or riparian areas and cause changes in chemical parameters.	Burning offsite would minimize onsite impacts.	Burying onsite would cause a disruption in soils, possibly disturbing floodplain vegetation or leading to sedimentation into nearby wetlands.	Burying offsite would minimize onsite impacts.

[1] Includes turbidity, temperature, dissolved oxygen, and pollutants

5.2.2.2 Practices that Protect Streambanks

A common result of disasters is the destabilization of streambanks through flood damage, vegetation removal, and changes in streamflow or channel location.

5.2.2.2.1 Effects of Streambank Protection on Stream and Related Ecosystems

General discussion

Damaged streambanks are a common result of natural disasters. Excessive erosion, scour and gullying, damage from debris, uprooted riparian vegetation, and floodwaters that overtop banks and create new channels, are typical impairments to streambanks. The effects include damage to aquatic and riparian habitat and wildlife, weakening of streambank stability, and endangerment of structures or lands in the floodplain and nearby areas.

Impairments caused by streambank damage affect both in-stream and adjacent communities. Of primary concern are structures and property along the bank, which may be threatened by streambank failure, erosion, or possible changes in stream course. In the aquatic environment, damaged banks may lead to increased erosion from gullying or loss of riparian vegetation, increased sedimentation and turbidity as excess sediment is deposited in-stream, and increased stream temperatures, as vegetative cover is reduced. Stream channels may change course as flows overtop their banks. Floodplains and wetlands may also be affected by the encroaching erosion, streambank failure, or by course alterations that may drastically affect the hydrologic regimes of those communities.

Damaged streambanks may also benefit the local environment. The creation of new stream channels may create new wetlands or floodplain areas, benefiting species of those communities. The recently abandoned stream channel may also receive enough flow or have sufficient standing water to maintain a backwater supporting a wetland environment. A new stream channel may also support improved aquatic and riparian habitat due to a better substrate or improved hydrology.

Sedimentation and turbidity will increase, as vegetation may have been removed, increasing bank erosion. Increased sediment loads may fill benthic habitat and pools. Alterations in the direction of flow may route the channel into more highly erodable bed materials. *Temperature and dissolved oxygen* will increase with the removal of riparian vegetation, as well as increased turbidity. Short-term increases in temperature may be experienced if flows overtop the streambank and exhibit sheet flow before carving a new channel. Dissolved oxygen may increase or decrease, depending on the post-disaster arrangement of in-stream or streambank structures that cause turbulence. The risk of introduction of *pollutants, nutrients and other chemicals* will increase as the removal of riparian vegetation and increased floodplain erosion from floodwaters overtopping the streambanks, especially if the adjacent areas are agricultural or receive urban runoff, occurs. *Habitat structure* will be adversely affected with the removal of vegetation and increase in sedimentation. Redirected channel flows may be routed through improved habitat. *Channel structure* may be negatively affected, as flows erode damaged streambanks and sedimentation fills pools and low flow channels. Damage may also redirect flows into the streambank, further altering the future structure.

Effects on other communities

Effects to adjacent communities will be similar to those experienced with debris removal (Section 5.2.2.1.1). Riparian areas, wetlands and floodplains may see increased erosion, vegetation removal, increased sedimentation, and possible changes in community type if there are directional alterations in the streamflow.

Variability of impacts between watersheds

Similar to the practice of debris removal, streambank impairments are largely dependent on the characteristics of the watershed. High gradient streams have faster moving waters and are less likely to meander around obstructions or bends in the stream channel. Instead, these streams may overtop the streambank, create new channels, cause heavy erosion or otherwise damage the bank structure. Flat waterbodies will be more likely to meander. However, larger rivers can accumulate flood stage waters and may overflow the streambank, destroy vegetation, or carry debris that can damage the streambank. Another possibility lies with streams that are channeled, either by natural topography or structures such as levees. These streamflows are restricted to the channel and unable to overtop the banks. They often dissipate the energy of flooding through increased bank erosion, the undercutting or progressive weakening of the streambank through saturation of the soil.

The type of disaster will also affect the damage to streambanks. Floods are the most common cause, as floodwaters erode or overtop banks and remove vegetation. Tornados damage vegetation by uprooting larger woody species, causing drastic changes in the streambank stability. Fires or extended drought will likely remove vegetation from the streambank and adjacent areas, increasing the potential for erosion along the banks.

Streambank damage situations at example EWP sites

Streambank repair example sites are located in Rocky Run, VA, Montgomery County, IA, Rose River VA and Santa Cruz, CA. Each site is briefly described below, including an assessment of the pre-disaster and post-disaster natural conditions. A more detailed analysis of impacts of the disaster and of EWP practices at these sites is discussed in Appendix D.

The Rocky Run EWP site is located at the outflow of Rocky Run, a high gradient stream originating in forested, rocky area. The housing community is situated where Rocky Run empties into the Dry River. The stream is intermittent, drying in summer, but still maintains wild populations of brook trout in the pools that remain during dry periods. The riparian areas along Rocky Run are heavily wooded, with substantial herbaceous cover as well, implying a significant contribution of woody debris and organic material. There are no known T&E species in the area

(Mohn 1999) and the nearest wetland is approximately one mile downstream, classified by NWI as R4SBA, a riparian area. (NWI 1999) Heavy rainfall led to flood conditions, with cobble and woody debris deposition. Significant streambank damage occurred, as the stream overflowed its banks and created a new channel through the housing community. Riprap and gabion walls were installed to repair the streambank, direct flows around the community, and prevent future erosion and damage.

In 1998, Montgomery County, Iowa was the site of streambank damage from flooding in the East Nishnabotna River. The local environment was described in Section 5.2.2.1 under the practice of debris removal, and can be briefly described as heavily farmed with little riparian vegetation and poor aquatic habitat (Priebe 1999). A large volume of riprap was used to restore a streambank and protect a bridge and homes downstream. As noted previously, there are no known T&E species onsite or nearby. The nearest wetlands are immediately downstream and are classified as R2USA and PFO1A, a riparian area and a forested non-tidal wetland, respectively (NWI 1999). These wetland and riparian areas likely are the wetted areas located between the levees (Miller 1999).

The Rose River site in Virginia is located on cattle grazing land and a moderately well-formed riparian vegetation zone composed mostly of grasses. The stream originates in a high gradient forested area several miles upstream and supports brook trout populations both upstream and downstream of the project area, and presumably in the project area itself. There are no known T&E species in the area (Mohn 1999) and there are wetlands located onsite and are classified as R3USA and PEM1A, a riparian area and an emergent wetland. (NWI 1999) Rock weirs and rootwads were installed to protect the streambanks and to prevent sedimentation and filling of the wetlands.

The Santa Cruz bioengineering site is located in a residential area at the foot of a mountainous state park. Riparian vegetation is somewhat limited due to the development but does contain some woody species. Two federal T&E species are known to inhabit the area: the red-legged frog and the steelhead (a salmonid fish). No wetlands are known to exist nearby (Davis 1999). Restoration work entailed the use of riprap, geotextile fabric, and the planting of willow trees along the bank.

5.2.2.2.2 Effects of Current EWP Practices to Repair Streambanks

This section describes environmental impacts of the current EWP practice of streambank restoration. Chapter 2 describes in more detail streambank impairments, the practice of streambank restoration, and the specific activities involved. As with all EWP projects, the primary goal of the repairs is to reduce or eliminate threats to life and property. Threat reduction may require stabilizing streambanks, halting erosional losses, and installing structural practices to prevent future erosion.

Impacts of Streambank Restoration Project Activities

The practice of streambank restoration is closely related to debris removal and often involves similar activities. Access creation, dewatering, heavy equipment use, and grading and shaping are employed in essentially the same activities described under the practice of debris removal. Activities unique to streambank restoration would include: borrowing of materials, installation of structural practices, and revegetation.

Borrow of materials refers to the use of natural materials either onsite or from other locations in restoring the streambank. For example, rootwads are normally constructed using downed trees from the particular project site, whereas the rock used as riprap often comes from local quarries or other suppliers. The location where materials are acquired can have both positive and negative aspects. Using debris that already exists at a site is a very efficient, natural method of site restoration, as the streambank can be restored and debris disposal is no longer an issue. However, there is a slight risk that onsite borrowing may remove important structures from other areas of the site and lead to future problems such as weakened streambanks from excavation or removed vegetation or reduced effectiveness of floodplains.

Installation of structural practices is a general description of the process of constructing streambank and in-stream structures that reduce streambank erosion and protect banks from severe erosion. These structures include streambank armoring methods such as riprap, gabions, rootwads, as well as in-stream methods such as rock weirs. The installation of these practices often involves heavy equipment and substantial preparation of the exact location of the practice. For example, installing riprap normally involves heavy equipment working in-stream or from the bank, to grade, excavate, or otherwise shape a site for the placement of the rock. The impacts from these activities are similar to those from equipment operation during debris removal, including short-term increases in turbidity and impacts to riparian and aquatic vegetation.

Revegetation is the final stage of streambank restoration. Once the structural work has been completed, it is possible that the equipment operation, in combination with the disaster impacts, has left the riparian vegetation in poor condition. To increase the effectiveness of the newly installed practices, grasses and woody species can be planted to reduce erosion, stabilize streambanks, and provide cover and temperature regulation (see Sweeney 1993 and Beeson and Doyle 1995).

Summary of Impacts on Aquatic Community Parameters

Sedimentation and turbidity: Short term increases in sedimentation and turbidity will be seen with equipment operation and access creation. Excavation and installation of the practices will have similar short-term effects. Long-term effects will be beneficial, especially in sites using rootwads and rock weirs, as these structures reduce water velocity and improve turbidity levels.

Temperature and dissolved oxygen: Short term increases in temperature and decreases in dissolved oxygen will result from equipment use and excavation. Long-term benefits will be realized as riparian vegetation is reestablished and installed structures may create turbulence. Rock weirs increase turbulence, raising dissolved oxygen levels.

Pollutants: Equipment operation introduces risks of leaks. Access creation may remove riparian vegetation and promote erosion and runoff. Reestablishment of riparian vegetation will reduce erosion and runoff of agricultural or urban lands.

Habitat structure: Sedimentation may fill benthic habitat. Access creation may remove riparian and aquatic vegetation. Some practices, such as riprap and gabions, may decrease riparian and aquatic habitat for some species and limit access to the water for terrestrial species. Some invertebrate species may find additional habitat in these structures (Bradt and Wieland 1978). Other practices, such as rootwads and rock weirs, may increase habitat, as pools and covered areas develop (Rosgen 1996). All practices will stabilize streambanks and provide substrates for vegetative growth.

Channel structure: Riprap and gabions may redirect energy towards other areas, increasing erosion in other parts of the channel and altering the natural meandering of the stream (USACE 1981, Gore et. al. 1995, and Stern and Stern 1980). Gabion mattresses and other stream bottom structures may have significant effects on the location or existence of low flow channels, which may not form until sedimentation fills the pore spaces in the rock substrate and forms naturally in the stream bottom. Rock weirs and rootwads create pool areas and alter flow velocities. Rock weirs may be constructed to direct flows away from streambanks and reduce bank erosion.

Biota: Increased sedimentation and turbidity can result in decreased spawning success, gill abrasions, migration barriers, lower dissolved oxygen, and the filling of downstream riffle areas (see Berkman and Rabini 1987, Koonce and Teraguchi 1980, and McCabe and O'Brien 1993).

Streambank restoration effects on Aquatic Ecosystems at Example EWP Sites

To better illustrate the impacts of streambank restoration, each example site can be examined in terms of the above parameters. A more detailed analysis of the site-specific impacts can be found in Appendix D.

EWP activity at Rocky Run involved the installation of riprap and gabions to strengthen streambanks along part of the stream. *Sedimentation and turbidity* may have increased with equipment operation, excavation, and impacts to riparian vegetation. However, the brook trout populations lie above these reaches, removing any effects of debris removal to their habitat. *Temperature and dissolved oxygen* may have declined as riparian vegetation was removed and turbidity increased. Dissolved oxygen may increase with the addition of structures that create turbulence. *Pollutants* may have been introduced as well, with equipment operation, vegetation removal, and the proximity of urban runoff sources. Effects to *habitat structure* could have been positive and negative, as riprap and gabions do not provide habitat preferred by fish and other species, but may benefit invertebrates. Terrestrial species will face restricted access to the stream but may gain habitat in the re-vegetated areas. *Channel structure* became poorer, as the riprap and gabions serve to force flows through turns in the channel and do not allow for natural flow regimes or floodplain development. The gabion mattress may also eliminate the low flow channel for some time until sediment fills the spaces and a new low flow channel can form naturally. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

Montgomery County was the site of an extensive installation of riprap along the East Nishnabotna River. *Sedimentation and turbidity* may have increased with equipment operation and excavation, causing impacts to riparian vegetation. However, these impacts might be regarded as minimal, since turbidity was an existing problem in this river. *Temperature* may have increased as turbidity increased. *Pollutants* may have been introduced as well, with equipment operation and the proximity of agricultural runoff sources. Effects to *habitat structure* could have been positive and negative, as riprap may create additional habitat for invertebrates. Fish species in this river tend to be bottom dwellers and would likely be unaffected. Terrestrial species will face restricted access to the stream but may gain habitat in the revegetated areas. *Channel structure* remained neutrally affected, as the riprap protects the site but directs energy further downstream and natural meandering is removed. The frequent use of levees in this area mimics the installation and function of riprap. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

At the Rose River site, riprap, rootwads, and rock weirs were installed. Increased *sedimentation* may have occurred during construction and excavation. The rootwads and rock weirs will act to minimize long-term turbidity impacts or even improve conditions. *Temperature* increased in the short term as turbidity increased. The establishment of riparian vegetation, cover through rootwads, and the pooling created with rock weirs, will benefit temperatures in the long term. *Pollutants* may have been introduced by equipment and erosion of adjacent agricultural lands. *Habitat structure* saw both positive and negative impacts, as riprap offers mixed habitat benefits and some cover and pools were created. C*hannel structure* was improved with pools and cover creation. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

The Santa Cruz site employed riprap, geotextile fabric and willow tree planting to stabilize the streambank. Short-term increases in *sedimentation* were seen but long-term effects will be positive, as the geotextile and vegetation will enhance erosion resistance. *Temperature* was increased in the short term with increased turbidity, but will benefit from vegetation establishment over the long term. *Pollutants* may have been introduced by equipment but vegetation and bank stability may decrease future erosion and runoff potential. *Habitat structure* exhibited positive and negative effects, as riprap yields mixed benefits to habitat and riparian vegetation will benefit both aquatic and terrestrial species. *Channel structure* was neutral, as this section lies in a residential area and must remain on its present course. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

Effects on floodplain, wetland, and riparian community parameters

Bank stability and erosion: Removal of vegetation to create access to site may increase runoff and erosion. Removal of debris that is protecting bank from direct exposure to flow will likely increase streambank erosion. Soil compaction from equipment operation may decrease infiltration of soils, increasing runoff. Armoring may redirect flows to unprotected banks and lead to increased erosion of the bank at that location. Rock weirs will likely reduce erosion, as flows are directed towards the center of the stream channel.

Vegetative cover and habitat: Removal of vegetation to create access to site will decrease cover and may reduce habitat quality. Root wads may encourage riparian vegetation.

Hydrology and water quality: Removal of vegetation may increase erosion from floodplain areas, increasing turbidity and input of nutrients from agricultural or other lands. Channelization of stream may remove natural flood regime and adversely affect the formation of wetlands Possardt and Dodge 1978).

Biota: Destabilization of streambank may adversely affect riparian vegetation. Alteration in wetland or floodplain function may result in adverse effects to resident biota (see Darnell 1976, Gore et. al. 1995, and Brode and Bury 1984).

Wetlands: Changes in hydrology, bank stability or biota may adversely affect any wetlands on-site or downstream.

Effects on floodplain, wetland, and riparian ecosystems at Example EWP Sites

At the Rocky Run site, some vegetation may have been removed to create access to the location for gabion installation. *Bank stability, vegetative cover* and *biota* may have been adversely affected. The *hydrology* at Rocky Run is substantially different from natural stream conditions, as the stream takes several engineered turns, possibly affecting riparian and floodplain ecosystems. There are no wetland on-site or nearby that may have been adversely affected, as the effects are localized.

The Montgomery County site would have involved some heavy equipment usage, possibly impacting *bank stability and water quality*. There is very little riparian *vegetative cover* to have any substantial impacts upon. There are *wetlands* along the East Nishnabotna that may have experienced a decline in water quality or an alteration in hydrology.

The Rose River site had been degraded by prior flooding and landowner attempts to modify the stream channel. Possible impacts to *bank stability* and *hydrology* may have occurred. The work was completed in a dry channel, so *biota* would have been minimally affected. No access was created, minimizing impacts to *vegetation*, and *wetlands* just downstream actually benefited from the work, as future sedimentation would likely have filled them.

The Santa Cruz site would have shown similar effects to the Montgomery County site in terms of effects on *bank stability* and *water quality*. However, the Santa Cruz site has a substantial amount of *riparian vegetation* that may have been removed of affected in implementing streambank restoration practices. Consequently, *biota* may have been adversely affected. There are no *wetlands* on-site or nearby (Davis 1999).

5.2.2.2.3 Comparison of the Impacts of Streambank Restoration Practices

Table 5.2-2 illustrates the impacts of the various methods used in restoring streambanks. Each practice serves the purpose of reducing erosion and protecting streambanks, but some may be more 'green' than others. Armoring is generally less functional for aquatic and vegetative species, whereas practices that employ natural materials often provide additional benefits.

5.2.2.3 Dam, Dike, and Levee Repair

The primary functions of water control structures include flood control, infrastructure protection, and land development. Dam, dike, and levee repair or removal is an EWP practice that is applied to either NRCS assisted structures, or for dams, dikes, or levees located along streams with a drainage of less than 400 square miles.

5.2.2.3.1 Impacts of Disaster-damaged Dams, Dikes, and Levees on the Environment

Dams, dikes, and levees are constructed for the purposes of impounding or re-routing streamflows. The installation of a dam is directly in the path of the stream and generally results in the formation of a reservoir. This may provide for municipal drinking water supply, recreation or simply flood protection for structures in the historical floodplain below. Dikes and levees, on the other hand, are built alongside a stream and are intended to mitigate the effects of high water levels, potentially preventing flooding in the protected areas behind.

Impacts to aquatic and related ecosystems

Damages to these structures can have serious short-term impacts. The breach of a dam could lead to the release of the entire impounded volume of water into the floodplain below. The volume of water released could actually be greater than any possible flood, depending on the size of the reservoir. The downstream effects of flooding would be amplified, as water scours stream channels, streambanks are damaged, and debris torrents are propelled into the floodplain. Impacts to ecological communities could also be amplified above 'normal' flood damage.

Table 5.2-2 Impacts Comparison of Streambank Protection Techniques

Armoring	Natural Materials: Dead Woody Structures	Natural Materials: Soil Bio-engineering	Natural Materials: Vegetative Planting and Seeding	In-stream flow modifications
Sedimentation and Turbidity				
Armoring would stabilize eroded streambanks within the impaired reach, reducing erosion. Flows could be re-directed into downstream banks and increase erosion, sedimentation and turbidity. Spawning and riffle habitat could be affected.	Structures would increase bank stability and reduce erosion.	Soil bioengineering would stabilize eroded streambanks within the impaired reach and decrease sedimentation and turbidity.	Vegetation stabilization would reduce sedimentation and turbidity by filtering overland flow and decreasing erosion within the impaired reach. Bank failure during high velocity flows could occur and cause increased erosion and sedimentation.	Decreases in bank erosion would result and therefore decrease sedimentation and turbidity levels. Increased flow velocities should aid in the transport of sediments.
Temperature and Dissolved Oxygen				
Near-shore habitat could be reduced and cause reductions in cover and food sources for larger biota.	Structures would provide quality substrate for vegetation, providing cover, shade, and detrital inputs.	Soil bioengineering would provide substrate for vegetation, providing cover, shade, and detrital inputs.	Vegetation stabilization would improve habitat and eventually provide shade and cover resulting in a cool, well-fed stream system.	In-stream flow modifications would decrease erosion and increase dissolved oxygen and habitat diversity.
Pollutants				
Heavy equipment use increases risk of POL spills/leaks. Decreases in streambank vegetation would decrease the filtration of overland runoff.	Heavy equipment use increases risk of POL spills/leaks.	Heavy equipment use increases risk of POL spills/leaks. Mixed practices would increase habitat diversity since both vegetation and hard structures are used, and should reduce runoff-based nutrient flows to stream.	Heavy equipment use increases risk of POL spills/leaks. Vegetation would filter overland flow and reduce sediment and nutrient loads.	Heavy equipment use increases risk of POL spills/leaks.
Habitat Structure				
Armoring could decrease bank vegetation and potentially inhibit future vegetation colonization. Armoring may increase attachment surfaces for invertebrates and increase food supplies within the system.	Structures would provide additional habitat for aquatic species and provide substrate for riparian vegetation, improving cover instream.	Improved riparian vegetation would provide additional cover for aquatic species and provide nutrient inputs.	Improved riparian vegetation would provide additional cover for aquatic species and provide nutrient inputs.	Flow modifications would direct flows away from banks, preventing the under-cutting of bank vegetation and would create some pools instream, providing habitat areas for aquatic species.

Table 5.2-2(continued) Impacts Comparison of Streambank Protection Techniques

Channel structure				
Armoring banks would decrease bank erosion within the impaired reach and reduce sedimentation to downstream reaches.	Structures would reduce erosion and sedimentation, preventing the degradation of downstream reaches.	The combination of vegetation and hard structures should decrease downstream sedimentation from both overland flow and bank erosion.	Vegetation would decrease downstream sedimentation from both overland flow and bank erosion. Erosion could reoccur during high flows and fill downstream riffles and pools.	In-stream structures would improve sediment transport and protect streambanks from instream erosion.
Biota				
A reduction in near-bank habitat could cause a reduction in spawning and rearing success in fish species, food sources, and overhead cover. Invertebrates may benefit from additional habitat in armoring structures.	Additional instream habitat and vegetative cover would benefit both fish and invertebrate species.	Fish would benefit since shade, cover, and in-stream habitat would be improved over impaired conditions. Vegetation establishment would increase food sources for invertebrate populations, provide habitat and cover for fish and improve water quality.	Shade, cover, and in-stream habitat would be improved over impaired conditions. Vegetation establishment would increase food sources for invertebrate populations, provide habitat and cover for fish and improve water quality.	In-stream structures would increase dissolved oxygen rates, pool structures and water quality, benefiting fish and invertebrates.
Riparian, Floodplain, and Wetland Ecosystems				
Armoring maintains the current channel, reducing localized flooding and channel meanders, possibly adversely affecting floodplain and wetlands.	Structures may improve riparian habitat with vegetation and instream cover. Structures may encourage meanders, possibly benefiting floodplains and wetlands.	Would improve riparian habitat with vegetation and instream cover.	Would improve riparian habitat with vegetation and instream cover.	Would improve riparian areas by reducing bank erosion.

In addition to the debris torrents and streambank damage, turbidity levels would be very high, vegetation may be stripped away and many biotic organisms would be destroyed or carried away. The torrent might seriously damage or bury sensitive ecosystems downgradient, such as wetlands.

Levee breaches may have similarly harmful results. Raised floodwaters may breach the levee, carrying large volumes of water and sediment load into the flat lands behind, damaging agricultural lands. The damage is often not localized to the breach, as floodwaters may spread both upstream and downstream, creating widespread damages. Similar effects to dam breaches may be seen, as vegetation is uprooted and erosional forces are high.

Long-term impacts of dam, dike, and levee breaches are less serious, however, as these breaches would closely approximate natural floodplain functions. In cases where repairs are not made, the site acts as a floodplain easement, the benefits of which are discussed in the next section. If a dam or levee is removed (as opposed to repaired), similar effects could be expected.

To summarize, the parameters introduced in Chapter 4 can be discussed. *Sedimentation and turbidity* would increase greatly, as the earthen dam or levee would be a source of sediment and the force of the floodwaters would cause heavy erosion. However, once flows begin to slow, areas of slack water would begin to see increases in *temperature* and decreasing *dissolved oxygen*. *Pollutants* would likely have a minimal impact in dam breaches, as the volume of water would dilute the pollutant. In the case of levee breaches, though, agricultural chemicals from the lands behind the levees may be added to the water column and decrease water quality. *Habitat structure* would see negative effects, as the breaches and subsequent large flow volumes will likely cause substantive damages to the stream channel and riparian areas. *Channel structure* would also see impairments, as the floodwaters would erode streambanks, scour channels, and lead to the formation of new stream channels.

Over the long term, these effects would be mitigated, as structures such as dams and levees would not be replaced and natural floodplain function would return (see The Cosumnes River Project undated). These effects are further discussed in the section on floodplain easements.

Effects of Disaster-damaged Dams, Dikes, and Levees on Riparian, Floodplains and Wetland Ecosystems

Dams, dikes, and levees normally work to restrict natural floodplain dynamics and provide for other uses of the land. Breaches in these structures would have both positive and negative effects on riparian, floodplain and wetland communities, as a more natural flow regime would be returned but often in a large, unmanageable volume. Riparian and floodplain vegetation and wetlands might benefit from the more natural hydrology, as flooding in these communities is common. However, the volume of water impounded and the force of water accompanying these breaches would likely be very damaging to any community. Scour, excessive erosion, and uprooting of vegetation would be likely impacts. Sedimentation may fill wetlands, reducing their functionality or possibly destroying them.

Damage to Dams and Levees at Example EWP Sites

Repairs to a levee were made in Fremont County, Iowa along the East Nishnabotna River. The levee damage threatened several hundred acres of farmland and several residences. As noted before, the East Nishnabotna has poor water quality, little riparian vegetation, and some hardy fish species present. Also noted was the continuum of wetlands and riparian areas along the river channel, often located in the area between the levees (NWI 1999, Miller 1999).

The Switzer Dam is located along the Dry River near the Virginia-West Virginia border and is part of the Maury River watershed. The spillway of this earthen dam was damaged by the rains accompanying Hurricane Fran, as overflow waters passed through the spillway, causing severe erosion, gullying, and uprooted numerous trees, leading to debris blockages downstream. A second spillway on a second dam along an unnamed tributary of the Dry River was also damaged. There is no continuous flow through the spillway, so there is no aquatic community to speak of. The outflow of the dam does eventually reestablish the Dry River, which supports trout and other aquatic, wetland, floodplain and riparian ecosystems, as described in the Rocky Run discussion. Rocky Run is located approximately seven miles downstream.

5.2.2.3.2 Impacts of EWP Dam, Dike, and Levee Repair or Removal

EWP dam, dike, and levee repair or removal does not apply to structures maintained or owned by other federal agencies. Dam, dike, or levee removal practices are used in a situation when the threat of failure is high and repair is not economically, socially, or technologically feasible. Dam, dike, and levee removal may occur in combination with easement purchasing to help restore hydrological functions and protect life and property.

Dam, dike, and levee repair (including dam spillway repair) may consist of the following practice components:

- Creating access when needed to move heavy equipment to the site
- Dewatering to allow operation to proceed under “dry” conditions
- Installing armor to protect either the dam, dike, or levee, or downstream structures
- Repairing spillways
- Grading, shaping, and re-vegetating affected areas by seeding or planting
- Fill – may cause increased runoff and affect aquatic habitat and biota. Sediment may fill in riffle habitats, turbidity may inhibit migration patterns of salmonids, turbid conditions may irritate gill structures (See section 5.2.2)
- Excavation – Same impacts as above
- Compaction – See section 5.2.2.4
- Revegetation – See section 5.2.2.1 (grading, shaping, and revegetating)

The impacts of creating access, dewatering, grading, shaping, and re-vegetating have previously been discussed in section 5.2.2.1. The impacts of installing armor have been discussed in section 5.2.2.2, actions that protect streambanks.

Summary of Impacts on Aquatic Community Parameters

Impacts would have been similar to those seen in association with other practices, such as short-term increases in *sedimentation and turbidity*, *temperature and dissolved oxygen*, and a possible risk of *pollutants*. *Habitat structure* and *channel structure* may also be affected by sedimentation and other construction impacts. *Biota* may also be adversely affected, as previously discussed.

The impacts of dam, dike, and levee removal are discussed under floodplain easements, as the natural flow regime would be returned.

Dam and Levee Repair at Example EWP Sites

As previously stated, the East Nishnabotna watershed is located in Southwestern Iowa and is comprised of mostly agricultural land. The natural environment, at the time of the disaster, was typical of an agricultural setting. Little or no riparian vegetation existed due to severe erosion from floodwaters. Short-term impacts to water quality occurred from heavy equipment traffic, which included an increase in *sedimentation and turbidity*. Some effects to *temperature and dissolved oxygen* may have also occurred. The risk of *pollutants* was present, and *habitat structure* and *channel structure* may have been adversely affected as previously discussed under construction impacts. *Biota* may have been adversely affected by the increased turbidity or reductions in habitat quality.

The Switzer Dam site would have experienced minimal impacts to the aquatic community due to the lack of freely flowing water. Slight impacts to *sedimentation*, *temperature, pollutants, and habitat* and *channel structure* may have occurred. Soil compaction and vegetation removal may have occurred. There is no aquatic *biota*.

Effects on Riparian, floodplain and wetland communities

Bank stability and erosion are improved, as the previous bank condition is returned. V*egetative cover* will be restored in some cases, such as the grasses that cover levees. *Hydrology*, *biota* and *wetlands* will return to conditions under the altered flow regime.

The impacts of dam, dike, and levee removal approximate the conditions of floodplain easements and further discussion may be found in that section. In some cases, the natural communities are impaired by the implementation of the dam or levee itself and would benefit most by their removal.

5.2.2.4 Practices that Protect Structures in Floodplains

Floodplain diversions and sediment/debris basins are constructed to protect important public infrastructure, such as water and wastewater treatment plants, as well as other property located in floodplains.

5.2.2.4.1 Floodplain Diversions

Disaster effects of damaged floodplain diversions and sediment/debris basins

Floodplain diversions are constructed and used when excessive runoff, or debris flow, is threatening to damage water or wastewater treatment or similar facilities. Sediment and debris basins cause stormwaters or floodwaters to pool, allowing for some settling of sediment and debris, reducing the downstream damages. When breached, the overland flow of water may lead to severe erosion, which can damage the municipal or other structures, fill aquatic habitat, uproot vegetation, and increase turbidity in streams. These effects to aquatic, riparian, wetland, and floodplain ecosystems are similar to those resulting from damaged dams or levees, and a more detailed discussion of these effects can be found under dam, dike and levee repair.

Damage at Example EWP Site

Floodplain Diversion Example Site – Clarendon, Texas

The City of Clarendon, Texas utilizes a six-lagoon system to treat its wastewater, eventually emptying the treated water into Lake Clarendon. The lagoons are protected by a system of levees which guard against inundation from Lake Clarendon, which is a playa lake. The lake may contain a small population of catfish and carp, each of which are very tolerant of fluctuations in turbidity, nutrient and dissolved oxygen levels. Lake Clarendon and its surrounding environment is a wetland (Sears 1999). Heavy rainfall caused the lake, which is normally 40 acres, to expand to 360 acres. This caused several of the first levees to fail, and allowed untreated sewage to be expelled into Lake Clarendon.

5.2.2.4.1 Sediment/Debris Basins

Sediment and debris basins temporarily detain a portion of stormwater runoff for a specified length of time, releasing the stormwater slowly to reduce flooding and remove and limited amount of pollutants. Pollutants are removed by allowing particulates and solids to settle out of the water. The primary focus of detention basins is to reduce peak stormwater discharges, control floods, and prevent downstream flooding (NCSU, 1999). Sediment or debris detention basins also prevent down-gradient debris torrents from destroying infrastructure. Water and sediment control basins are effective for preventing downslope gully erosion, trapping sediment, and reducing peak flows downstream. The basin traps sediment and the nutrients attached to it. Infiltration through the bottom of the basin provides for groundwater recharge.

5.2.2.4.3 Effects of Current EWP Practices to Protect Structures in Floodplains

The following EWP practice components are involved in installing a diversion:
- Creating access when needed to move heavy equipment to site
- Excavating soil
- Compacting soils for stability
- Constructing outlets for the release of stormwater
- Grading, shaping, and revegetating affected areas by seeding or planting

EWP practice components involved in sediment and debris basin installation include the following:
- Creating access when needed to move heavy equipment to site for short-term construction and for long-term maintenance
- Excavating soil and shaping the basin
- Compacting soils for basin stability and retention capabilities
- Constructing outlets for the release of stormwater

- Grading, shaping, and revegetating affected areas by seeding or planting

The above practice components can lead to impacts to aquatic, riparian, wetland, and floodplain ecosystems due to the compaction of soils, creating access, clearing land, increased runoff, and sedimentation. A complete description of these practice components can be found under the practices of debris removal or streambank restoration.

5.2.2.5 Practices that Restore Watershed Uplands (Critical Area Treatment)

Watersheds are often impaired and lives and property threatened by damage done in upland areas that leaves large areas depleted of protective vegetation and susceptible to severe erosion, debris flows, and mud slides when heavy rain events next occur.

5.2.2.5.1 Impacts of Disasters that Create Critical Upland Areas

Natural disasters such as droughts, fires, or floods have the potential to denude large areas of vegetation growth. Vegetation plays a vital role in controlling wind and water erosion, groundwater infiltration, and soil productivity. Without vegetation, soils become susceptible to increased erosion, decreased infiltration, decreased soil productivity, and mass-flow events. These events can lead to decreases in wildlife habitat, water quality, and increases in threats to life and property. Areas that have been voided of vegetation often become a priority concern for entire communities or residents living adjacent to the impaired area. Unprotected soil particles carried by high winds can reduce visibility and irritate eyes and respiratory systems. Heavy rains can lead to debris torrents, which can deposit sediment, woody debris, and other materials in floodplains.

Damage at Example EWP Sites

Critical Area Planting Site – Boise 8th Street Burn

On August 26, 1996, the Boise Front experienced a devastating fire that burned nearly 15,300 acres. A principal concern of the Boise Front Watershed was the susceptibility of the area to catastrophic erosion. The combination of steep slopes and highly erodable granite soils make the area extremely sensitive to changes in the vegetative community. Ninety percent of the soils within the burned area were classified as highly erosive and the burn left no standing vegetation on approximately 95% of the lands within the fire boundary (BLM, 1996). There are no wetlands onsite and the downstream areas are also unlikely to have wetlands (Fink 1999). There are no T&E species present or nearby that would have been affected. The burn area has minimal aquatic, riparian, floodplain, and wetland habitat, as streams are intermittent. However, subsequent rainfall and the ensuing erosion and debris torrents would affect both human and natural communities downstream, where the burned area gives way to the city of Boise and the Boise River.

Critical Area Planting Site - Antelope Valley Drought, CA

Due to an extended drought in California, soil was being rapidly eroded from a 7,700-acre parcel of land that had previously been farmed. Federal air quality standards were not being met in surrounding areas during high wind events, as visibility was reduced and deposition of sand was threatening roads. The site is within the historic range of the federally listed desert tortoise (*Gopherus agassizi*) and the kit fox (*Vulpes macrotis*), but as indicated by the U.S. Fish and Wildlife Service, it is unlikely that the tortoise or fox would inhabit abandoned cropland. Therefore no impacts to threatened and endangered species should have occurred. There are no perennial streams on-site, but deposition of sediments may have affected downstream channels or riparian areas.

Upland Diversions Example Site – Boise 8th Street Burn

Upland diversions were used to divert surface flows away from areas prone to extreme erosion. The diversions utilized in the 8th Street Burn rehabilitation included contour felling and contour trenching. Site preparation activities included cutting down burned trees, excavating, filling, grading, and compacting soils. No additional roads were constructed for the creation of upland diversions, all equipment was either air-lifted by helicopter, or transported by hand to the site.

Check Dam Example Site – Boise 8th Street Burn - Hulls Gulch and Crane Creek Drainage

Numerous gravel bag and straw bale check dam sites were established in the Hull's Gulch and Crane Creek drainages in 1997 to help control soil loss in impaired areas while ground cover was being re-established.

Road Protection (BAER) Site – Boise – 8th Street Burn

Three projects areas were selected for the installation of drains and conveyances to protect roads from surface water flow and debris torrents. The three areas included a roadway in Stewart Gulch, in the Cottonwood Creek drainage, and in Upper Hulls Gulch. The structure installed in Stewart Gulch consisted of a conveyance structure that was placed under the roadway, below a detention basin. The structure installed in the Cottonwood Creek drainage included placing two major culverts under the realigned road up-slope of a flood channel. The structure installed in Upper Hulls Gulch included installing a rock armored flood diversion channel, which protects the road from wash out. Each of the structures is intended to convey water from the overflow of the detention basin under the road to protect it from washing out.

5.2.2.5.2 Impacts of EWP Practices to Restore Critical Areas

Critical area treatment involves the use of one or more practices to stabilize these priority areas of a watershed that pose a high threat to life or property. These practices tend to increase the vegetative cover, bind and retain soils, help maintain infiltration, reduce surface runoff by slowing water velocity through structures on side slopes, and improve drainage conditions to protect property (SCS, 1992). Treatments that are used to stabilize critical areas include critical area planting, installing diversions, installing grade stabilization structures, installing contour trenches, and protecting roads. All practices within critical area treatment, depending on the location of the project, may have similar short-term and long-term actions including creating access and grading, shaping, and revegetating affected areas by seeding or planting. The environmental consequences of these actions have previously been discussed in general in Section 5.2.2, and will be discussed only briefly here.

Critical area planting utilizes permanent grasses and legumes to stabilize soil and reduce damage from sediment and runoff to downstream areas. It is also used to control wind erosion from exposed topsoil. Critical area planting may require creating access and preparing sites for planting, seeding with native, or non-native stock, planting native, or non-native plants, and applying fertilizers and other additives that aid in plant growth.

Preparing sites for planting may involve tilling, ripping and raking, which turn soil over to make it more conducive to vegetation growth. This is used especially in areas where soils have become hydrophobic and do not allow seeds to penetrate the surface layer.

Seeding, or planting with native, or non-native stock can be accomplished a number of ways including aerial seeding, drilling, and hand seeding. Aerial seeding involves the deposition of seeds from a plane or helicopter. Drilling involves the use of a tractor pulled drill, such as the rangeland drill, which furrows a trench and plants the seed stocks. Many times, chains are dragged behind the drill to cover the trenches, which prevents the loss of seed. As previously stated, drilling is often conducted horizontally on side slopes, which helps create terraces that slow runoff and aid in the infiltration of surface water (Vetten 1999). Hand planting is also an option that can be utilized to stabilize impaired areas in settings, which are not conducive to mechanical planting, or seeding.

Applying fertilizers, additives, or ground cover such as lime and mulch, aid in the re-establishment of newly planted vegetation may impact certain compartments of the environment. During rain events, runoff containing fertilizer and additives may enter the aquatic environment and affect both the water chemistry and the biology of the system.

Grade stabilization structures are employed to reduce the effects of unchecked runoff on unprotected slopes while they are revegetating. *Check dams* are small dams constructed in drainageways, across slopes, or at the toe of slopes, to reduce downslope erosion by restricting flow velocity. Check dams are utilized in areas that have intermittent flows where it would be impractical to line an area with non-erodible materials. Check dams are usually constructed of riprap, straw bales, logs, or sandbags (Smoot & Smith, undated).

The critical area treatment process may also include the *protection of roads* from severe floodwaters, which can cause erosion and instability. EWP practice components that are involved in road protection may include access creation, installing drains and conveyance, armoring, and grading, shaping, and revegetating.

Installing drains and conveyances involve heavy construction activities, including the removal of ground cover, and excavation.

Upland diversions, including contour felling and contour trenching, are constructed and used to protect critical areas that lack vegetative cover from excessive runoff, and protect downslope communities, or structures from debris laden subsurface water flow. Contour felling involves placing cut trees in rows horizontally on side slopes to divert water. Contour trenching involves a similar practice, except that logs are replaced by excavated trenches, which are constructed on slopes of between 35 and 60 percent with moderate to deep rills. Their main purpose is to store or divert runoff thus reducing soil erosion and overland flow.

Outlet structures are utilized to conduct storm water away from developed lots, buildings, housing developments, or critically damaged areas and usually discharge into the nearest stream channel. Outlet structures are usually lined with clean stones to reduce the velocity of water exiting the structure.

Soil compaction may be required to aid in diversion stability and effectiveness. Compaction of soils decreases infiltration rates, increases in runoff, ponding of water, and decreased soil productivity.

Summary of Impacts to Aquatic Ecosystems

Critical area treatment is more frequently used in upland areas, such as the Boise foothills, where streams tend to be intermittent and the primary concern to aquatic systems is not construction-related, but related to storm events, where sudden erosion and vegetation uprooting may harm downstream, perennial aquatic systems.

Sedimentation and turbidity: Short term increases in sedimentation and turbidity may be seen with equipment operation and access creation. Excavation, soil compaction, and installation of the practices may have similar short-term effects. Long-term effects may be beneficial, as revegetation stabilizes streambanks and reduces overland erosion.

Temperature and dissolved oxygen: Short term increases in temperature and decreases in dissolved oxygen will result from equipment use, removal of vegetation, and excavation. Long-term benefits will be realized as riparian vegetation is reestablished.

Pollutants: Equipment operation introduces risks of leaks. Access creation may remove riparian vegetation and promote erosion and runoff. Reestablishment of riparian vegetation will reduce erosion and runoff of agricultural or urban lands. Use of fertilizers and other chemicals may adversely affect water quality if not absorbed before next rainfall event.

Habitat structure: Sedimentation may fill benthic habitat. Access creation may remove riparian and aquatic vegetation. Some practices, such as riprap and gabions, may decrease riparian and aquatic habitat for some species and limit access to the water for terrestrial species.

Channel structure: Sedimentation may alter channel structure. Drains or other structures may alter course or profile of stream channels.

Biota: Increased sedimentation and turbidity can result in decreased spawning success, gill abrasions, migration barriers, lower dissolved oxygen, and the filling of downstream riffle areas (see Berkman and Rabini 1987, Koonce and Teraguchi 1980, and McCabe and O'Brien 1993).

Critical area treatment at Example EWP Sites

The 8th Street Burn restoration involved critical area planting, the installation of upland diversions, the installation of check dams, and the protection of roads. The area of the burn typically has only a few perennial streams but a larger number of intermittent channels, minimizing direct aquatic impacts. *Sedimentation and turbidity* may have increased during construction, as heavy equipment was used for some of the work and the vegetation on-site would have been removed or damaged in the burn. T*emperature, habitat structure, channel structure, and biota* would have experienced minor effects during construction, but long-term effects would be positive, as erosion would be decreased substantially by vegetation establishment. Impacts from *pollutants* were restricted to POLs from equipment, as no fertilizers or other chemicals were used.

The Antelope Valley site required tilling of the sandy soils and seeding of native grasses to establish vegetative cover. In some places, snow fences were erected to impede further erosional losses. Much like the 8th Street burn site, there is no aquatic environment on-site but concerns for downwind aquatic systems, as well as impacts to humans, prompted restoration action. *Sedimentation and turbidity* may have increased during construction, as heavy equipment was used to till the soils, possibly creating more wind-borne sand particles that may have impacted downwind streams. T*emperature, habitat structure, channel structure, and biota* would have experienced minor effects during construction, but long-term effects would be positive, as erosion would be decreased greatly by vegetation establishment. Adverse effects from *pollutants* may have resulted from equipment use and fertilizers.

Effects on Riparian, Floodplain and Wetland Ecosystems

Bank stability and erosion: Short-term effects may have included increased soil compaction from equipment use and minor vegetation removal or damage. Long-term effects are highly beneficial, as revegetation stabilizes soils in the upland and streamside areas, reducing erosion (see Karr 1977). Aerial or hand seeding and planting may reduce short-term impacts.

Vegetative cover and habitat: Short-term adverse effects to vegetation may have been experienced if vegetation were damaged or removed. Erosion and sedimentation during construction could have affected downstream vegetation. Long-term effects are highly beneficial, as revegetation returns natural grasses or woody vegetation, providing habitat and cover.

Hydrology and water quality: In the long term, hydrology would be improved, as vegetation and structural measures would improve water flows and prevent erosion and sedimentation.

Biota: Revegetation may create habitat or forage for biota. Use of native species may promote local diversity and discourage exotic species.

Wetlands: Reducing the overland erosion and debris flows may reduce the sedimentation and filling of wetlands downslope.

5.2.2.5.3 Comparison of the Impacts of Critical Area Treatment Techniques

Table 5.2-3 below illustrates the impacts of the various methods used in treating critical areas. Natural vegetation has minimal impacts but generally takes more time than other practices, increasing the risks of further damage from new rainfall events or disasters.

Table 5.2-3 Impacts Comparison of Critical Area Treatment Techniques

Natural Revegetation	Conventional Seeding	Critical Area Planting	Structural Measures
Water Quality[1]			
Natural regeneration would help reduce peak flows once established. Vegetation could take longer to establish. Natural regeneration would not involve the use of fertilizers that may enter the stream and lower water quality.	Seeding an area should reduce peak flows once established. Seeding should have minimal site disturbance impacts. Conventional seeding could cause fertilizers and chemicals to enter waterways and affect algae and plant populations.	Critical area planting should reduce peak flows once established. Site disturbance could cause increased sedimentation in the short-term. Critical area planting could cause fertilizers to enter waterways and affect algae and plant populations.	The construction of structural measures could increase sedimentation in the short-term. Erosion and sedimentation should decrease in the long-term. Structural measures will likely reduce erosion more quickly than with vegetation establishment.
Habitat and Channel Structure			
Natural regeneration could allow sedimentation and runoff in the short-term.	Habitat should be improved over the long-term due to decreases in erosion and sedimentation.	Habitat should be improved over the long-term due to decreases in erosion and sedimentation.	Increased turbidity could occur during the construction of structural measures.
Biota			
Natural regeneration could allow sedimentation and runoff in the short-term.	Conventional seeding methods that use fertilizers could affect stream biota in the short-term. Improved habitat would benefit biotic species.	Critical area planting methods that use fertilizers could affect stream biota in the short-term. Improved habitat would benefit biotic species.	Increased turbidity could occur during the construction of structural measures.
Riparian, Floodplain and Wetland Ecosystems			
Natural regeneration would not control sedimentation until vegetation becomes established. Sites should have improved habitat once revegetation occurs.	Conventional seeding practices that utilize fertilizers could affect wetlands. Sedimentation and filling could occur until vegetation becomes established.	Conventional seeding practices that utilize fertilizers could affect wetlands. Sedimentation and filling could occur until vegetation becomes established. Critical area planting could disrupt wildlife and vegetation. Sites should have improved habitat once plantings become established.	The construction of structural measures would cause high levels of site disturbance. Immediate sediment control would occur. Structural practices would cause high initial site disturbances and could decrease wildlife habitat.

[1] Includes turbidity, temperature, dissolved oxygen, and pollutants

5.2.3 Impacts of Proposed EWP Watershed Restoration Practices

This section describes the impacts of the new practices to be implemented under the proposed actions: use of natural stream dynamics principles in streambank restoration projects, floodplain deposition site restoration, upland debris removal, repair of damaged conservation practices, and restoration using improved alternative treatment practices.

5.2.3.1 Restoration Using Natural Stream Dynamics Principles (Natural stream dynamics)

The practice of streambank restoration has been analyzed in detail earlier in the Chapter. Traditionally, EWP has used armoring methods to repair damages, such as riprap or gabions. While effective for protecting the structural integrity of the streambank and property along the stream, these practices offer little to the biotic components of aquatic and riparian communities. The Proposed Action would allow for the use of the principles of natural stream dynamics in restoring more natural function to streams.

5.2.3.1.1 Effects of Streambank Protection on Stream and Related Ecosystems

The impacts of streambank restoration have been discussed in Section 5.2.2.2. Streambank damage and subsequent impacts at sites where the Rosgen method would be very similar to the impacts and sites presented.

Impacts on Riparian, Floodplain, and Wetland Ecosystem Parameters

Bank stability and erosion: Removal of vegetation to create access to a site may increase runoff and erosion. Removal of debris that is protecting a bank from direct exposure to flow will likely increase streambank erosion. Soil compaction from equipment operation may decrease infiltration of soils, increasing runoff. Natural streamflows would create a meandering stream channel, decreasing flow velocity and reducing erosion.

Vegetative cover and habitat: Removal of vegetation to create access to a site will decrease cover and may reduce habitat quality. Natural stream dynamics may promote establishment of riparian, floodplain or wetland vegetation, depending on the hydrologic regime in the reach. Increased cover and vegetation may induce improvements in biotic species present.

Hydrology and water quality: Removal of vegetation may increase erosion from floodplain areas, increasing turbidity and input of nutrients from agricultural or other lands. Channelization of stream may remove natural flood regime and adversely affect the formation of wetlands. Slower stream velocities may reduce turbidity.

Biota: Improved habitat and hydrology may improve biotic resources such as wetland vegetation. Riparian vegetation will likely improve, as riparian areas would see reduced erosion and increased bank stability.

Wetlands: Returning a more natural stream flow with meanders will likely promote wetland formation or improvement. Using the principles of natural stream dynamics may increase the prevalence of slack waters and reduces flow velocity, promoting wetland functions.

Variability of impacts between watersheds

The variability of impacts across different types of watershed would be similar to the analysis in Section 5.2.2.2.

Streambank damage situations at example EWP sites

The Plumtree site is located along the North Toe River in the mountains of western North Carolina, just north of the town of Plumtree. The reach has a well-developed, woody riparian area and supports a very active recreational fishery, including brook, brown and rainbow trout, as well as smallmouth bass, chubs and dace. There are no T&E species onsite or in the general vicinity. No wetlands are onsite or in the immediate downstream area (Brown 1999), although the North Toe does show several areas classified as riparian zones (NWI 1999). A stretch of the river approximately nine miles long was damaged by heavy rainfall, leaving woody and rocky debris and damaging streambanks. The Rosgen method of classifying streams was used to design the stream restoration, which included rootwads, rock vanes, log sills, point bars and streambank revegetation.

5.2.3.1.2 Effects of Proposed EWP Practices to Repair Streambanks

This section describes environmental impacts of using the Rosgen method of stream restoration. Chapter 2 describes in more detail streambank impairments, the practice of streambank restoration, and the specific activities involved. As with all EWP projects, the primary goal of the repairs is to reduce or eliminate threats to life and property. Threat reduction may require stabilizing streambanks, halting erosion losses, and installing structural practices to prevent future erosion.

Impacts of Natural stream dynamics Project Activities

Many of the activities involved with using the Rosgen method are essentially the same as those described under streambank restoration. The primary differences are found in the *borrow of materials* and the *installation of structural practices*.

Borrow of materials, under the Rosgen method, is somewhat different than traditional EWP practices. Natural materials from the disaster site or areas close by are emphasized. The type of materials acquired are generally very different as well, since natural stream dynamics methods call for a greater use of rootwads, tree revetments, rock vanes and other natural uses of woody and rocky material. Often, these materials are available onsite, either as existing borrow materials or as storm debris.

The *installation of structural practices* differs from prior EWP sites. Equipment use is encouraged to be in-stream in cases where the work can be completed relatively quickly and the effects of equipment use can be temporally restricted to a short period of more intense disturbance, rather than an extended period of moderate disturbance. Installation by hand is also common in Rosgen sites.

Summary of Impacts on Aquatic Community Parameters

As mentioned previously, the impacts of using the principles of natural stream dynamics in designing restoration practices are similar to impacts observed with other streambank restoration sites. Refer to Section 5.2.2.2 for details, as this section will simply address any changes in those discussions.

Sedimentation and turbidity: Sedimentation will be greatly reduced, as extensive re-vegetation, engineered meanders, flow control structures, and natural bank protection practices such as rootwads will improve flow conditions and decrease turbidity. The short-term increases from in-stream equipment use may be restricted to a limited time period, minimizing the temporal disturbance to aquatic species.

Temperature and dissolved oxygen: The methods used will increase dissolved oxygen and reduce temperatures by providing pool areas, as well as multiple structures that will increase turbulence.

Pollutants: Reduced time of equipment operation in-stream may reduce the risk of spills. Structural methods will decrease erosion and encourage meandering streams, reducing the inflow of runoff and pollutants.

Habitat structure: Habitat will be greatly improved, as natural materials will create cover and pool habitats. Improved water quality from more natural and more effective practices will improve habitat quality.

Channel structure: With the creation of meanders, natural flow is restored, improving the sedimentation and erosion cycle in-stream. Flow control structures can reduce bank erosion while still maintaining natural flow regimes.

Effects on floodplain, wetland, and riparian community parameters

The following effects are similar to those experienced under streambank restoration in Section 5.2.2.2. Only the changes to the effects listed there are discussed further here.

Bank stability and erosion: There is an increased focus on leaving some debris in-stream. This will reduce the chances that a critical piece of debris that may be protecting a streambank from direct flows will be removed. Rootwads, rock weirs, and other methods increase bank stability by not only protecting the streambank, but also introducing meanders, directional controls, and pooling to slow the flow velocity and reduce erosion.

Vegetative cover and habitat: These methods leave the streambank in a more natural state, allowing for quicker re-establishment of riparian vegetation. Rootwads may also provide some limited riparian habitat for small mammals or birds.

Hydrology and water quality: The introduction of meanders and reduction of flow velocity will improve hydrology by creating some areas of slack water and promoting riparian and wetland vegetation. Water quality will likely improve, as turbidity and runoff will likely be decreased.

Biota: Riparian vegetation is likely to re-establish more quickly, favoring terrestrial biota. Access to the stream is improved, as meanders may create sandbars and other streamside habitats.

Wetlands: Improvements in hydrology and water quality, along with improved vegetation should promote wetland formation or restoration.

Design based on natural stream dynamics at Example EWP Sites

At the Plumtree site, NRCS used a combination of rootwads, revetments, and weirs to implement the principles of natural stream dynamics. *Bank stability and erosion* were improved, as rootwads and weirs protected banks from flows. Most of the heavy equipment use was completed in-stream, reducing the impacts to riparian soils and vegetation. *Vegetative cover* was disturbed as little as possible, and the natural streambanks will likely promote rapid re-establishment. Some planting and seeding was also completed to augment natural revegetation. *Hydrology* was improved by the introduction of meanders and slack water areas, and water quality improved with the reductions in runoff and decreased turbidity. *Biota* will likely see positive effects, as riparian areas are left in a natural state, sand bars are created and vegetation will re-establish quickly. *Wetlands* are not found on-site, but the natural stream function may lead to the creation or restoration of wetland communities.

5.2.3.2 Restoration of Agricultural Uses in Floodplains (Floodplain Deposition Removal)

Larger rivers frequently carry a heavy sediment load, especially during floods. The high erosion potential of the flood and the increased velocity creates and environment for increased amounts of suspended sediment. When these floodwaters reach an area of slower velocities, this sediment can be rapidly deposited. A common example is seen during the breach of a levee, when floodwaters reach the flat land behind and deposit the suspended sediment, burying crops or structures in thick layers of silt and sand.

5.2.3.2.1 Effects of Floodplain Deposition on Stream and Related Ecosystems

Floodplain deposition generally involves the deposition of large volumes of sediment on croplands in the floodplains. Impacts to aquatic communities are similar to the effects under other flood events, whereas floodplains see substantially different effects.

Effects of Floodplain Deposition on Aquatic Ecosystems

The impacts of floodplain deposition would be similar to those described under dam, dike, and levee repair, most specifically under the impacts of levee breaches. *Sedimentation* increases, as floodwaters slow and begin to settle. *Temperature* increases and *dissolved oxygen* decreases over time. *Pollutants and nutrients* are very likely to increase, since most floodplain deposition sites involve active cropland. *Habitat structure* would see negative effects, as sedimentation would fill benthic habitat and vegetation may be destroyed. *Channel structure* would likely also be adversely affected, as sedimentation could partially fill the channel.

Effects of Floodplain Deposition on Riparian, Floodplains and Wetland Ecosystems

Riparian, floodplain, and wetland communities can be devastated by floodplain sediment deposition, as the volumes of sediment involved can be incredibly large. Layers of sand and silt can reach several feet thick, burying crops and other vegetation, as well as filling wetlands. *Bank stability* is generally poor due to the levee breach or other event, but is not directly related to the deposition. *Erosion*, however, may have adverse effects, as there is an ample supply of highly erodable material in the floodplain with very little vegetation to reduce erosional flows. *Vegetative cover and habitat* are generally buried in layers of sediment, greatly reducing the quality. *Water quality* may see some negative impacts, as turbidity levels may increase with the introduction of this source of sediment. *Biota* will experience negative impacts, as habitat is degraded or destroyed and wetlands are damaged. *Wetlands* may be filled by sediment, effectively destroying them.

Floodplain Deposition at Example EWP Site

The Missouri River site is located along the Missouri River in St. Charles County, Missouri. The property lies behind levees on the northern bank of the river and is primarily used for agriculture, in a corn-soybean rotation. Historically, flooding has been frequent and severe, as the site is subjected to floodwaters from the Missouri as well as backwater from the Mississippi River. A layer of sand up to one-foot thick covered cropland, rendering it useless to further cropping (Cook 1999). The wetlands found near the river were likely filled with sand and their function greatly reduced.

5.2.3.2.2 Effects of Current EWP Practices to Restore Agricultural Use (Floodplain Sediment)

There are two principle methods to deal with floodplain sediment: deep tilling and sediment removal. Deep tilling involves using heavy equipment to level the sediment to an even thickness, followed by tilling the soils to mix the sediment with the topsoil buried below and restore agricultural function. Sediment removal would involve scraping the land and loading the sediment for shipping and disposal off-site.

Impacts of Floodplain Sediment Removal Project Activities

Deep tilling, as described above, uses heavy equipment to level and mix the soils. These activities would occur after floodwaters had retreated and the floodplain was again dry. This would tend to minimize impacts to ecological communities, as no water flows, riparian areas or wetlands would be affected, and floodplain vegetation is mostly in the form of crops. The primary concern to ecological communities would be prevention of erosion, as the supply of *sediment* and *pollutants and nutrients* is high. Other functions would essentially be unaffected by the restoration efforts, as the work is intended to restore agricultural function to previously farmed land.

Sediment removal involves many of the same principles as deep tilling. Virtually no impacts would be felt in the ecological communities. Disposal of the sediment, however, may pose some problems. Many levees are constructed with sediment dredged from river channels, and floodplain sediment would be a likely source of levee materials. This may introduce erodible materials back into the floodplain, increasing *turbidity* and contributing to *sedimentation* and the degradation of *habitat and channel structure*.

Floodplain Sediment Removal at Example EWP Sites

The Missouri River site was flooded in 1993 by a breached levee and immense volumes of sand and debris were deposited in the cropland. The levees themselves are composed of sand dredged from the river, providing further material for deposition. In order to restore agricultural utility to the lands, two phases of heavy equipment operation were used. First, a scraper was used to flatten and level the sand deposits to an even layer of approximately 18 inches. Then, a deep plow was used to till the soil and mix the sand with the buried topsoil and recreate usable fields. The levees were repaired (Tummons 1995).

Summary of Impacts on Aquatic Ecosystem Parameters

Minor effects to *sedimentation and erosion*, *pollutants*, and *habitat* and *channel structure* as described above. The scraping and deep tilling at the Missouri River site had very minimal effects on natural communities, as it mostly worked towards restoring prior cropland.

Effects on floodplain, wetland, and riparian community parameters

Minor effects to *vegetation* as described above.

5.2.3.3 Restoration of Watershed Uplands (Tornado Debris Removal)

Tornadoes can leave large amounts of household and woody debris in upland terrestrial areas. The deposition of these materials can have adverse affects on upland watershed areas.

Disaster Impacts on Aquatic Ecosystems

The impacts of tornado debris in uplands are similar to the impacts seen in critically damaged areas such as the 8th Street burn. Often, there is no aquatic environment nearby, as streams are intermittent or are located well away from the disaster site. The impacts may be felt in aquatic systems downslope of the site, as subsequent rainfall events may wash sediment or pollutants into those systems. These impacts, whether local or further away, would be similar to the impacts discussed under debris removal and critical area treatment, with one notable addition to *pollutants*, as household debris may contain paint, asbestos, insulation and other household chemicals.

Upland Tornado Damage at Example EWP Sites

Upland Debris Removal Site – Bauxite National Areas, Arkansas

In 1997 a category-four tornado devastated 500 acres of sensitive glade and woodland forest in the Blue Branch Watershed in Arkansas. Thousands of piles of blown down trees cluttered the forest floor suppressing rare species and creating a fire hazard (Nature Conservancy, 1998). Two species of aggressive, non-native plants also existed at the site further threatening the stressed communities. These species, the kudzu vine (*Pueraria lobata*) and the Japenese honeysuckle (*Lonicera japonica*) readily colonize bare soil and out-compete native vegetation, threatening a state listed threatened plant. The restoration efforts included debris removal by hand, followed by a series of prescribed burns.

Upland Debris Removal Site – Saline County, Arkansas

The tornadoes of March 1, 1997 also devastated private property. The Griffin property was an upland debris removal site on five acres of privately owned land. The project involved the cleanup and removal of 4 acres damaged timber and 150 cubic yards of household debris, which had been scattered over the property. Debris removal involved the use of heavy equipment, and its subsequent delivery to a county landfill for burning or burial (Reitzke 1999).

Impacts of Upland Tornado Debris Removal

Upland debris removal uses similar methods to debris removal in stream channels, but would likely have far less aquatic impacts. Heavy equipment is used to remove the woody debris, creating possible impacts from erosion and soil compaction on downslope stream systems. Debris removal may alter the overland flow of rain and runoff, possibly affecting erosion along the slope and sedimentation instream.

Upland Debris Removal at Example Sites

As mentioned above, impacts to aquatic communities would have been minimal. At both sites, streams are at least a half-mile away, minimizing any overland aquatic impacts. For a more detailed discussion of some of these possible impacts, see the impacts section of critical area treatment.

Effects on Riparian, Floodplain, and Wetland Ecosystems

Impacts to these communities would also be similar to the impacts under critical area treatment with some notable exceptions. First, debris removal may not involve revegetation of the damaged area, reducing the positive impacts that the restoration work may have provided under critical area treatment. Secondly, T&E plant species that have been covered or shielded from sunlight are exposed and may re-establish themselves, as was observed in the Bauxite Natural Area site.

5.2.3.4 Restoration of Damaged Conservation Practices

Enduring conservation practices are generally upland structures designed to operate on a single farm, most often for soil conservation. The four practices are in the Maury River watershed and are all located in upland areas. These sites include a diversion, a waste management pond, embankment pond, and a grassed waterway.

5.2.3.4.1 Effects of Damaged Conservation Practices on Stream and Related Ecosystems

Practices such as diversions, ponds, and waterways are common structures on farms used to prevent soil erosion, contain wastes and runoff, and to provide a supply of water for irrigation or animal consumption. Diversions and grassed waterways are often used together and serve to redirect overland runoff and intermittent streams around valuable cropland and into existing stream channels. Animal waste storage ponds collect waste for long-term storage, and it is generally emptied periodically for application to the croplands. Embankment ponds collect rainfall and runoff for protection against erosion, animal drinking water, and for human recreational use.

Effects of Damaged Conservation Practices on Aquatic Ecosystems

These four practices are typically placed in upland areas, away from stream channels, and should have minimal effects on aquatic communities, even when damaged. A failure in a diversion or waterway would likely result in increased erosion to croplands, as the runoff would no longer be diverted away. These effects may be localized to the damaged structure, as the volumes of water contained or diverted are rather small and may not be sufficient to reach existing waterways. The content of the runoff would be composed of water and sediment, with some contribution from pollutants and chemicals. A failed animal waste storage pond would prove highly problematic, however, as the highly concentrated waste can be devastating on aquatic communities, causing sizeable fish kills and degrading water quality. The failure of an embankment pond could also be more troublesome, depending on the volume of water impounded. The effects could be minimal and localized, or they may more closely resemble the effects seen under dam and dike repairs.

To summarize, *turbidity* may be locally increased during failures, with the possibility of larger effects during greatly elevated flows. *Temperature and dissolved oxygen* are unlikely to see substantial effects. *Pollutants* may become suspended in the runoff, degrading water quality. *Habitat structure* may be adversely affected if erosion or poor water quality negatively impacts aquatic vegetation and habitat. *Channel structure* may be negatively impacted by increased erosion and sedimentation.

Effects of Damaged Conservation Practices on Riparian, Floodplains and Wetland Ecosystems

The general effects on riparian, floodplain, and wetland ecosystems would be similar to those seen in aquatic systems. Normally, enduring conservation practices are located outside of historic floodplains and stream channels, minimizing interactions with those environments. *Bank stability and erosion* may be negatively affected if flow volumes are large, as the riparian vegetation may be damaged. *Vegetative cover and habitat* may be similarly affected. *Water quality* may experience some decreases, especially in cases where animal waste or agricultural chemicals are introduced to the stream channel. *Biota* may be adversely affected by increased erosion or reduced water quality. *Wetlands* may see some change in water flows, in water quality, or may experience some negative effects from sedimentation.

Damaged Conservation Practices at Example EWP Site

There are four enduring conservation practice sites located in the Maury River watershed, all upstream of the City of Buena Vista and on private farms. The four practices represented are: a diversion, a waste storage pond, an embankment pond, and a grassed waterway. Each of these sites is fully functional and has not failed during their lifespan, even in the heavy rains that caused the severe flooding in Buena Vista, VA. Therefore, hypothetical failures have been analyzed with available information about the sites and the possible environmental effects. On each site, there are no wetlands present (except for one wetland upstream of the diversion site {NWI 1999}), no T&E species are known to exist, nor are any cultural resources present.

5.2.3.4.2 Effects of Current EWP Practices to Repair Enduring Conservation Practices

Generally, repair of each of these conservation practices would involve the use of heavy equipment for a short time and require some grading and shaping. Much like floodplain sediment removal, the work is normally completed with very little impact to aquatic, riparian, floodplain, and wetland ecosystems.

Impacts of Repair of Enduring Conservation Practices Project Activities

The primary concern to ecological communities would be prevention of erosion, as the supply of *sediment* and *pollutants and nutrients* would likely be high. Other functions would essentially be unaffected by the restoration efforts, as the work is principally conducted in upland areas.

Repair of Enduring Conservation Practices at Example EWP Sites

Each of the four sites is located within the Maury River watershed and exhibit somewhat similar biotic characteristics. The terrestrial environment is generally agriculture and tends to be constructed outside of normal stream channels. Intermittent streams may be nearby and runoff channels may exist, but the aquatic environment is virtually non-existent on-site. However, each of the sites do eventually empty into stream channels and a typical stream in this area is a stable stream with a fairly high gradient. Many of the streams in the area are intermittent, but some do maintain populations of smallmouth bass and perch in the permanent reaches. Generally, there is a well-developed riparian zone and agriculture near the streambeds tends to be more haying or pasture, reducing the amount of fertilizers and other chemical inputs to the streams (Nye 1999). There are no wetlands at these sites, except for some small wetlands near the grassed waterway site (Flint 1999).

The diversion is found on the Goodbar farm just to the south of the town of Denmark. The area is moderately steep, as it is part of the downward slope from Big House Mountain to Kerr's Creek below. The diversion is located away from existing stream channels and protects the downslope croplands from overland flow of rainfall and subsequent erosion. The water is channeled into a waterway and routed around the croplands.

A likely scenario for the failure of the diversion would involve heavy rainfall and a breach in the diversion, allowing runoff to erode the croplands. Depending on the volume of rainfall, the erosion could damage crops and flood the field below. These effects would probably be localized to the farm, but there are also two homes nearby that might be affected by erosion and runoff flows. Possible effects would include sediment deposition and threats to structures.

The waste storage pond is found on the Martin farm, to the north of the town of Fairfield. The waste from the dairy on-site is collected and dried within the pond before eventually being applied to agricultural fields. There is no outflow from the pond and no stream channels are located nearby, although intermittent portions of Marlbrook Creek are a quarter of a mile away.

If the waste storage pond were to receive heavy rainfall, it could overtop is walls and possibly lead to a breach in the wall of the pond. The waste would flow into and probably damage a pasture and pose a threat to water quality, as the creek may receive some of the animal waste runoff. The impacts would include increased turbidity and threats to aquatic life due to torrents of nutrients and sediment into the stream. Human health would be a primary concern, as drinking water wells may be threatened and fish may not be fit for human consumption.

An embankment pond is located on the Hickman farm, east of Horseshoe Bend in the Maury River. It is in an upslope area that drains into an unnamed intermittent stream and eventually into the Maury River approximately two miles below. It was built where two hills converge and serves to collect the runoff from each, preventing excessive runoff in the pasture and residences below.

If the embankment pond were to fail, the erosion would damage the downslope pasturelands, yards and homes. The pond is fairly small, so effects would be localized to very near the site and any additional damage would be constrained by an old railroad grade located further downslope. As the stream is intermittent, there would be no fish or wildlife effects, but vegetation may be removed by the small scale flooding.

The grassed waterway site is found on the Moore farm to the southwest of the town of Raphine. The waterway routes runoff waters around agricultural land to prevent erosion. The grassy vegetation, a tall fescue, is used to slow flow velocities and prevent erosion of the waterway. The site drains into an unnamed tributary and eventually into Moore's Creek approximately a half mile downstream.

If the waterway were to fail, damage would likely occur to the pastureland in the form of gullies and erosion. The effects would probably be local but there are several roads and houses located approximately a half mile away.

Summary of Impacts on Aquatic Ecosystem Parameters

Minor effects to *sedimentation and erosion*, *pollutants*, and *habitat* and *channel structure* as described above.

Effects on floodplain, wetland, and riparian community parameters

Minor effects to *vegetation* as described above.

5.2.3.5 Restoration Using Improved Alternative Solutions

The implementation of improved alternative solutions would involve one of the practices introduced. A typical site where this practice may be used would be a streambank restoration site. In some cases, NRCS may find that a given amount of protection is sufficient for removing the threat of damages, yet the sponsor may wish to expand the size of the restoration. NRCS would review the plan for environmental and social defensibility, as well as technical merit, and give its approval if warranted. The positive and negative impacts of both the original alternative and the "improved alternative" will be site-specific and those impacts will have been addressed in the section of this document that discusses the impacts associated with that practice.

5.2.4 Impacts of Current EWP Floodplain Easements

Floodplain easements offer a long term, economically, and environmentally sensible solution for floodplain management. A surprising number of EWP sites are frequently damaged, requiring repeated restoration efforts by NRCS. Recurring levee repair, streambank restoration, and debris removal work is common at these sites. Easements will provide both landowners and NRCS a desirable alternative that will reduce threats to the public, protect property, reduce public expenditures, retard soil losses and erosion, allow for natural floodplain function, promote riparian and buffer areas, improve wildlife and fish habitat, and still provide for agricultural use of the floodplain lands.

The impacts of easements can be captured in an analysis of the floodplain parameters. Six parameters have been identified for characterizing the health and functionality of a floodplain (see The Cosumnes River Project, undated). Easements will change *land development and use* to a less developed state, with more natural vegetation and minimal agricultural use. These changes will greatly improve the filtration, water storage, wildlife and fish habitat, and energy dissipation capabilities of the floodplain. *Hydrology* will be improved, as infiltration rates will increase, velocities will be reduced, filtration capacity will increase, and natural flood regimes will be returned. *Vegetation* in the floodplain will benefit greatly from easements, as the land uses will revert to more natural functions, promoting grasses, woody vegetation, and possibly wetland vegetation. This will improve habitat, slow water velocity, and improve infiltration rates. *Habitat*, as discussed, will improve markedly, as terrestrial areas will be revegetated with herbaceous and woody vegetation. Aquatic communities will also benefit, as the easements will improve water quality through better runoff filtration, reduced erosion, and floodwater retention. Easements may create additional habitat for aquatic species such as herpetiles or may open new fish spawning habitat. *Wildlife* will see similar benefits, due to the habitat improvements and the removal of development. *T&E species* will benefit, as floodplains will return to more natural conditions and be more capable of supporting those species.

Effects of Easements on Riparian, Floodplain, and Wetland Ecosystems

Floodplain easements will have impacts on related ecosystems. Aquatic communities will benefit from the improved water quality, reduced floodplain and in-stream erosion, slower flow velocities, and improved flood storage. Riparian communities will see similar benefits, as streambank erosion will be reduced, revegetation will be encouraged, and habitat will be improved. Wetland communities will also be positively affected by improved hydrology, improved water retention, reduced erosion, and re-vegetation. Upland communities will see some benefits as well, as habitat will be improved, erosion reduced, and vegetation will improve.

5.2.4.1 Impacts Under the Easement Categories

The current EWP floodplain easement Program is characterized by having three categories of eligible lands. All sites are agricultural land, but each category has different requirements for the subsequent use of the lands. These categories provide a gradation from more natural easements

(Category 1) to fully functioning agricultural land (Category 3). An easement may be comprised of acreage from one or more categories. Each category is outlined below.

5.2.4.1.1 Category 1 Agricultural Easements

Category 1 easements are considered to be the most natural of the three categories. These easements are for use on lands where vegetative buffer areas are to be restored or where a state or federal T&E species may benefit from restored habitat. Once established, no grazing, cropping or timber harvest is allowed. Floodplain function and habitat for fish and wildlife is to be optimized in these easements.

To the extent possible, these easements essentially return the natural floodplains to the land. All compatible uses are excluded from these properties, removing any agriculture or development. Vegetation will return and floodplain hydrology will begin to exhibit natural functions. This category of easement will return the land to a fully functional natural floodplain more quickly than other easement categories.

5.2.4.1.2 Category 2 Agricultural Easements

Category 2 easements are moderately natural areas and tend to be the more commonly purchased easements. They are characterized as lands that are, or historically have been, at high risk for frequent flood damages. These lands may also benefit wildlife species designated as species of federal concern, such as anadromous fish or migratory birds. Land use on the easement will be limited to compatible uses such as managed timber harvest, haying or grazing. Cropping will not be permitted, and haying and grazing may not be authorized if the easement restoration plan calls for reestablishment of woody vegetation.

Easements created under Category 2 exhibit similar characteristics of those under Category 1. Land use is more flexible, allowing some compatible uses, but eliminates intensive agriculture. This will improve water quality in the aquatic community, floodplain habitat, and hydrology. Natural vegetation will return and wildlife will realize benefits from the improved floodplain community. The critical difference with Category 2 easements is the time required to return to more natural floodplain functions. The inclusion of compatible uses will inhibit some natural processes, the most prominent of which is re-vegetation of woody species and grasses. The slower recovery period will lead to smaller improvements in infiltration, sedimentation, and habitat establishment.

5.2.4.1.3 Category 3 Agricultural Easements

Category 3 easements are the most agricultural in nature and include only good quality farmlands that are subject to periodic flooding. These areas may remain in cropping, timber, grazing and haying.

These types of easements offer the least benefits to restoring floodplain function. By continuing with intensive cropping, natural vegetation is not restored, erosion continues at a similar rate, and no additional habitat is created. A benefit of Category 3 easements is that the capacity for floodwater retention is increased, as these lands are open to flooding, which will reduce flow velocity and improve flood storage.

5.2.4.2 Impacts at Easement Example Sites

Easement example sites are located at Medicine Creek, Missouri, Platte River, Missouri, and East Nishnabotna, Iowa. Rose River has also been included as a hypothetical example of an agricultural easement outside of the Mississippi/Missouri River corridor and provides an example of a very different waterbody. Each site is briefly described below, including an assessment of the pre-disaster and post-disaster natural conditions.

The Medicine Creek site is a frequently flooded tract located in northern Missouri. The property is located between Medicine Creek and Muddy Creek, two heavily modified streams with levees directly adjacent to the streambank for much of the stream length. Subsequently, there is virtually no floodplain remaining in these sub-basins. Riparian areas are narrow and of poor quality. Water quality is also poor, as turbidity and agricultural runoff are common problems in this region. Aquatic habitat is of low quality, as reflected by the fisheries present: channel catfish and sunfish. Two state listed T&E species are in the area, the American bittern and the northern harrier, two migratory birds. No wetlands are on-site but NWI maps (1999) list some wetlands nearby as part of the continuum of riparian and wetland habitat along Medicine Creek. In 1993 and 1995, the levees protecting the site were breached during flooding and repairs were made. The site is now targeted for easement purchase, complete with the installation of a setback levee to reopen floodplain area and create managed wetlands. (Young 1999)

The Platte River floodplain easement site is located in western Missouri at the confluence of the Platte River and the Little Platte River. Flooding is very frequent in this area, with 3 to 4 short duration floods per year in the spring. (Berka 1999) Traditionally, maintaining this levee has taken a great deal of effort. (Howard 1999) The Platte is a typical prairie river, being flat, wide and having muddy waters. Riparian and aquatic habitat is poor, as extensive levees and agriculture have degraded these communities. Fish populations near the site include hardy fish such as catfish and carp. There are no T&E species in the area, but some migratory waterfowl and a significant population of game mammals and game birds are in the area. There is an emergent wetland on the southeast corner of the property that has open exchange with the waterbodies. There are also several wetlands listed nearby and downstream in the Platte River corridor (NWI 1999). During the rains leading to the 1995 flooding, a breach formed along the Platte River portion of the privately constructed levee, damaging crops. The restoration plan for this easement features wetland creation and enhancement. (Berka 1999)

Along the East Nishnabotna, the Riverton easement site is located downriver from the other sites described under debris removal, streambank repair, and levee repair. Expectedly, flooding is frequent and levees predominate the riparian area. The river is typical of rivers in the area, with slow moving, muddy water. As with the Missouri easement sites, the aquatic and riparian habitats are poor and support very little diversity of vegetation or wildlife. No T&E species are onsite or in the area. There are wetlands onsite, along the northern portion of the property as well as across the river in the Riverton management area. The East Nishnabotna River corridor also shows several wetlands and riparian areas (NWI 1999) both upstream and downstream of the site. The constant threat of flooding persuaded the landowner to enter the property into the easement Program, where it will be restored with managed wetlands and turned over to the Iowa Department of Natural Resources for inclusion to the Riverton State Game Management Area on the opposite bank.

Purchasing an easement at the Rose River site would have both beneficial and adverse impacts. As previously discussed, Rose River is a high gradient stream that has naturally reproducing brook trout in its upper reaches. The easement would allow floodwaters to overtop channel banks and increase stormwater detention times in floodplain areas. This would reduce downstream storm surges. Both aquatic and riparian biota would benefit from the establishment of an easement and vegetation establishment. Vegetation would provide food, cover, and detrital material for both the terrestrial and aquatic systems, as well as filter overland flow.

5.2.5 Impacts of Proposed Floodplain Easements

Under the Proposed Action, two changes will affect the operation of the EWP easement Program. First, the classification system for eligible land and easement type (Category 1 to 3) will be revised to include only Category 2 easements. Secondly, the eligible lands guidelines will be expanded to include improved lands, such as housing communities, in order to provide better floodplain function and relocate families and businesses that are under constant threat of flooding damage.

5.2.5.1 Impacts of Changes in Agricultural Floodplain Easements

The elimination of Categories 1 and 3 from the current floodplain easement Program will have both positive and negative impacts. Elimination of Category 1 would likely have adverse environmental effects, as the biotic and hydrologic functions of the easement will be reduced. However, the restoration/management plan will require a buffer strip along the water course and can prohibit any compatible use if a “hands off” state is desired. Category 2 easements, by allowing compatible uses, will not be as effective in reducing erosion, promoting re-vegetation, improving flood storage, and will also take longer to reach a restored state.

Conversely, the removal of Category 3 easements from the Program will have positive effects of the biotic and hydrologic function. By not allowing intensive cropping in the easement area, agricultural runoff will be reduced, habitat will improve, erosional losses will be reduced and floodwater retention will increase.

These effects may tend to be somewhat offsetting, as the most restrictive and least restrictive easement categories are eliminated. However, the benefits of eliminating cropping on easements would likely more than compensate for the lack of the most restrictive category, particularly if such restrictions can be applied if warranted on a Category 2 easement.

5.2.5.2 Impacts of Non-agricultural Floodplain Easements

To date, floodplain easements under EWP have addressed principally agricultural lands and the elimination of future expenditures for flood repairs. With the addition of improved lands easement purchases, inhabited areas that are subject to frequent flooding may be purchased and returned to natural floodplains, removing imminent threats to life and still satisfying the desire to reduce government expenditures for disaster relief.

To illustrate such a purchase, the community of Rocky Run, VA can be used as a hypothetical non-agricultural floodplain easement site. Purchasing an easement would allow the channel to return to its natural route and alleviate much of the erosion that occurs around the sharp bends. Gabion and riprap structures would no longer be needed, and the riparian vegetation would be allowed to re-establish itself. The re-establishment of the riparian vegetation would benefit the biota of the local riparian and aquatic communities by creating more habitat for biota, and providing shade and detrital material for the aquatic system. The established vegetation would also filter overland runoff, which would help reduce nutrient and sediment loads within the aquatic system. Sediment and cobble would continue to be deposited in the lower gradient regions of the stream system. This is a natural process that occurs in high gradient systems. The channel may become braided, or change course depending on the amount and location of debris deposition.

Effects on floodplain, wetland, and riparian community parameters

Bank stability and erosion: Bank stability is no longer of great concern, as stream channel would be allowed to meander and flood stage waters would be common. Sedimentation and erosion are normal processes in floodplains and would be allowed to proceed naturally.

Vegetative cover and habitat: Easements will improve hydrologic conditions for establishing wetland vegetation, as well as encourage other riparian and floodplain vegetation. Habitat will likely become more diverse and foster a wider variety of species.

Hydrology and water quality: Natural streamflow returns full floodplain function. Wetland establishment or enhancement will improve water filtration capabilities and improve water quality. Restriction of land uses will reduce the input of chemicals and other pollutants into the waterbody.

Biota: Improved habitat and hydrology will likely lead to improved conditions for plant and animal species. Widespread improvements to all types of biota, as natural conditions return.

Wetlands: Restoration of natural flooding regime and hydrology promotes wetland formation and enhancement.

5.2.6 Watershed Ecosystem Impacts Under the EWP Alternatives

The changes to the Program described in Chapter 2 will have significant impacts in how future EWP projects are selected, prioritized, and implemented. Subsequently, the impacts to the natural environment will also vary across the alternatives. Below is an analysis of the changes to the Program and the impacts to the biotic communities within watersheds.

5.2.6.1 Alternative 1 (No Action Alternative)

The No Action Alternative would not involve any changes in the current Program. The impacts to the environment would be essentially the impacts described under each practice, in Sections 5.2.2, 5.2.3, 5.2.4, and 5.2.5. Refer to these sections for the detailed discussions on environmental impacts of the current Program.

5.2.6.2 Alternative 2 (Proposed Action)

To best describe the changes in the Program that will come about under the Proposed Action, these fifteen changes (as described in Chapter 3) can be separated into four main groups: Execution of Practices, Easements, Environmental Review, and General Administration. *Execution of Practices* refers to changes made in the way an existing practice is planned or conducted, or the addition of a new practice. *Easements* changes are those that involve easement purchases of all types and changes to easement management. *Environmental Review* refers to activities that help to characterize a particular site or the process of evaluating a given site. *General Administration* changes are simply procedural in nature and have no environmental impacts. Each change will be analyzed further below.

5.2.6.2.1 Effects of Proposed Changes on Implementation of EWP Practices

Eliminating the use of 'exigency' (element #1) will likely have environmental benefits, as only extremely critical situations would be considered under the "urgent and compelling" designation. Previously, many sites were listed as "exigent" that would not qualify under the proposed changes. This may have resulted in restoration work being completed hastily and without full coordination with other agencies, possibly resulting in less than optimal consideration of environmental resources. By making the change from "exigent" to "urgent and compelling," more extensive planning and coordination will likely result in greater environmental benefits.

The *"urgent and compelling" designation* would be added to stress critical repair work (element #2). This could certainly affect the implementation of debris removal, streambank restoration, or any other practice that centers on structural repairs. This change will increase the emergency response nature of EWP and help to protect life and property. This quick response may have undesirable environmental impacts, as there may not be sufficient time for coordination with other agencies and environmental resources may be damaged. However, in combination with the changes described under *improving disaster readiness* (element #6), the risk of these types of damages will be reduced, as training will help NRCS staff to recognize potential problems with T&E, cultural resources, and other resources of interest. The planning and coordination conducted would establish a protocol for ensuring that environmental resources are not overly affected, while not hampering the urgency of the repairs.

Establishing cost share rates (element #4) will likely have positive environmental impacts, as EWP can complete work for sponsors that may not have been able to afford their portion under the previous costshare arrangement. Depending on site-specific information and the type of practices used, benefits may be generated by the restoration.

By *improving disaster readiness* (element #6), adverse environmental impacts may be reduced. Training will increase staff awareness to problem areas with the implementation of the various practices. Pre-disaster planning and coordination will prepare staff for what impacts to expect and allow for proactive solutions to situations that are likely to be encountered. Disaster response protocols can be established to prepare for the possible interactions with T&E species or cultural resources, and plans can be made to preserve those resources while still responding to the urgent need for repairs. It is also possible that NRCS staff could be made aware of areas where these resources are known to exist or how to recognize new occurrences, and rapid response consultations with outside agencies could be facilitated. Pre-disaster planning and training will also inform staff about disaster effects that may be considered beneficial, such as certain amounts of woody debris in-stream or periodic small floods in wetted areas.

Repairs to agricultural lands (element #7) may yield environmental benefits, as these repairs will employ streambank restoration practices described in Section 5.2.2.2, which carry some benefits and some consequences, depending on site-specific characteristics and the type of practice implemented. By repairing or restoring previously untreated land, stream degradation due to disaster impairments will decrease. Also, under the new Program, more environmentally beneficial methods will be available for implementation, which increases the likelihood of positive impacts from this restoration work. However, if repairs are made, the land will likely continue in agricultural use and may contribute to poor water quality and habitat. If repairs were not made to the site, erosion would increase resulting in increased sedimentation.

Limiting repairs to twice per decade (element #8) will likely have greater environmental benefits, as compared to continual repairs. Instead of repairing sites with frequent damage and incurring the financial and environmental costs of both disaster impacts and construction costs, these sites can be purchased as easements. As discussed previously, floodplain easements offer numerous environmental benefits. However, if the site is not entered into the easement Program, benefits may not be realized. The landowner or others may do repair work on their own without proper training and guidance on providing for environmental considerations. If the site is not purchased by EWP nor repaired privately, it may serve as the equivalent of a floodplain easement until some future decision is made on how to proceed.

Enabling single beneficiaries (element #9) to be eligible for EWP work may generate positive environmental impacts, as previously unrestored sites may now be eligible for repairs. Depending on the site-specific details and restoration, benefits may be realized, especially if more natural restoration practices are used. Additionally, current policy may promote single beneficiary site owners to attempt the restoration work on their own or through private contractors. These privately funded repairs would be made without interagency review or consultation, possibly resulting in greater environmental degradation over both the short and long term, as these groups may not have the training necessary to properly address environmental considerations.

Use of *natural stream dynamics* (element #10) may produce locally significant environmental benefits, as a closer approximation to natural stream function will be returned. Other benefits such as improved habitat and reduced erosion will also be realized. These are detailed in Section 5.2.3.1.

Repair of enduring conservation practices (element #12) would likely offer positive environmental benefits, as discussed in Section 5.2.3.4. Repairing damaged or undersized conservation structures will minimize further environmental degradation of downstream habitat. These practices are installed for the purposes of environmental protection, such as the containment of agricultural runoff, erosion control, or animal waste management. Additionally, by requiring that these practices meet current NRCS standards, older or undersized practices will be replaced with more effective ones.

Funding improved alternative solutions (element #13) may yield positive environmental effects, as discussed in Section 5.2.3.5. Supplemental work completed on EWP projects could yield improved water quality or habitat and will be subject to the normal environmental review process under EWP. The substitution of one practice for another could also give rise to significant benefits, especially in cases where the sponsor wishes to employ more natural restoration methods.

Disaster recovery work away from streams (element #14) can lead to environmental benefits. By restoring floodplain deposition and upland areas, the areas below (floodplains, wetlands, riparian zones and aquatic communities) can realize benefits in water quality and habitat, as seen in Sections 5.2.3.2 and 5.2.3.3. Conversely, repairing these sites may discourage easements or other more natural land uses since a landowner can continue to farm the restored land.

5.2.6.2.2 Effects of Proposed Changes on Easements

Improved disaster readiness (element #6), as described above under *Execution of Practices*, may provide additional environmental benefits. In addition to the positive impacts listed, disaster-readiness training, coordination, and planning may encourage further identification of problem areas within the watershed and subsequent easement purchases. This change will offer broader solutions and provide for better coordination of easement purchases.

Limiting repairs to twice per decade (element #8), as presented above, would likely encourage easement purchase.

Simplification of agricultural easement purchase (element #11) would provide some benefits and some detrimental effects, as discussed in Section 5.2.5.1. The elimination of Category 1 removes the most natural easement, as acceptable uses of the land would maximize floodplain function and natural restoration. By eliminating Category 3, the least desirable easement from an environmental standpoint, the consequences of continued cropping on easement lands are removed. The remaining Category 2 easements provide positive environmental impacts but not to the degree of the former Category 1 (by allowing compatible uses), requiring longer timescales for floodplain restoration. In sum, there is no net gain or net loss of environmental benefits

Non-agricultural easements (element #15), as analyzed in Section 5.2.3.2, may provide significant environmental benefits. By removing developed land uses, the easement tract would be returned to a far more natural state and improved floodplain function.

5.2.6.2.3 Effects of Proposed Changes on Environmental Review

Prioritization of funding (element #3) will likely yield some environmental benefits, as potential sites will be evaluated for unique environmental characteristics. Sites with sensitive environmental resources will be restored first, reducing the length of time in a damaged condition. This will likely benefit the environmental resource, as the source of impairment will be removed more quickly and the length of the disturbance minimized.

Defensibility review (element #5) will ensure that social requirements are also met in determining site eligibility. Additional projects may become eligible for restoration due to some socially compelling reason. Based on previous conclusions that restoration may yield environmental benefits, these socially compelling projects are also likely to have accompanying environmental benefits. Additionally, social values may influence the environmental outcome, as a community may request more environmentally beneficial restoration practices or may be unsure of such practices and request armored structures. The former would likely result in environmental benefits, and the latter would likely result in smaller benefits than those that would have been realized by installing the practices originally proposed by EWP.

Differences in Actions at Example Sites Under Proposed Action

A number of the sites discussed in this document may have been repaired differently had the elements of the Proposed Action been available. These are discussed in more detail below. Conversely, some sites involve practices that are not affected by any changes to the current program and would not have been executed any differently.

Rose River, Virginia. It should be noted that the EWP floodplain easements were not part of the Program in 1996 when EWP repairs were being made following Hurricane Fran. Therefore, the current Program alternative as it is now, could have included floodplain easements for the Rose River site through the agricultural area of the site. However, the area of the site along the highway that was riprapped would not have changed. Protection of that section of the highway would still have been provided.
Given that the easements would now be available under the current Program, one alternative for this site would have been the following:

- Purchasing an EWP floodplain easement for the majority of the site; about 100 acres.

- Stabilizing just the 300 feet of streambank with riprap where it was encroaching on the highway.

Several new and innovative practices were utilized at this site that were not routinely used on other EWP sites throughout the state. An example is the use of vortex rock weirs to provide grade control in the stream channel and create riffle-pool structure in the stream for habitat. Class 3 riprap was also used to reinforce the rootwad revetments and ensure their success and long-term stability. Since this site was approximately 1 mile long and the stream structure totally destroyed, it required some special considerations. Design of this site was carried out in cooperation with the VA Dept. of Game and Inland Fisheries and the Virginia Dept. of Forestry to ensure that issues regarding habitat and principles of natural stream dynamics were properly addressed. Using the defensibility criteria being proposed, the innovative practices installed could be justified under any of the three alternatives, but especially under Alternatives 2 and 3.

Long term stabilization was provided using the Conservation Reserve Program, Corps of Engineers mitigation funds for the purchase of trees, and utilization of Trout Unlimited personnel to complete the tree planting, a riparian forest buffer with livestock exclusion. This combination of programs and practices addressed all aspects of long-term stream health for this site. This is a model site where both in-stream and bank stabilization practices were incorporated for a complete restoration project.

Buena Vista, Virginia. It is unclear which additional practices would be needed as part of the proposed alternative. Floodplain easements are not an option within this urban setting because of the large number of houses and limited benefits for such an option. However, there are approximately 10-15 structures located in the frequently damaged areas that could be moved out of the floodplain. The City has applied to FEMA for assistance in relocating or elevating approximately 44 structures within the floodplain. This proposal is still viable but has not been implemented at this time.

The long-term solution for this watershed selected by the city is to construct channel improvements and sediment basins in selected areas throughout the City. NRCS has developed a flood control watershed plan under the authority of Public Law 83-566 for the community that describes the proposed practices that could be implemented. This plan is currently in the review and approval process for OMB and Congress. This plan is an example of what would be proposed under Alternative 3.

It should be noted that this watershed received EWP assistance three times from 1992-1996 because of flooding which severely damaged the entire community. The proposed limitation of 2 periods of assistance in 10 years would affect the EWP Program in this community. Since purchase of EWP floodplain easements does not appear to be a viable option, this community would suffer with the proposed limitation. They have chosen to permanently remedy the situation through participation in the PL 83-566 program. However, there is limited funding under PL 83-566 program and it may take some time to obtain the needed funds. If Alternative 3 were an option for the local sponsors and they can secure additional funding from other sources, they may elect to construct the needed practices using EWP funds.

Rocky Run, VA. This site is located in a rural setting with a small 15-unit subdivision where 8-10 houses get flooded frequently. In the past, the Rocky Run was diverted and re-channelled to allow for the construction of the homes. This stream has jumped the banks several times in the last 10 years as it attempts to return to its original channel. EWP assistance has been provided to restore the channel to its pre-flood re-channeled location. This site is an ideal situation for the proposed alternative where the use of improved land floodplain easements would assist the residents to relocate their homes out of the floodplain and allow the stream to return to its original location. The upstream portion of the watershed is mostly forested and originates in the George Washington and Jefferson National Forests.

Alternative 3 is only applicable in this situation if there is active participation and enforcement of Federal, state, and local floodplain ordinances to prevent future development in the floodplain.

Dry River Dam, Virginia. This PL 83-566 dam was repaired using the Chief's exception to the Codified Rule. If NRCS were to repair this structure under the proposed rule, it would be done the same way. The only other choice would be to breach it in order to prevent a dam failure with potentially catastrophic results. This would negate all the benefits it was originally built to protect. No additional practices would be needed in the upstream watershed since it is forested and flows from the George Washington and Jefferson National Forests. No actions under Alternative 3 are needed.

East Nishnabotna River, IA. Policies under Proposed Action would have had little effect on the execution of the East Nishnabotna restoration work. Soils in this area are highly susceptible to erosion and the channels are constricted by levees. Therefore, the work completed under the current program would remain necessary to remove the threats to the properties. Using the principles of natural stream dynamics may not be effective, as the crops generally are planted directly to the edge of the bank and a meandering stream may destroy substantial amounts of cropland. Easements, on the other hand, might have been a useful tool in mitigating the damages.

5.2.6.3 Alternative 3 Prioritized Watershed Planning and Management

Alternative 3 includes all of the proposed changes described in the Proposed Alternative, while also including *disaster-readiness and mitigation*, *prioritization of watersheds*, and *coordination of disaster planning with other stakeholders*. These three additional elements are linked to one another through a watershed-level management plan, and they can therefore be discussed jointly.

The total watershed management process of prioritization and disaster planning will yield significant environmental benefits. Using a locally-led process, stakeholders will increase acceptance of environmental factors such as water quality and wildlife habitat, as well as ensure that unique environmental values in a particular watershed are considered. By ranking watersheds and focusing disaster planning in high priority areas, the cumulative impacts of the disaster/repair cycle that historically have typified these areas will begin to diminish, as short term solutions are set aside in favor of longer term ones. Easement purchases and other longer term approaches will produce substantial environmental benefits, by changing land uses to restore natural floodplain functions, reducing the amount of recurring restoration work, and introducing management strategies that are more proactive in dealing with natural disasters instead of simply responding to them. The planning process will address much larger spatial and temporal scales for disaster recovery, accounting for natural variability and processes. Although still secondary to the overall goal of protecting life and property, the process will include environmental considerations as important items, promoting improved watershed health in each of the ecosystem types. Cooperation with other programs will also serve to improve watershed health, as actions by the various stakeholders and agencies will be conducted to avoid overlapping or conflicting efforts, and with multiple goals in mind.

5.3 EWP PROGRAM IMPACTS ON HUMAN COMMUNITIES

An assessment of the EWP Program effects identified and evaluated the social, economic, and other "human-based" resource elements of the environment (that is the social environment). The process included developing a meaningful description of the social setting in which the proposed alternatives are implemented, isolating those components that may be affected, and describing the magnitude and extent of anticipated effects.

The potential socioeconomic effects of EWP Program practices in the affected communities are derived by comparing the prevailing social conditions in selected example communities before the disaster (pre-disaster) with those immediately following the event (post-disaster), as well as those following the installation of EWP Program practices (post-EWP). The prevailing social conditions before the disaster are presented by the description of the Affected Environment in Chapter 4 and further detailed in Appendix D for the communities selected as example demonstration sites for EWP Program practices. The potential effects of a natural disaster on the affected communities are addressed here as part of the impact assessment, along with a general review of the potential effects of the EWP Program and a summary description of Program effects at the selected example communities. The comparison of the effects of the EWP Program alternatives is based on a generalization of the effect of the Program alternatives on individual communities and forms the conclusion of this assessment.

5.3.1 Assessment of Human Community Effects

The economic and social effects of the EWP Program are the result of a complex interrelationship between the project activity and the existing social conditions of the affected communities. Each community's response to the changes resulting from the implementation of a particular alternative will be unique. This unique response arises from individual variations among communities in terms of their economic conditions; previous social history, population characteristics, social organization, and the prevailing culture and character.

5.3.1.1 Elements of Human Communities Assessed (Jobs, Income, Services, and Resources)

Social communities are complex and dynamic. The range of potential direct and indirect effects associated with EWP Program practices is diverse. To characterize these impacts in the context of the communities affected, it was necessary to define certain key elements, or social variables. These indicators are logically connected to actions that are a part of the EWP Program alternatives and represent direct and indirect effects of the proposed practices on the social structure and patterns of the affected communities. Changes in these variables as the result of an EWP action would reflect important changes in other aspects of the social structure as well.

Eight specific variables serve as indicators of potential effects on the socioeconomic environment from the EWP Program. The eight are grouped into three categories:
- Effects on business and the local economy;
- Effects on infrastructure, public health and safety, and community resources; and
- Effects on community, structure and social patterns.

Business and the local economy includes the potential effect on employment and income in the community as well as changes in the value and quantity of natural resources (land) available to the community that may serve as a source of investment or raw material input to production. Effects on the *infrastructure, public health and safety, and community resources* relate to elements of the community infrastructure (utilities, energy, waste treatment, transportation, etc.), services (police, fire, hospitals, social assistance), physical property (houses, commercial and industrial buildings, other structures), and resources (cultural, educational, recreational, aesthetic). *Community structure and social patterns* are a function of the demographic composition of the community, existing land uses in the adjacent and surrounding community, and the characteristic patterns of interaction and attachment to the community that may exist among residents.

An impact, or effect, is defined as either a quantitative or qualitative change in some aspect or characteristic of the environment. This change is evaluated in terms of its potential (on balance) to result in an adverse or beneficial effect on the human social community. The magnitude and extent of the potential effect is a function of the intensity and duration of an associated activity, and the extent of the total land area or size of the community segment affected by the action.

5.3.1.2 Assessing the Effects of EWP Program Projects Nationally Using Typical Rural Communities

For the programmatic assessment of the proposed alternatives, the socioeconomic environment is defined as a generalization of the social characteristics of the communities addressed by the EWP Program. These characteristics are selected on the basis of their relevance to the assessment and comparison of the proposed Program alternatives. They reflect the anticipated effect of the Program in addressing the specific threat to life and property associated with a natural disaster.

Implementation of the selected EWP Program practice itself, however, will have additional consequences for the local community. These effects reflect necessary activities associated with the implementation of the proposed practice in the local community. Examples of these activities include those associated with Program expenditures, changes in land use or function, or the acquisition of an easement. Therefore, the potential effects of the EWP Program include both the outcome of the Program activity as it relates to the alleviation of a potential threat and those associated with the implementation of the proposed practice itself. These effects are demonstrated by the examination of specific EWP Program project impacts in selected example communities.

The assessment of the socioeconomic effects of the EWP Program practices focused on six communities selected as examples of each of the five rural community types identified in Chapter 4 (Section 4.1.3). Three of these communities also were the subject of the cumulative effects assessment described in Section 5.4. As described in Chapter 4, effects are found in both rural and metropolitan areas. One of the communities selected for this assessment, the Boise Hills community, was selected because it also demonstrates potential downstream beneficial effects in a major metropolitan area, in this case the city of Boise.

Floodplain easements represent a categorically distinct option that would not be appropriate to all settings; therefore, a separate analysis was conducted for the socioeconomic impact of easements. A sixth community, considered a plausible candidate for the potential use of the easement option, was included in the assessment along with the original five communities. Table 5.3-1 summarizes the impact assessments that were conducted for each of the six sites described in the affected environment section of Chapter 4 and in Appendix D

Table 5.3-1 Assessments Conducted for Selected Sites

Community	**Bethel Road, GA**	**Buena Vista, VA**	**Boise Hills, ID**	**Shenandoah, IA**	**Rocky Run, VA**	**Rose River, VA**
Community Type	Multiple farms	Independent city in rural area	Rural portion of metro county	Incorporated rural community	Residential cluster	Multiple farms
EWP Practices	Debris removal	Debris/ cobble removal	Critical area treatment	Levee repair	Gabions and riprap	Debris removal
Socioeconomic Impacts Practices	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic Impacts, (Hypothetical) Easements	No	No	No	Yes	Yes	Yes
Cumulative Impacts, Watershed	No	Yes	Yes	Yes	No	No

5.3.2 Effects of Natural Disasters on Human Communities

The general social effects of a natural disaster (and also the primary criteria for defining a natural event as a disaster) are that some level of stress is placed on the economic, social, or physical infrastructure of a given community. This stress results through the direct damage or destruction of a given resource or through the creation of a continuing threat to life and property. The level of stress in these situations normally grows beyond the capability of existing institutional structures, social services, and support networks to cope, to absorb the change, or to adapt to meet future contingencies.

The specific consequences associated with a natural disaster, as well as the prevailing conditions of the individual communities affected, are unique to each event. No uniform or codifiable set of socioeconomic effects exists for natural disasters (Vogel, 1999). However, some general areas of impact can be defined. These effects are the primary result of the determination of a potential threat to human life or the potential, or actual loss, damage, or destruction of property that are the consequence of a natural disaster. They include the potential for change in the local or regional economic structure or the damage, as well as the destruction of infrastructure, housing, or other community resources.

5.3.2.1 General Discussion

In addition to the direct physical effects of a natural disaster, the patterns and structures of social life within the community may be altered. Dislocated businesses or services may disrupt neighborhoods and communities. Local sources of employment and income may be temporarily or permanently lost. Disasters also can affect the appearance, quantity, or value of land available to the community as a source of current and future investment or as the source of productive resources. Where public revenue is required for disaster response and recovery, other socially beneficial or valued programs (such as education, or recreation) may be denied funding because the money has been spent on disaster recovery (Myers, 1997). Other effects may include the temporary or permanent disruption of services to the community or the destruction of important cultural or social resources.

For individuals within the community, increased levels of tension, anxiety, and interpersonal conflict are evident (Morris-Oswald, 1997). The immediate or long-term evacuation of residents during reconstruction may require the inconvenience of living in temporary housing, sometimes far removed from the permanent place of residence. An additional source of strain for both business and residential property owners results from the time (normally uncompensated) required to clean up and repair damage or from the long-term effects of damage that is not repaired. (Cushing, 1999).

The major sources of effects on individuals and communities resulting from a natural disaster can be grouped into the impact categories noted above. Table 5.3-2 presents a summary overview of the consequences of a natural disaster for the human social community.

Table 5.3-2 Summary of Socioeconomic Effects of Natural Disasters

Community Aspect	Potential Effect
Economic Structure	
Employment and Income	Loss caused by threat or damage to or destruction of individual firms, agricultural production, recreational, or other economically productive resources. May also be indirectly affected by changes in the cycle of business activity, alterations in supply demand relationships, or a change the relationship with external firms or market sectors.
Value and Quantity of Natural Resources	Change in quantity and condition of the land and associated resources caused by loss or damage may affect both current economic value (represented as a capital loss to its owner) or its desirability as a source of future investment (especially by outside entities), potentially threatening community viability and future growth.
Infrastructure and Resources	
Infrastructure	Damage to the essential elements of community infrastructure (i.e., water supply, waste treatment, transportation, or power systems) may have both short-term consequences for the conduct of social life and long-term implications for public revenue expenditure for restoration.
Property	Loss of residential housing and other important economic or culturally significant buildings may affect the immediate quality of life in the community or in the long-term, may represent an irreplaceable loss.
Public Health and Safety and other Community Resources	Indirect effects on the community include increased demand on public revenue and other resources to assist in post-disaster recovery. Other consequences may include loss or impairment of emergency, increased risk to public health, social assistance and basic services. Aesthetic, recreation, and other resources also may be affected.
Social Pattern and Structure	
Demographic Composition	Change in the size and composition of the local population may result from the loss of housing resources and out-migration in response to a perceived continuing threat or to the negative perception of long-range desirability of the community.
Land Use	Potential threat or actual loss may alter existing or planned uses of certain properties essential to community life or economic production. Alteration of physical appearance may diminish the value of adjacent or neighboring properties.
Community and Neighborhood Social Patterns	Loss or damage to property may result in the disruption of residential networks important to the social life of the community. Loss may also include culturally important facilities such as churches, schools, and community centers, as well as commercial and retail outlets for basic services.

5.3.2.2 Summary of Disaster Impacts in Six Example Communities

Each community represented to demonstrate the socioeconomic impacts of EWP Program practices in Section 5.3.2.2 has been affected by natural disasters associated with the regional watershed. Although short-term impacts normally are the greatest concern for local residents and business entities, these impacts also may have long-term consequences if repair and restoration are not accomplished. The affected areas are primarily rural in character, therefore, impacts on agricultural areas of the watershed region are especially important. In several cases however, the effects of watershed disasters also extend to large population centers in nearby urban and metropolitan communities. Table 5.3-3 presents a summary of the post-disaster impact of the natural disasters occurring in each community selected to demonstrate socioeconomic impacts.

Table 5.3-3a Summary of Post-Disaster Socioeconomic Effects on Rural Communities

Bethel Road, GA	Buena Vista, VA	Boise, ID	Rocky Run, VA	Rose River, VA	Shenandoah, IA
Employment and Income					
Agricultural production from two private farms lost	Potential loss of retail and manufacturing employment	Income from recreational and agriculture uses; threat to central city	Affected areas contain no economically productive facilities	Loss of production from two private farms and pasture	Potential loss of retail and commercial income
Natural Resources					
Diminished land value due to physical and visual damage	Decreased attraction for industrial and residential development	Diminished value of adjacent areas; potential threat to planned development	Value of residential properties diminished	Diminished land value due to physical and visual damage	Value of land area for development and other uses diminished
Infrastructure					
Two public roads and storm drainage structures	No disruption of services; some effect on roadway and other facilities	No significant disruption; potential threat to water quality, public roads, storm drainage	No significant disruption, some potential threat to local transportation	State Road protected with riprap at lower end	Local airport, public highway; impaired wells contaminated or collapsed
Property					
Two private dwellings and associated farm outbuildings	Residential areas and two manufacturing facilities are threatened	Limited damage from fire; flood significant threat majority of community	Fifteen residences damaged or threatened	Two residences, state road, farm buildings, and other structures	Residential areas, retail, and commercial structures affected
Public Health and Safety, and other Community Resources					
No major impact, some loss of visual quality	Visual quality of the affected area compromised	Loss of major recreational area; viewshed destroyed	No major impact to resources	No significant resources; visual quality compromised	Major effect on recreational and other significant areas

Table 5.3-3(continued) Summary of Post-Disaster Socioeconomic Effects on Rural Communities

Bethel Road, GA	Buena Vista, VA	Boise, ID	Rocky Run, VA	Rose River, VA	Shenandoah, IA
Demographic Composition					
No major change to current configuration	Slight decline in population; potential for new growth threatened	No major effect from fire; flood threat affects older neighbor-hoods, suburban areas	Potential dislocation of approximately 42 individuals	No major change to current configuration	Local residents displaced or threatened by flood damage
Land Uses					
Existing land uses threatened	Potential threat to future planned uses in the urbanized areas	Recreational uses of burned area lost; threat impedes regional plan	Threatens residential use of land in the immediate area	Existing land uses threatened	Potential threat to current uses and future development plans
Social Patterns					
No major change to current configuration	Potential disruption of neighborhood; viability of community threatened	Indirect effect from threat to neighborhood posed by subsequent flooding	Disruption of neighborhood; potential threat to viability of residential community	No major change to current configuration	Potential for disruption of residential networks and neighborhood patterns

5.3.3 Impacts of EWP Program Projects on Human Communities

The rural quality of the communities potentially affected by EWP Program activity introduces certain special characteristics unique to the rural environment. Affected communities generally are small, with populations of less than 10,000. In many cases, they consist of unincorporated villages, hamlets, and housing clusters that may lack a distinct economic base. In some cases, these communities may be integrated economically with nearby metropolitan centers or with the regional economy, while others may be self-sufficient and isolated. In general, characteristic patterns of community life, the presence of shared values and information, and a sense of community identification define each of these communities in a uniquely rural context.

The resources, institutional structures, and service delivery mechanisms of these small communities are often smaller-scale, more informal in structure, and more diversified in function. Correspondingly, local resources in the form of land, employment opportunities, natural qualities, cultural features, and the quality of social life may be more important, more highly valued, and correspondingly more difficult to replace if lost or damaged, either by a natural event, or in the process of eliminating the threat to life and property that may result from a future disaster event. In many cases, there may not be an identifiable community center where public activity (commercial, administrative, and recreational) is carried out, or specific boundaries that define the parameters of the community.

5.3.3.1 General Discussion

The socioeconomic impact assessment addresses the relationship of each impact element to the EWP Program from two perspectives. The first is the effect of the Program as it relates to the elimination of the direct or potential effects of a natural disaster by reducing the potential risk to some socially important or valued aspect of community life (such as human health, or the protection of homes, businesses, or some other important social facilities within the community).

The second is related to the requirements of the proposed EWP Program practice itself, including construction activity or physical structures required for the immediate protection of property, or the purchase of easements or title to land as a means of eliminating the object of the threat instead of the threat itself. Capital expenditures, additional employment, additional land and facilities associated with construction, physical alteration of the environment, or fiscal and administrative requirements to be met by sponsors, property owners, public entities or other elements of the community, may be considered. The EWP Program requires that the effect of the proposed action must be acceptable to the individual property holder and the community as a whole (NRCS, 1999).

5.3.3.1.1 EWP Program Impacts on Business and Local Economy

The extent of potential effects of the EWP Program is related to the potential for the reduction of risk to human health and property or protection of the value and utility of existing land, structures, or other facilities. Also related is the value of economic contribution or loss (e.g. additional employment or income) that may result from EWP Program activity in the local community. It is reasonable to assume that the proposed Program alternatives will have the potential to affect the local economic climate of participating communities by influencing the type of practice implemented and the manner of its implementation.

The purpose of assessing potential economic effects is to estimate changes in employment, income, and levels of business activity that may result from EWP Program activities (Leistritz, 1994). Direct effects are those immediately attributable to the disaster itself, such as loss of life, injury, capital losses, crop damage, damage to public and residential structures. Indirect consequences, which follow from those immediate impacts, include such changes as interruption or alteration of business activity, changes in employment caused by a loss of capital, or changes in regional supply relationships. Two primary circuits of capital are important, one involving the circulation of capital into and out of the production/consumption cycle, and the second involving capital investment in land and infrastructure (Gottdiener, 1994).

Employment and Income

Local industry, and therefore, employment or income, may be affected by EWP Program projects thorough the expenditure of project funds, hiring of local residents for proposed work, or by noise, visual, or other impacts that interrupt business activity. To the extent that money is spent in the local community in support of the proposed action, the local trade and service sector of the economy can be expected to experience some direct and indirect increase in employment, as well as additional income from sales of products and services. This cycle of spending is the basis of an economy's multiplier effect and is predicated on the assumption that an increase in external activity (i.e., sales outside the community, in this case, in the form of contract services) will create a corresponding and amplified economic effect within the community.

The magnitude of the change is dependent on what proportion of the Federal share of EWP Program funding is actually spent locally with each new round of expenditure and what proportion is lost in the form of taxes, savings, or the purchase of products and services that are not available within the local community. Community resources flow very quickly from communities where there are limited institutions and resources to meet the requirements of local residents (LaMore, 1995). Indirect effects may include the creation or expansion of local businesses or the creation of secondary or indirect employment as a function of direct expenditure and employment. In contrast, monies or services-in-kind offered as the community share of the project may offset the local gain in the economy from Federal funds.

Because of the competitive nature of contracting operations for the EWP Program projects, and the limited resources available in most of the target communities, much of the work associated with an EWP Program project will likely be contracted to firms outside the community. As a result, much of the dollar value of a project will be lost to the community. It is reasonable to assume, however, that some increased revenue will be available to the local community in the form of money spent by temporary workers, through employment of available local workers, or by contracting portions of projects to local firms that may have the necessary resources to perform certain parts of an EWP Program project.

Changes in local employment and income also may be a result of restoring impaired facilities and resources. Smaller rural communities tend to be net exporters of labor, either to the surrounding regional area, or by commuting to nearby metropolitan centers of employment. Indigenous employment in sectors such manufacturing, agriculture, services, or construction also is important to the local economy. To the extent that EWP Program practices restore the economic productivity of land and associated facilities that might otherwise be destroyed or abandoned as a result of a natural disaster, a beneficial impact to the local economy is realized.

Value and Quantity of Natural Resources

Natural resources, defined economically, refer to the stock of environmentally provided assets (land, soil, forests, minerals, water, fauna, wetland areas, etc.) that represent the useful materials that are the raw input or consumable products of human production. The quantity and condition of natural resources are both important. In addition to their utility value, these assets also represent a source of investment income to the current owner and a source of future investment in the community by outside sources. Natural resource assets may be damaged either by the disaster or by implementation of the proposed EWP Program practice.

Protecting property such as land for investment becomes an important beneficial impact of the Program, while potential loss of productive agricultural, commercial or residential property, or diminishment of its attractiveness, may represent a serious negative impact, even though the overall benefit of the project is positive. A change in the quantity or condition of land may decrease agricultural production and will affect the local economy. For many communities, potential income from recreation and tourism, and additional income realized from a growing base of retiree in-migration may be an important contribution to the local economy.

The value and quantity of natural resources may change with the restoration or improved condition of land, the damage or destruction of land during construction, the removal of threat to a designated property, or the removal of existing productive (or residential land) from the economic base through the exercise of a floodplain easement on the property. An easement will permanently remove land from production or investment, thereby diminishing the available capital stock of land as part of the economic base of the community.

Removing a potential threat to the land or property may increase its value, or at minimum, restore it to its original value before the disaster. With residential property, Fridgen and Shultz (1999) found that flood risk was a significant factor in the valuation of residential property. Several studies have found that floodplain property values are lower than those land values outside the floodplain (e.g., Damianos and Shabman, 1976; Donnelly, 1989), while others found no variation in value. Two studies concluded that residential land values within floodplains were nearly 12 percent lower than land outside the area (Holway and Burby, 1993). Similar results were found for vacant lands.

Correspondingly, the property itself and any adjacent properties may be subject to increased value and subsequent development pressure should the immediate threat of a natural disaster be removed. Early studies of flood control programs indicated that, “for every six dollars in potential flood damage savings, at least five dollars was lost through increased floodplain occupancy” (Moore and Moore, 1989). Much of the early justification for funds was due to eventual habitation of these areas. However, studies conducted on the values of land protected by such programs and practices as the EWP Program implements have varied results.

5.3.3.1.2 EWP Program Impacts on Infrastructure, Public Health, and Community Resources

Although economic factors are a primary aspect of the decision to implement one or another of the Program alternatives, certain social and community factors also become important. The characteristics of the proposed project may have the potential to impair or disrupt the local community through changes in the associated property, infrastructure, public health and safety, or other resources important to the local community. These changes, either beneficial or adverse, can substantially alter residents’ perception of the quality of life in the community or threaten the continued viability of the community itself.

<u>Property</u>

Changes may result from the removal or perpetuation of a threat to specific properties, the restoration of damaged or unusable properties to productive use, or the exercise of a right of way or easement for the construction of a practice. Using a floodplain easement as a mechanism to restore watershed areas to a much better natural condition is another area of potential influence. Removing a threat contributes to the protection of valued structures and community settings, thereby enhancing the character and desirability of the community.

The potential loss of a structure due to an easement or failure to restore has the potential to disrupt local social life and may have an adverse impact on important cultural events. Apart from direct project-related actions, the effect of a change is also influenced by the character of the community setting, the presence of informal support systems and mechanisms, the current value and age of the structure, and considerations of existing vacancy rates.

Infrastructure

EWP Program project activities have the potential to increase or decrease the requirements for basic infrastructure services within the community. Elements of the local infrastructure can be jeopardized by the existing watershed impairment, if not removed. Likewise, the requirements of the project (water, land, transportation, and temporary workers) may place additional stresses on existing infrastructure resources or, as in the case of local transportation, block or obscure essential services. Infrastructure impacts on the cost and quality of public services has an influence on residents' sense of well being and satisfaction with the community (Burdge, 1995).

The existing and future water supply, municipal waste treatment and discharge, sewer lines, power lines and substations, natural gas pipelines, or transportation facilities are of concern both for the comparison of EWP Program alternatives and for the impact of specific projects on participating communities. Potential demands that are increased beyond existing capacity or service that is impeded will have an adverse impact. Conversely, where project actions restore or protect infrastructure resources, a beneficial impact may be offsetting.

Community Resources

The availability of social services such as those related to public health and safety, emergency response, social assistance, and other basic services are especially important to the maintenance of the social life of rural communities. However, they may be either temporarily or permanently affected by the implementation of EWP Program practices. Similarly, community resources, cultural, educational, civic, or recreational and aesthetic opportunities may be lost or impaired. Both the existing watershed impairment and the project efforts to restore the watershed and reduce the existing threat to life and property may result in a change.

The most important effect of a natural disaster is to increase the level of risk to the life and health of the residents of the affected community. EWP program measures have the potential to reduce the potential level of risk both directly through the repair and restoration of damaged land, and the corresponding removal of threat to life and property, and indirectly by restoring the operation of local public health and emergency response services. In addition to the direct threat to residents or users of affected properties, natural disasters may cause impairment to the normal operation of public health and safety systems. EWP practices that protect vital infrastructure, or transportation routes, hospitals and other medical facilities have the additional benefit of contributing to the general health and welfare to the community at large.

Apart from direct impacts on the land and physical structures, project-related employment may affect local demand for basic services such as shopping, food, and entertainment, as well as for necessary social services, public assistance entities, and educational or social support services. Other concerns may exist for potential changes in local government services or anticipated increases in local tax rates to provide needed temporary service or the sponsor's share of proposed projects. The ability to provide these services affects the availability of public capital for investment in social development. Sensitive local buildings and structures such as museums, churches, cemeteries, theaters, or nursing homes, public housing, or retirement facilities also may be affected.

One of the key components of quality of life for many people is the availability of open space, parks, and recreational facilities (Hollis, et. al., 1999). The level and reliability of service, as well as the level of satisfaction of local residents may be directly affected. Either the beneficial removal of an existing threat, or the requirement to alter the quality or appearance of a viewscape or other facilities such as trails, parks, or natural recreation features such as rivers or lakes, may have an impact. For many communities, these resources represent a source of economic income from tourism as well as a recreational resource for local residents.

Where community facilities are protected or the previous use of a damaged facility is restored, a beneficial effect of the program can be anticipated. The potential for a negative impact also exists as a result of the potential increased demand on or impairment of these resources that may be related both to the manner of the project execution or to project activity in the form of the proposed practice at a specific site. Questions related to who bears responsibility for the cost of maintenance or repair, and to the source and availability of additional resources necessary to restore damaged services or to create additional service capability, become important.

5.3.3.1.3 EWP Program Impacts on Community Structure and Social Patterns

Determining the potential effect of the program on the character and social structure of the local community depends on consideration of potential changes in a number of social characteristics. For some projects, construction-related activity, the protection of land through installation of protective mechanisms, or the exercise of floodplain easements has the potential of affecting the demographic composition of the local community. Also important is the potential to disrupt historic or established neighborhoods within the community, unique residential networks, or communities (Cantor, 1993).

Demographic Composition

Population-related consequences of the project on the local community may include changes in the size, age, racial and ethnic composition, poverty and income levels, or residence patterns of the community. Effects may be short-term in the case of temporary workers present in the community during the construction phase of the project, or the temporary displacement of local residents. Long-term effects may result from permanent in-migration or out-migration in response to project-related activity. These changes may indirectly influence other aspects of social life, including the community setting and character, the size and structure of local government services, the availability of housing and community services, and alterations in the patterns of natural resource use. Of particular interest for the implementation of EWP Program practices is the presence of sensitive populations in the immediate area of the project.

Land Use

Changes in land uses resulting from EWP Program implementation are possible where potential threats are eliminated, previous land uses are restored, or alternative development options change the attractiveness of existing land. The magnitude of any effect will be influenced by certain community factors such as the general character of the community setting and the importance of the previous land use (recreational, income producing, residential, open space, etc.) to the social life of the community or the maintenance of the watershed.

At the site level, the physical alteration of the environment may affect visual appearance or other characteristics, altering the suitability of the land for certain uses. Alterations to the land used as a staging area or to provide access to the project during construction or for subsequent maintenance requirements, must be considered in addition to any new changes to land uses. Exercise of a floodplain easement affects the land's potential use irrespective of any other physical change.

On a large scale, the EWP Program may affect several pieces of land use regulation: local zoning, comprehensive planning, farmland preservation, and the control of urban development. Each element can be addressed on the local level through land use planning mechanisms already in place. While Alternatives 1 and 2, discussed in Sections 5.3.5.1 and 5.3.5.2, address more localized land use decisions such as zoning ordinances and comprehensive planning, Alternative 3 encompasses land use decisions and planning tools on a larger scale. See Section 5.3.5.3 for a discussion of those decisions.

Local land use decisions that are applicable to EWP Program components differ, encompassing legislative, administrative, and quasi-judicial ones. Administrative decisions require objective standards for decision-making and can be made by a planning officer of the jurisdiction. A legislative body, such as a County Council, has the final power to make policy and zoning decisions. Their decisions are subjective and can be influenced by politics. Quasi-judicial bodies such as a board of adjustment will hear facts about a case, often an appeal of a zoning decision, and make a judgment. The type of land use decision will dictate the amount and type of evidence and information needed to make local decisions. (Callies et al, 1994)

The EWP Program practices would be closely related to current zoning within the affected community. One commonly occurring example is that of a floodplain ordinance regulating development within a designated area. This ordinance could be part of the local zoning code or may exist as a separate regulation. Floodplain ordinances are often based on FEMA-delineated floodplains and floodways. The ordinances usually prohibit all development in the area, or they impose building elevation requirements for structures. EWP Program components should be checked against existing regulations to identify potential conflicts.

Land use and comprehensive plans also are important considerations for EWP Program coordination. The practices should be compatible with the long-term vision of the community's spatial structure. The standing comprehensive plans could influence EWP Program decisions regarding particular practices in designated areas. The need to demonstrate how a development application follows the intent of the comprehensive plan is required in many legislative and quasi-judicial decisions.

The legality of floodplain ordinances has been challenged in takings claims. Regulatory takings are those where a land use regulation is so restrictive that it constitutes a taking of private property. This can sometimes be a concern with easements as well as any land use regulation. The following case is an example of a land use regulation challenged on its 'over-regulation'.

In *Responsible Citizens v. City of Asheville*, the validity of the floodplain ordinance was upheld. The court used two tests for determining if a taking had occurred through the enactment of this floodplain ordinance. First, whether the end goal of the floodplain ordinance was within the police power granted to the local government, and second, whether the means by which this goal was obtained was reasonable. The court found that protecting the public safety is a permissible objective, and preventing floodway obstructions and requiring flood-proofing of structures is a reasonable means of achieving this (Owens, 1999).

Community Structure and Social Patterns

Project-related effects might result in the breakup or isolation of specific neighborhoods, affecting the sense of community and disrupting important networks that support local residents. Disruption may result from the maintenance of important social networks and from necessary economic functions (such as the barter exchange of construction or mechanical skills among neighbors, or the exchange of services like transportation or child-care). Also potentially affected may be significant cultural and social institutions such as churches, social centers, public buildings, or unique structures that have special meaning to local residents even though they are not specifically eligible for consideration as historic or cultural resources. Consequently changes in the patterns of interaction of local residents can occur (Gramling and Freudenburg, 1992).

The potential for relocation or temporary dislocation of significant segments of the population, either because of land requirements for new construction or easement purchase, also represents a significant potential for disruption to local community life. It may also threaten the continuing viability of the community, especially in smaller rural areas. Land acquisition may disrupt social networks, both for families that may be relocated and for those that remain in the affected area. Burdge (1987) found that the resiliency of large family based communities was lost when the families that comprised the community lost land or were forced to relocate.

A high level of social cohesiveness often characterizes rural communities. Cohesion in this sense refers to the forces or attractions that hold members of a community together and is based on the quality of social life within the community. Anything that may decrease the desirability of the community itself, or the desirability of associating with or identifying with the community, may have a detrimental effect on the level of cohesion and the corresponding sense of community (Finsterbusch, 1980). Local change, the loss of stability, or a sense of traditional identity can significantly affect this level of cohesion, especially in small, traditional, rural communities. Correspondingly, the protection of these elements may be considered a uniquely beneficial impact, depending on the specific characteristics of the individual community.

5.3.3.1.4 EWP Program Impacts on Environmental Justice

Executive Order 12898 (1994), "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations", requires that Federal agencies consider as a part of their action any disproportionately high and adverse impacts on minority or low-income populations. This consideration has three components: 1) a demographic assessment to identify minority and low-income communities that may be present in the affected area; 2) an integrated assessment of disproportionately high and adverse impacts on these communities; and 3) the increased involvement of the affected public in decision making and potential mitigation strategies (Wilkinson, 1998).

A primary objective of the EWP Program is its equitable administration: the accessibility of information about the proposed Program; the availability of project assistance to individuals and local communities; and the consequences of project implementation. Of essential concern is the identification of those who benefit and those who are disadvantaged by the implementation of one or another of the proposed alternatives and whether the individuals or populations involved are representative of either a recognized minority or socioeconomically disadvantaged (poverty) status. Also of concern is the presence or absence of small, local businesses and small farm operators, especially minority contractors who may be present and who could perform required EWP Program construction work.

The potential effect of the proposed alternative on limited-resource farmers, ranchers, and communities is another area of concern. Limited resource farmers and ranchers are defined as those having a distinct disadvantage in obtaining USDA program assistance. (NRCS 1998). Limited-resource communities are defined as those where average property is less than 75 percent of state average values and where the average per capita income for the last three years is less than 75 percent of the national average or where current unemployment is double the national three-year average. (USDA, 1988). The capability of the community as a whole to provide local sponsorship and to absorb the costs associated with sponsorship is also important considerations in determining local effects.

5.3.3.2 Impacts in Typical Affected Communities

To demonstrate the potential socioeconomic effects of the EWP Program at the community or site level, an assessment was made of the potential impact of the installed practices on six example communities. These communities were selected to reflect the more important characteristics associated with each community type and represented a varied sampling of EWP Program installed practices, (e.g., streambank stabilization, debris removal, re-vegetation, levee repair,).

For purposes of the demonstration assessment, the result of the no action (Alternative 1) is described for each community to serve as a basis of comparison with the other two alternatives. The results of the analysis from each of five communities, while not strictly a representative sampling, can be generalized to other communities of the same type. Under similar conditions, the anticipated effects of EWP Program actions would be similar to those identified here for the six communities.

In general, the primary effect of EWP Program practices in the watershed communities selected for this assessment is evident in the beneficial aspect of repairing and restoring the affected area to its pre-disaster condition and use. Protected land areas are regained by the community as part of the economic base or as residential, investment, or natural use areas. From a programmatic perspective, the primary consequence of EWP Program action is to mitigate the effects of natural disasters in the subject communities. This mitigation often results in a potential for increased human habitation and higher levels of social and economic dependence on these disaster prone areas of the watershed region. An adverse effect on the associated watersheds can be anticipated where increased development results in an increase in urban or agricultural runoff.

5.3.3.2.1 Effects on Business and the Local Economy

For each of the six sites included in the assessment, direct effects on the local economy resulting from potential employment or project expenditures in the local community are minimal. With the exception of the Boise Foothills project, the scope of the EWP Program practices in the other five communities was relatively small and the time required for the construction phase of the project relatively short. The smaller community size also limited the institutional and commercial entities that might be present to supply goods and services to the projects, thereby limiting the communities' ability to absorb project expenditures. This is especially true for the Rocky Run community, which is entirely residential and for the smaller, single, or multiple-property projects such as Rose River or Bethel Georgia. However, some demonstrable income may have been created in the larger community settings such as Buena Vista, VA and in the Shenandoah, Iowa projects. The larger effort in the Boise Foothills project, in conjunction with the increased economic capacity of the larger community, enhances the ability of the community to capture additional income and employment from the project.

The primary benefit to each community examined is related to the effect of the installed practices in restoring or protecting the existing value and utility of natural resources, in this case the quantity and appearance of land and other resources in the community. In the case of the smaller projects, this benefit is confined to one or two agricultural properties, whereas the effect on communities such as Buena Vista, VA and Shenandoah is experienced more as a benefit to the entire community. This is especially true in the case of the Boise Foothills where the outcome of the project provided a significant benefit in restoring the value of the mostly residential and commercial land adjacent to the burn area. The project also provided additional protection to the central business district of Boise. In all cases, the land disturbed or permanently withdrawn from the community base was minimal compared to the total land area available. Most of the disruption to land was temporary.

For the communities affected, minority or socioeconomically disadvantaged residents do not represent a substantial portion of the affected populations. However, because of local concern for the physical appearance and land requirements associated with the Boise Foothills project, some concern may exist. In some cases, the visual appearance and character of more remote, rural areas may have been compromised to provide increased protection and remove the potential threat to residential and commercial neighborhoods in the close-in suburbs and downtown core. A potential for a disproportionate effect on minority and small landholders in the Eighth Street Fire community is therefore a consideration. The presence of minority populations in the area is not high and examples of a disproportionate impact are not evident. The project also was preceded by a number of public meetings to address local residents' concerns.

5.3.3.2.2 Effects on Infrastructure, Public Health and Community Resources

With the exception of the Rocky Run, VA and Rose River, VA communities, all remaining communities included in the assessment experienced some benefit from the protection or restoration of infrastructure services. Benefits included restoration of stormwater drainage and improved flood control, water quality improvements, and restoration of secondary roads. In the East Nishnabotna, IA watershed, where EWP Program activity is complimented by other flood-control and disaster-recovery efforts, the protection of wells and sewers represents a major contribution of the Program. EWP Program activity in each of the six sites was not significant in impairing or disrupting existing infrastructure elements.

In all cases studied, some benefit from EWP Program activity extended to elements of property. At three of the sites, Rose River, VA Shenandoah, IA and Bethel Road, GA, the primary protection was extended to one or two residences in low-density rural/agricultural settings. In the case of Rocky Run, VA and Buena Vista, VA however, multiple residential properties and some commercial residences were protected. As a result of the program, the overall risk to the health and safety of the residential population was significantly reduced. In Rocky Run, VA the overall viability of a small and isolated community was enhanced by project activity. For the Boise project, the EWP Program action protected as many as 4,500 residences and 760 commercial and business establishments in suburban and downtown areas downstream from the site of EWP Program activity. For all six sites, the execution of the EWP Program installed practices represented no significant effect on any existing elements of property.

EWP Program activity at the six sites did not substantially affect social services or other basic services to local residents. In the Boise Foothills, ID project, a substantial benefit was realized from the increased protection of public buildings and commercial establishments in the central core of the city. The EWP Program effect on local resources is somewhat more defined. In Boise, ID and Shenandoah, IA the areas affected represent substantial resources for recreation or educational uses. In the Rose River, VA and Rocky Run, VA communities, there was some improvement in the visual quality of the area. The overall effect of the EWP Program was not substantial, although some visual impairment might be associated with installed practices in the Rocky Run, VA and Boise Foothills, ID projects.

5.3.3.2.3 Effects on Community Structure and Social Patterns

The relatively small size and the short duration of most of the EWP Program projects under consideration had no effect on the demographic composition of the community associated with increased employment or other project-related activity. In Rocky Run, VA and Buena Vista, VA the project was significant in protecting a residential community and thereby maintaining the existing residential character of the area. In all cases, one indirect effect of EWP practices in protecting the affected area was to increase the possibility that additional development in the floodplain may be encouraged. Easements could be utilized to keep these "open tracts" from being developed. Particularly in the areas around Boise, ID and Shenandoah, IA, where additional development is planned, this may have the effect of increasing the extent of the cost and potential damage associated with a subsequent natural disaster.

EWP Program practices within the highlighted communities have different effects on an area's land use, depending on the type of practice used. The practices differ in the amount of change they create. For example, the use of riprap and gabions are practices primarily within a stream and its bed. Debris removal is also concentrated in a more localized area. On the other end of the spectrum, floodplain easements and levees require larger tracts of land and have broader reaching impacts.

Using easements and setback levees as EWP Program practices often have a larger impact on land use decisions than practices focused on smaller areas. In the East Nishnabotna, IA, watershed, the use of easements and setback levees are decisions affecting the land use of areas throughout the watershed, as well as near the town of Shenandoah, IA. The purchase of easements throughout the watershed affect not only the inundation of agricultural land zoned for that purpose, but downstream properties that may wish to maintain the integrity of current land use. Placing an easement on one parcel without acquiring the rights on adjacent properties would affect the neighboring landowners. In addition, the development plans of a city such as Shenandoah may be affected by the purchase of an easement and subsequent inundation. Levees would have an impact on the development plans of an urban area in a similar manner, protecting some land upstream, and having negative effects on downstream uses.

Critical area treatment uses a combination of armoring practices on a larger scale. Practices such as vegetation planting and grade stabilization structures can produce impacts on a large scale. However, the land use impacts are not as significant as the biotic or landscape ones. Preventing erosion on susceptible slopes such as in the Boise Foothills project protects residential and recreational land uses. The re-vegetation alone would not cause large disruptions in existing land uses. As in Boise, the re-vegetation and erosion prevention practices protected existing land uses.

On a smaller scale, practices such as riprap and gabions in streambeds and on streambanks affect a small area of adjacent land uses. Use of these armoring practices in communities such as Buena Vista, VA protects the developed areas within the city, allowing adherence to a master plan. Immediate flooding of susceptible land also is prevented by these structures. Without practices regulating the streamflow and integrity of the bank, land uses within the immediate area would be threatened.

Lastly, removing post-disaster debris within waterways is a practice influencing the uses of adjacent land as well as further into the community. The amount of flooding is largely dependent on the amount of stream blockage. The flooding of land, by water prohibited from flowing in its course, can affect lands on various scales. As in Hall County, GA and Rose River, VA, adjacent farmland was threatened; however, no immediate threat to any surrounding communities or developed area existed. In Buena Vista, VA, however, developed areas were threatened by imminent flooding. The extent of the EWP Program practice will largely depend on the location of debris blockage and its proximity to developed land rather than open space or farmland.

Preserving the existing community structure and social patterns of the affected communities is an important beneficial effect of the EWP Program. Particularly in the case of the three projects, Bethel, Rose River, and Shenandoah, where the affected area was primarily agricultural, EWP Program activity protects existing farm operations. In the more residential areas, especially Buena Vista, VA and Rocky Run, the continuing viability of the local community or neighborhood depends on the ability to control the effects of flooding. For the Boise Foothills project, EWP Program practices reduce the effect of the original disaster and facilitate the continued development of the community. Although each project required minimal disruption of the local environment during project construction, only the Boise project resulted in a substantial temporary loss of access to neighborhood parks or other recreational locations. No permanent disruption of community was experienced. In all cases, the overall effect of the project was essentially beneficial in protecting or restoring the previously existing community structure and patterns of interaction.

5.3.3.2.4 Environmental Justice Effects

The communities studied do not have substantial minority populations; therefore, environmental justice effects related to these populations are minimal. In the cases presented no communities or neighborhoods were identified that were predominately minority in character. Several of the states involved have existing programs to encourage minority and small and disadvantaged businesses to participate in contracting opportunities. Minority contractor participation was identified in at least one of the projects, Rose River, VA. Minority participation in the other projects could not be determined from the information provided for this assessment. In the case of the Boise project, a substantial participation of the local community was evident in facilitating acceptance of the proposed practices by local residents.

5.3.3.2.5 Summary of Socioeconomic Effects of the EWP Program at Six Selected Example Communities

Table 5.3-4 presents a summary of impacts on the communities selected for this analysis. A summary description for each site follows the Table.

Table 5.3-4 Summary of Post-EWP Program Socioeconomic Effects on Rural Communities

Bethel Road, GA	Buena Vista, VA	Boise Hills, ID	Rocky Run, VA	Rose River, VA	Shenandoah, IA
Employment and Income					
Small potential for increased income	Some benefit from project expenditure, significant benefit from protection of businesses	Substantial income from project-related expenditure; benefit from the removal of threat to commercial and retail areas	No commercial or business entities present in the community	Restoration of income potential from affected properties; small business benefits from project expenditure	Income from agricultural production; indirect benefit to retail and commercial areas
Natural Resources					
Utility and value of affected land area restored	Repair and removal of threat enhances value as investment	Restoration and improved value of affected areas	Property value maintained by threat removal	Utility and value of affected land area restored	Agricultural value of land affected; some increased development potential
Infrastructure					
Restoration of drainage culverts in the affected environment	Some benefit derived from threat removal	Flood control benefits to agricultural areas; water quality improvement	No significant infrastructure features affected	No significant infrastructure features affected	Repair reduces threat to local wells and sewage system
Property					
Two residential properties protected from immediate threat	Protection of residential properties and business areas; some benefit to important structures	Reduction of threat to 4,500 residences and 760 commercial properties; major impact from protecting important structures	15 residential properties protected by installation of flood-control structures	Two single-family dwellings and state road protected; several buildings nearby indirectly benefited	Residential dwelling and a number of buildings significant to the community social life protected

Table 5.3-4 (continued) Summary of Post-EWP Program Socioeconomic Effects on Rural Communities

Bethel Road, GA	Buena Vista, VA	Boise Hills, ID	Rocky Run, VA	Rose River, VA	Shenandoah, IA
Public Health and Safety, and other Community Resources					
No expected effect	Provision of sponsor's share represents noticeable expense for small community	Restoration of recreational and other watershed uses; some visual impairment from engineered structures	Some visual impairment associated with riprap and gabion structures, but improved over post-disaster condition	Some improved visual quality over post-disaster appearance, no other resources significantly affected	Adjacent areas are important for recreation uses and provision of basic services
Demographic Composition					
No change in the local community	No change; restoration may increase growth potential	Restoration increases potential growth of new communities in suburban areas	Maintains population that may otherwise be displaced by flood	No change in the local community	Maintains population that may otherwise be displaced by flood
Land Uses					
No anticipated change in land uses	No change in anticipated land uses	Restoration of pre-disaster uses in burned area; some change may result from potential new development	Some loss of land for new structures; otherwise no change in existing uses	No change in anticipated land uses	Protects existing land uses; some development potential from reduction of potential threat
Social Patterns					
Minimal disruption during construction; threat removal benefits local church	Significant benefit to maintenance of continuing viability and attractiveness of community	Enhanced viability of new development; established neighborhoods protected	Continuing viability of community depends on control of periodic flooding	Immediate area is sparsely populated; some potential for disruption during construction	Benefit to the maintenance of community activities; nearby residential neighborhood protected

Bethel Road Neighborhood – Hall County, GA

The requirement for debris removal and stream bank stabilization in the Bethel Road area of Hall County is the result of flood damage in the West Fork Little River Watershed. The area affected is a less-densely populated rural portion of Hall County. The potential for a significant impact on the local economy is small. Immediate effects on the local community would be expected to be beneficial, but not major. Only two private properties are affected and the result of the action in of restoring land and protecting of structures is generally beneficial. The project is in a rural land use zone, considered in the county's comprehensive plan as accommodating slow residential growth without the provision of water and sewer. The project site is within about 700 feet of existing structures. In the absence of the EWP Program installed practice, the roadway and adjacent rural lands would be threatened with inundation. Residences within the immediate vicinity would not be directly threatened. The impacts of the Program practices are primarily beneficial to undeveloped lands.

Apart from access roads to the two properties affected, construction-related disturbances are essentially temporary. Impact on the local community from noise or other construction-related activity is minimal. Any adverse visual impact associated with the newly installed structures is offset by the improved appearance of the restored area. The sparsely populated area surrounding the site would be expected to minimize any local impacts on community life or social structure.

Buena Vista, VA

In general, any potentially adverse effects of EWP Program project activity on the socioeconomic conditions of the Buena Vista, VA community are balanced against potential benefits. EWP Program practices in the area respond to flood damage that potentially threatens residential and commercial areas of the city. The community's continuing viability and its attractiveness to current and potential new residents and investors depends to a great extent on its ability to control flooding or protect local property from the effects of the flood plain. Although the project contributes additional EWP Program support money to the local economy, provision of the local sponsor's share represents a noticeable expenditure for a smaller community of an independent city such as Buena Vista, VA.

The developed areas near the EWP Program sites are primarily residential. These are the areas most affected by the direct impact of stream blockage. Commercial uses and industrial areas are indirectly affected. The comprehensive plan acknowledges the conservation of naturally sensitive areas as important, specifically targeting development within the floodplains, on steep slopes, and in areas with drainage problems (Buena Vista Comprehensive Plan, 1995). Potential impact on the immediate local neighborhood from project-related construction includes some physical disruption, as well as increased noise levels. A benefit to the immediate community is an improved visual aspect as well as increased protection of local residents in the event of another flood. The affected properties also are restored to their previous value. No substantial alteration of the pre-existing social community or demographic characteristics would be expected from a project of this level and this short duration.

Boise Foothills, ID

Although the area immediately affected by the Eighth Street Burn is primarily agricultural and open space with few residential and commercial areas, it lies adjacent to a major suburban expansion of the City of Boise. The affected area is also the watershed for the greater Boise area. The potential of flood and flood runoff to affect these adjacent suburban communities and the older residential and commercial areas of the central portion of Boise represents a major adverse impact on the maintenance of the quality of life that may be associated with any subsequent natural disasters. EWP Program practices were directed primarily at decreasing the threat of massive slides and erosion from burned hillsides. Although the EWP Program project resulted in no net increase in the total acreage available for human uses beyond that which existed before the fire, the installed practices removed the immediate potential hazard associated with flooding and restored the utility and visual qualities associated with the original condition of the land before the event. In addition to a number of important public buildings and other structures of cultural importance, the protected area also includes approximately 4,500 residences and 760 commercial buildings. Although no significant loss of residential or commercial property occurred as a result of the fire, the burn area extended into residential areas north of the city and produced a significant visual impact (NRCS, 1996). The rural quality of the watershed also provides access to recreational facilities for a substantial portion of the area populations.

Some potential for temporary disruption (noise, other physical disturbance, and some loss of access to recreational areas) from project-related construction activity was likely during the two-year duration of the project. The project was preceded by a number of public meetings to address local resident concerns. Despite initial concerns, the overall evaluation of the completed project by local residents is generally favorable. Although some permanent impairment of the land resulted from these practices, the impact on adjacent property holders has been minimized and no disproportionate impact on minority, socioeconomically disadvantaged, or sensitive populations is evident. The EWP Program practices installed to mitigate the effects of the Eighth Street Burn allow Boise to continue development within the city. Without these mitigative practices, both the urbanized areas and foothills would be threatened for future development.

Rocky Run, VA

Flooding of the Rocky Run area has resulted in substantial damage to a residential community, affecting 15 single-family dwellings and associated service buildings. No other significant structures (e.g., churches, schools, public buildings,) were affected. The effect of the EWP Program project is generally beneficial in terms of an improved visual aspect (compared to the unrestored condition), but permanently alters the visual qualities of the stream. Some temporary disruption of the surrounding area may have occurred during the construction phase of the project. The community at the Rocky Run site is not large enough to benefit economically from the EWP Program project expenditures, apart from the protection of property that may result from the action.

The project site in Rocky Run lies within the planning jurisdiction of the county and is currently zoned as general agricultural with single-family residences permitted. The comprehensive plan for the County envisions that current land uses will continue in the project area. The County also has a floodplain ordinance, restricting new development within the floodplain and floodway. Currently, the residential subdivision protected by the EWP Program project improvements is a nonconforming use under the zoning ordinance.

The conditions of the Rocky Run site are conducive to consideration of an improved land easement option. Removal of the existing residential community and returning the stream to its original condition would eliminate the requirement to maintain and continually repair the existing structures that are required to reroute the stream around the 15-house cluster that represents the community. Apart from economic costs, however, the potential for significant disruption of the current community and the near improbability of being able to reconstruct the community and its social relationships at some other site are serious considerations.

Rose River, VA

The area immediately affected by EWP Program project actions is primarily rural in character. The flood-related threat to the area is centered on two farm properties and includes two single-family dwellings, farm buildings, associated structures, a state road, and pastureland. Since the site had already been damaged by floodwaters and heavy equipment use by the landowner before the EWP Program action, any potentially adverse visual impact associated with the newly installed structures is offset by the improved appearance of the restored area. The sparsely populated area surrounding the site would be expected to minimize any local impacts on community life or social structure. The potential for a significant impact to the local economy is small. There are several important structures, including three churches, a school and two cemeteries, near the restored area. Although not directly threatened, these facilities benefit from the improved setting.

The site lies within various zones defined by the county zoning ordinance, including agricultural use, single-family homes, and other miscellaneous uses such as a greenhouse or airport with special use permits. The comprehensive plan for the County envisions the same long-term uses within this area (Grayson, 1999). The practices installed in Rose River allow these existing land uses to remain intact. Since the Rose River project restores a naturally functioning floodplain, the alternative use of an agricultural easement might also be considered. The purchase of an easement would have the beneficial effect of removing the requirement to continue to provide and maintain protective measures and would reduce the potential demand on the local sponsor, especially if the Federal role is reduced. Use of an easement however, would require the removal of agricultural land from crop production and could involve one or two immediately adjacent dwellings.

Shenandoah, IA

Since 1993, three major floods have had a significant effect on the community surrounding the EWP Program sites at Shenandoah and in the East Nishnabotna Watershed. In addition to the destruction of cropland and damage to physical structures, wells in several areas have been contaminated, affecting sources of water for local residents. For the affected sites, the unrepaired condition of the levee represents a potential loss of cropland and a significant negative impact on the local community. The scope of the EWP Program actions was relatively small and did not involve either a substantial capital expenditure in the region or a major change in land area and uses. The principal benefit to the local community is associated with the restoration and protection of potentially productive cropland and the restoration of the value of existing buildings and other structures that would result from removal of the potential threat. Short-term, construction related effects would be expected to be minimal and confined to the areas immediately surrounding the sites. Long-term effects of the levee repair do not significantly alter the appearance of the local area, compared to its condition before the flood.

Various EWP Program projects installed within the East Nishnabotna Watershed could have beneficial effects on the land use decisions of the City of Shenandoah. While the practices occur at many points upstream of the City, their effects will noticeably permit certain land use and development decisions. Levee repairs upstream from Shenandoah, as well as the levees nearest to the city limits, allow agricultural land to remain. In the absence of the levee, agricultural land to the northwest of the city would be flooded, possibly jeopardizing current pockets of development. The revised county comprehensive plan anticipates zoning changes to allow commercial industry in this area (Marker, 6/15/99). Without the protective levee, changes such as those proposed would not likely occur. The continuing potential for flood-related damage to this area would, however, indicate that easements might be considered as one of the EWP Program options. Other flood response programs (FEMA, Corps of Engineers) in the community include consideration of the removal of individual residences, farm structures, and other facilities from the most seriously affected areas of the floodplain. Purchase of easements on agricultural land, as the EWP Program considered for the Shenandoah sites, would support or complement the actions of other programs in the area.

5.3.4 Impacts of Floodplain Easements on Human Communities

The most important characteristic of a floodplain easement is that it gives the private landowner and the public an alternative to using public funds to restore disaster-prone property to pre-disaster condition and function. In addition to reducing risks to lives and property, the purchase of an easement eliminates the need for future disaster payments.

The floodplain easement, a perpetual legal interest in a property, restricts the owner's use of the land as a mechanism to reduce flood damage claims and protect wildlife habitat or floodplain hydrology. In contrast to expensive, and sometimes temporary, conservation practices, the impacts of an easement and reconstruction of a floodplain may benefit an area both ecologically and socioeconomically. Similar to the floodplain easement, the setback levee adds the element of protection of neighboring property.

Incorporated as part of all three EWP Program alternatives, the exercise of floodplain easements is structured differently according to the alternative, the requirements of project, and the type of land involved. Where floodplain easements replace other recovery practices on non-improved land, local sponsorship would be possible, but not required since the USDA would hold the easement. This option would be voluntary on the part of the landowner and would require minimal local revenue contribution. USDA would fund the establishment of the easement and any environmental measures required. Floodplain easements on agricultural land differ categorically from those on other unimproved or improved easements. Depending on the application, restrictions may allow the use of natural vegetation only or compatible uses by the landowner (e.g. haying, grazing, and timbering).

Exercise of an easement on both agricultural and improved lands is possible under Alternative 2 and would be expanded to include multiple easements in priority watersheds under Alternative 3. Easements may include developed and commercial property in which residential relocation may be necessary. Where improved land easements are exercised, the participation of a local sponsor, specifically a government entity or administrative district with authority to hold property, is required. Local sponsorship increases obligations on a local government, as well as the potential for community disruption caused by relocating the current tenant of the property.

5.3.4.1 Current Agricultural Easements

Repeated cycles of damage and repair to agricultural land as a result of periodic flooding adversely affect rural communities located in flood-prone areas. Protective practices and engineered substitutes for the normal functioning of the watershed cost not only the local community, but also larger public entities (state and Federal agencies) that provide resources and funding for disaster assistance. Constructing protective practices includes a social cost in terms of the alteration of the environment and setting of the community.

The use of a floodplain easement offers a cost-effective alternative to more traditional flood control approaches. Traditional approaches usually involve a tradeoff between flood control and damage reduction, and the continued health of ecological resources (Williams 1996). These approaches reduce the threat of flooding but do not eliminate it. Flood control practices may also compromise the character and aesthetic quality of a setting. However, the exercise of an easement on flood-prone properties also is a trade off between the economic and social value of the land in its current use and the beneficial effect of restoring the land to its natural condition and minimizing future costs of natural disasters and flooding.

The purchase of easements through the EWP Program in a location such as the East Nishnabotna, IA watershed would benefit the landowner and community alike. The purchase of easements in land designated as open space would allow land uses to remain unchanged. If land were designated agricultural, their uses could potentially be minimally impacted. In Iowa, the proposed easements are in areas designated for agriculture. Using the easement for constructed open space improvements could, however, have some impact. The improvements would then be susceptible to recurring floods. If easements were purchased in developed areas, however, impacts would be different.

The socioeconomic effect of the exercise of easements is a combination of beneficial and adverse changes that affect the critical aspects of the social community. Table 5.3-5 summarizes these potential effects on the socioeconomic indicators identified in this section.

Effects on the Local Economy

Employment and Income. Apart from the benefit reducing the continuing cost of flood control and damage recovery, the community experiences a number of additional beneficial economic effects. The purchase price of the easement supplies income to the landowner and by extension to the community, as the income is re-spent within the community. By volunteering land for easement, a landowner, especially in agricultural areas, may realize income from land that otherwise would be costly to maintain and that may not have furnished regular income from production (NRCS 1999).

Table 5.3-5 Summary of Socioeconomic Effects of Easement Acquisition

Community Aspect	Impact Area	Potential Effect
Economic Structure	**Employment and Income**	Purchase price of easement represents income to the landowner; Marginally productive land becomes a one-time asset to owner; Income generated from recreational and other permitted uses of the protected property; Benefit associated with restoration of watershed condition: Loss of economic or agricultural production associated employment; Future cost of damage recovery and flood protection minimized, but also income lost to community from periodic disaster payments.
	Value and Quantity of Natural Resources	Loss of the value of the affected land for investment or as part of the economic base; Value and development potential of adjacent land may be improved; Enhancement of ecological value.
Infrastructure and Resources	**Infrastructure**	Improved function minimizes cost of associated flood protection strategies; Potential for improved water quality, especially in areas serviced by wells.
	Property	Where easement is purchased on improved land, associated residential or commercial structures are demolished or removed; Value and use of adjacent structures improved.
	Public Health and Safety and other Community Resources	Change in value of easement property represents a small tax advantage to owner, but reduces the revenue base to local government; Improved recreational and other uses of the land.
Social Pattern and Structure	**Demographic Composition**	Relocation of residents may change demographic distribution of certain social characteristics in the population.
	Land Use	Tradeoff between value of existing uses to social community and benefit of reducing continuing need to respond to flood conditions; Some potential for conflict with existing community land use plans.
	Community and Neighborhood Social Patterns	Permanent disruption of neighborhood or community networks; Potential threat to ongoing viability; Easement on agricultural land may enhance community desirability.

Purchasing easements on agricultural land could provide local farmers with some tax breaks; however, they would not be an economic windfall. Every state except Michigan has deferred assessment programs for agricultural lands (AFT-Deferred, 1998). A deferred assessment program, also referred to as use-value, taxes land at its agricultural value instead of its market value. The use-value of agricultural land is often a small percentage of the full market value. In Orange County, North Carolina, for example, farmers pay taxes equaling an average of 6 percent of market value on land enrolled in the program. (Belk, 1999). Thus, direct tax savings of an easement to the average farmer are not substantial due to the small amount already paid. Only the benefits gained through reducing the estate tax burden by selling an easement would be substantial to most farmers.

While an individual farmer might not realize great economic benefits, the community would. Through the purchase of easements to preserve open space or flood-prone areas, the community would maintain a solid tax base. When land is developed, police, fire, schools, water, sewer and after services must be provided. The cost of these services burdens a tax base. Communities with primarily residential development often incur heavy debt, destroying credible bond credit ratings.

Open space is an affordable use of land from the perspective of providing community services. Studies on the costs of community services have been conducted around the country. The median costs (per tax dollar of revenue raised) of providing services for commercial/industrial use is $0.28, for farm/forest use is $0.37, and for residential use is $1.15 (AFT-COCS, 1999). Easements purchased under the EWP Program could contribute to a sound economic strategy for a community; protecting flood-prone areas from development will prevent economic losses while strengthening the local tax base.

Easements may be the best use of land within a watershed from social, ecological, and economic standpoints. Although losing the previously productive land may carry adverse effects, the community could benefit from changes in income and employment associated with increased recreational and other permitted uses of the land. An associated benefit is derived from the improved condition of the watershed itself.

Exercise of an easement on the land does reduce income to the community that was previously derived from disaster payments. These payments often represent a boon to the property owner and by extension to the local community in the form of compensation for damaged crops or structures (Philippi 1995) and resources to construct and maintain flood control devices.

Value and Quantity of Natural Resources. Any loss of productive agricultural, commercial, or residential property represents a potentially significant impact to a community. The exercise of floodplain easements removes the land from the economic base of the community and potentially decreases its value. Schueler (1999) cites several studies indicating that the value of wetland and floodplain areas lying within a protected region in which development is restricted may to 10 to 36 percent of the original.

However, the return of watershed land to its natural function contributes significant economic benefit such as increased seasonal water availability for agricultural, municipal, and industrial uses, reduced downstream sedimentation and pollution, increased biodiversity, and improved habitat for fisheries, plant life, and animals (Williams 1996). Additionally, economic benefit also accrues to the local community because of an increase in the attractiveness of properties adjacent to protected floodplains as potential development areas (EPA 1995). Thus, although some land is lost to the local economic base, remaining adjacent property may increase in value and desirability.

Effects on Infrastructure, Public Health and Community Resources

Infrastructure. By imposing use restrictions on an affected property, an easement reduces both the requirement for and associated cost of implementing extensive flood-control practices. Restoring the natural function of the watershed may also improve water quality as well as reduce runoff and the associated costs for treatment that would otherwise be borne by local government. An improvement in water quality is often associated with improved property values particularly in areas served by wells (Schueler 1999).

Property. A floodplain easement on improved property results in the loss of the value and use of any structures, except where can be relocated outside the floodplain. Assistance to the local community from state and Federal sources may afford some compensation, but the loss of these structures is usually irreversible. Less important to an easement on agricultural land, the loss of residential, commercial, or other structures significant to the social life of a community may be an important impediment to exercising an easement. This is especially true where the cost greatly exceeds the cost of maintaining flood control structures, or where the structures involved are culturally or socially important to the life of the community and are not easily replaceable.

Public Health and Safety and other Community Resources. The exercise of a floodplain easement, especially on non-agricultural or improved land has the effect of removing the potential risk to the health and safety of resident or other user populations. By relocating human activity away from flood prone areas, the easement removes the object of any potential harm from natural disasters and thereby eliminates any subsequent risk. In addition to removing the direct threat to immediately affected populations, floodplain easements also benefit the community as a whole. Elimination of the population at risk contributes to the overall effectiveness of disaster emergency services by reducing the number of sites that must be addressed in the event of a future disaster and allowing a more efficient use of disaster resources.

A change in the value and use of the land designated as part of a floodplain easement will give a tax advantage to the landowner, but also causes loss of revenue to the local government. Easement areas are typically assessed at a much lower value than other property. Removing too much land from the local tax base could undermine the revenue source for other important local governmental services. However, this effect is at least partially offset by the improved value of neighboring parcels and the reduced cost of providing infrastructure services to the local community that may result from restoring the natural function of the watershed. The potential for use of the restricted land for parks or other recreational uses represents a corresponding benefit.

Social Pattern and Structure

Demographic Composition. Demographic changes are not an important consideration for the use of an easement on agricultural land. However, one exception is the potential for an easement to reduce the total amount of agricultural land available to the community. Such a reduction changes land availability and price, which may restrict the establishment of new farms or make the operation of existing farms more difficult. Depending on the scale of the easement Program, this may have a tendency to reduce the demographic diversity of agricultural communities as fewer owners control a greater portion of the remaining land.

Land Use. Exercising an easement is a meaningful tradeoff between the social value of the current use of the land and reducing potential flood-related damage and any associated impediment to the full utility of the affected land. The condition and use of the land before a disaster and the effect of the disasters on the continued use of the land must be considered. In many cases, the desirability of a “naturalized” landscape may increase the value of the land over current uses such as agriculture, particularly when the current value is offset by the cost of maintaining the land or repairing flood damage. The community benefits when the exercise of an easement is part of an overall land use plan that includes watershed management to ensure environmental and flood protection and where land uses on adjacent parcels are compatible with the proposed easement restrictions.

Community and Neighborhood Social Patterns. Purchasing easements has the potential to disrupt important social patterns and neighborhood networks. In agricultural areas, the acquisition of a farm property may affect the individual farm family, and in the case of marginal farms, the economic and cultural diversity of the community by concentrating the remaining farmland in the hands of fewer owners. Burdge (1998) notes that the process of creating a single-family farm business often requires the participation of multiple other families and the intergenerational transfer of property among interconnected families. To determine the full impact of an easement purchase, therefore, the full range of impacts resulting from the intergenerational effect and the immediate relocation of the tenant must be taken into consideration. Changes in land availability and price in the immediate area may increase the easement owner’s difficulty in acquiring land to compensate for the lost acreage or in establishing a new farm.

5.3.4.2 Proposed Nonagricultural Easements

The purchase of an easement on improved land, or the outright purchase of title to the land, expands the potential range of impacts associated with Alternatives 2 and 3. Although not significant on agricultural land, exercise of an easement in residential areas or on improved lands can change the size and composition of the local population. As residents move and relocate, the characteristics of neighborhoods may change. Especially important is any permanent differential change affecting minority or low-income households.

In residential areas or on improved lands, removing or relocating a population may significantly alter the local environment. Where a sufficient number of residents are involved and the community is sufficiently small, the disruption could be significant and could threaten the viability of the community itself. Also important is the availability of suitable residences near by for persons displaced by easement purchase. Where land values in the displaced neighborhood are substantially lower than in the immediately surrounding areas (particularly with respect to low-income neighborhoods), residents may have to move to distant locations, thus permanently disrupting social networks.

When an easement results in the loss of an important structure or place within a community such as a park, monument, or gathering place for residents, the potential effect may be disruptive, at least temporarily.

The easements proposed under the EWP Program preserve a community's social and economic resources. Through the use of easements, open space is preserved, the tax burden of providing community services is reduced, and flood-prone lands are sometimes preserved in their natural state.

Structural flood-control projects often create a false sense of security in the community. They increase the potential for development of flood-prone areas if land use zoning is not properly implemented. Rather than reducing the threat of damage from catastrophic flooding, structural practices may actually increase the risk of damage and loss by increasing the population density and the number of structures in the floodplain areas that could be affected if the protective practices fail. If not coordinated with local planning ordinances to prohibit development, residents could move back into the protected area. Development also increases the stress on the watershed itself. Despite protection efforts flood losses cost $4 billion annually (Faber, 1997). The use of an improved land easement would eliminate increased development and reduce the need to return and continue to make repairs after disaster.

Floodwaters often cause losses in the short term, but landowners receive disaster assistance from Government agencies and insurance policies. This disaster assistance can exceed profits from the use of the land. The purchase of easements on these lands will reduce repair expenditures and disaster funding.

Although landowners participate voluntary in the purchase of improved-land easements some participation of the local government is required as sponsor and holder of the land title. For some communities, this represents an administrative burden that may not be supportable without additional resources. This is especially true when tax revenue is lost because the property is withdrawn from the tax base.

Because the use of floodplain easements is a relatively new Program practice, the number of actual sites to demonstrate potential impacts is limited. Two sites, Rose River and East Nishnabotna, were therefore selected for hypothetical consideration under Alternative 1, and one, Rocky Run, was considered under Alternative 2. All are summarized in Table 5.3-6. The improved-land easement option would have impact on land uses often residential in nature, returning the land to its natural use as a floodplain. The easement purchase could conflict with the long-term development visions of a community and require analysis on a case-by-case basis. In communities such as Rocky Run, Virginia, the purchase of easements would require the relocation of residences in the floodplain. These residences lie within an area zoned as general agriculture, but permitting single-family residences (Grayson, 1999). Thus, the official land use category would not change while actual use would change from residential to open space.

Table 5.3-6 Summary of Effect of Easement Option on Three Example Communities

Impact Area	Rocky Run, VA	Rose River, VA	Shenandoah, IA
Employment and Income	Community is residential, employment and income is from outside sources, therefore no effect.	Depending on restrictions, easement could result in the loss of value of agricultural production	Income from agricultural land lost, some commercial areas may be affected
Natural Resources	Loss of the value of 15 properties currently used for residential dwelling	Agriculture value of land jeopardized by repeated flooding and repair attempt; Acreage loss may be compensated by increased value of adjoining land	Loss of land area may be compensated by enhanced value of adjacent land for additional development by the community
Infrastructure	Improved drainage to the remaining community, some improvement in water quality anticipated	No major disruption, some improvement expected from enhanced watershed function	Improved water quality in an area serviced by wells, transportation facilities located nearby may be affected
Property	Loss of 15 single-family dwellings; no other significant structures	Two single-family residences may lie in the designated easement area, minimal effect to other farm buildings and structures	Potential loss of residential units and service structures in the area
Public Health and Safety and other Community Resources	Potential use of affected area as park or other recreational area	No real effect on community resources, some improvement to the overall visual quality of the land anticipated	Removal of major responsibility for the maintenance and repair of levee; Easement area is a potential recreational resource
Demographic Composition	Relocation of approximately 42 residents could substantially change composition of community	No significant change to community composition, only two households directly affected	Some relocation of residents, but substantial change in population size and composition
Land Uses	Change in current use from residential to nonresidential would not impact surrounding land uses; Restores a naturally functioning floodplain.	Change in current use is compatible with surrounding uses and enhances open space quality of the setting	Change in current land uses may enhance development plan for other areas, repeat flooding inhibits many uses of easement area
Social Patterns	Relocation would have a significant effect and could threaten future viability; Housing values lower than surrounding area could require relocation	No change in community social patterns anticipated	Affected area is primarily nonresidential, some potential for effect on current residents

5.3.5 Human Community Impacts Under the EWP Program Alternatives

5.3.5.1 Continue Current EWP Program (Alternative 1)

In general, the effect to the human social community of continuing the current Program would be similar to that described for the six example sites in Section 5.3.3.2. In addition to the reduction of any potential risk to public health and safety that may result from repair of the affected site, EWP program measures have the beneficial effect of protecting the use and social value of any associated property. Thus, the beneficial effect of program implementation extends to both the immediate site and any residents or potential users of that site and, indirectly, to the local community as whole. On a programmatic basis, the primary beneficial effect can be represented as the aggregate reduction of risk to human health and safety and protection of the value of threatened property in all of the communities nationwide that are potentially affected by damage from natural disasters.

Continuing the current Program would create no change in the technical and financial assistance provided to local communities or to the administrative approach to the Program. Program-related impacts to local economies would be minimal. Most proposed projects are relatively small in scope and, despite the smaller rural characteristics of most of the communities involved, the total dollar expenditures would not contribute substantially to the local economy.

Under the current EWP Program, land use decisions are affected largely by the type and timeliness of post-disaster repair. The practices used the EWP Program are often structural, intended to restore pre-disaster land use. However, current uses should correspond with the local long-term land use plan. Although the land use plan is not a legally binding document, it is important to ensure that current EWP Program practices correspond with the intent of local land use plan to avoid possible policy conflicts with local jurisdiction. Without coordination with local planning and development ordinances, pre-disaster land use cannot be guaranteed. In the absence of these regulations, and post-disaster land uses may fluctuate.

The effects of the practices under this alternative would however, benefit the community by restoring or protecting economically productive or residential properties. Program practices may repair and protect land thereby restoring the value of its use to the local community. Although program practices provide a substantial benefit to the local community in the short-term, this does not necessarily eliminate the need for additional repairs over the longer term.

In some cases, the effect of EWP Program practices may be to create a false sense of security and may actually encourage development in flood-prone areas. This has the effect of providing an immediate benefit to the health and safety of affected populations and the protection of the affected property. But, in the longer term, the frequency and cost associated with another natural disaster may be increased. The immediate risk is reduced, but the future risk remains as long as human uses of flood prone land continue unchanged. Purchase of floodplain easements on agricultural-land minimizes this effect, but since no similar option for improved land easement exists, the potential for perpetuating cycles of damage and repair on residential, industrial, and commercial areas remains high.

Easements allowed under the current Program do not always protect high-value agricultural land. Thus, depending on the type of agricultural land affected by the disaster, the land may or may not return to its former use. For example, a high-value vineyard may be destroyed by a disaster, and financial hardship could cause the owner to sell his land. None of the project sites had high-value crops, so an example of a landowner selling due to financial difficulties is not available. However, the diversity of crops throughout the country allows such a situation to occur.

With respect to infrastructure and social resources and services, the Program's effects are generally beneficial. The immediate threat to the safety and health of residents and users is reduced, and in many cases, the longer term risk to the property itself may be reduced as a result of EWP practices. Installed practices restore the previously existing condition and provide a measure of protection for important structures and resources. In some cases, installed practices may diminish the aesthetic quality or recreational experience associated with some properties, but in general, the Program does not appear to have a major adverse effect. The primary direct effect is beneficial by providing for the recovery of previously existing levels of service. Exercise of an agricultural easement in some cases may provide the additional benefit of protecting open space and improving the aesthetic or recreational quality of an area.

The sponsor's share of project costs may present obstacles to some smaller, independent communities who do not have support from county or State jurisdictions. The economic strain placed on local resources may cause other important social efforts within the community to be underfunded.

The immediate effect of the EWP Program is to provide for the restoration and protection of communities through either the installation of armored structures or the exercise of floodplain easements on agricultural lands. Both of these approaches support the existing community structure. In smaller communities, such as the Buena Vista, VA and Rocky Run examples, EWP Program assistance may be critical to continuing viability of the community. Exercising the easement option on unimproved agricultural lands does not have a serious impact on the community, but may result indirectly in a long-term change if land becomes less available and the viability of smaller farms is compromised.

Because project defensibility under the no-action alternative is based primarily on environmental and economic justification, environmental justice may not always be served by Program projects. In socioeconomically disadvantaged areas, some property owners may be denied assistance because the cost of protecting the property is greater than the value of the property. However, the same project at the same cost may be justifiable in another area because property values are higher. This leads to a potential for disproportionate access to benefits from the Program and may be especially important in socioeconomically distressed.

5.3.5.2 Program Improvement and Expansion (Proposed Action – Alternative 2)

Under the Proposed Action, direct effects to a local economy, infrastructure, community resources, and social patterns at the immediate site level would remain substantially unchanged from those identified for the Current Program. However, several proposed changes under this alternative would influence the overall impact of the Program on the human social environment and may alter the solutions proposed or the manner of participation for the affected communities.

Under the Proposed Action, the beneficial effect of reducing the risk to human health and safety evident under the current program would be further enhanced by the addition of an immediate response mechanism for "urgent and compelling" conditions. These situations often represent a high risk to human life or substantial damage to property that require a more immediate response. By providing a spending allocation of up to $25,000 based on local authorization for these "urgent and compelling" conditions, the Proposed Action substantially increases the ability of the Program to respond quickly and more directly in circumstances where an immediate threat to life and property is apparent. As a result, the overall benefit of risk reduction associated with the program is significantly enhanced.

Changes to the cost-share rate would increase the cost burden for some communities. However, the provision to provide additional financial support to areas designated as "limited resource" encourages EWP Program participation by communities that might not otherwise be able to afford to participate in the Program. This provision addresses the environmental justice issue, by improving access to Program benefits for socioeconomically disadvantaged communities

Program modifications in funding, priorities, and easement regulations could potentially affect post-disaster land uses. Additionally, the proposed action allows for greater opportunities for cooperation with local land use plans. Easement purchases can be integrated into an area's comprehensive plan for growth and provide functional open space for a community.

A landowner' ability to restore the land to pre-disaster uses depends largely on the elements of the proposed Program changes and the economic incentives available to him. The elimination of the exigency designation and a new priority ranking system are expected to influence this ability. The priority ranking system could delay or deny protection to properties that would have been protected under the old system. The proposed Program changes also include a change in the cost-share ratio for reconstruction activities. Although changing the cost share ratio lowers the maximum funding available to sponsors, the potential effect of the change is minimal because the higher rate has fallen into disuse under the current Program.

Including social defensibility criteria in addition to the ecological and environmental defensibility criteria in the current Program also addresses environmental justice issues. By establishing a social rationale based on the utility of the property to the landowner, the proposed action includes participants who might have been a left out of the current Program. This is especially true when the economic value of a property may be low or difficult to calculate, but the importance of the property to the landowner as a place of residence or business, or to the community as a vital part of its social or cultural life, is recognized. Criteria for social defensibility provide another perspective on the justification to carry out a project with the result that additional segments of the population (especially minority or low-income) have access to Program benefits.

The proposed action also allows for the buyout (with floodplain easement) of residential or improved lands. This converts previously residential, commercial, or industrial land to open land. Converting developed land to open space reduces the need to provide public services, relieving the burden on the tax base associated with providing these relatively expensive services. The reversion of land to its "natural use" after two repairs in ten years will encourage the conversion of developed land to open space. The end result will be increased open space in the community, a lower tax burden, and improved natural capabilities to fight disasters.

By expanding floodplain easements to include non-agricultural or improved land, the Proposed Action addresses an important long-term effect associated with the current program. Relocation of people and structures away from flood-prone areas eliminates any potential future risk and has the beneficial aspect of reducing the cost of future disaster recovery. The short-term effect and cost of exercising floodplain easements on improved land may be higher than those associated with the immediate repair of land and protection of existing property under the Current Program. However, a longer term benefit from eliminating the potential for future risk to people and property and a subsequent reduction in the cost and resource commitment necessary for future disaster recovery can be anticipated to off-set the higher short-term cost of the program under this alternative.

Participation in the easement purchase program under the proposed action is voluntary; however, the proposed limitation of two repairs in ten years encourages property owners to consider the easement option. The easement may appear to be the only solution and therefore a less-than-voluntary alternative. Although this provision may have an adverse impact if a property owner opposes the easement option, (because of financial considerations or a particular attachment to the property), it does have beneficial consequences for the community at large. By encouraging floodplain easements, this provision reduces the potential for continuing cycles of damage and recovery and tends to discourage additional development in frequently flooded areas. The overall effect of this provision is not substantial because frequent damage to the same site is relatively uncommon.

The exercise of an easement option on a property withdraws the property from the revenue base of the community and eliminates a source of capital investment. In the case of agricultural easements, this may not have a substantial impact unless the total easement area is a substantial portion of the total agricultural land in the community. Although not likely when only a few properties are involved, a shortage of agricultural land may drive up the price of remaining land. Community structures may also change if marginal farms are unable to compete and are forced to sell out.

In the case of improved-land easements, both the land and its associated structures may be lost to the community. Easements alter the character of community by breaking up social networks. Where only a few properties are involved, the loss of investment value is not likely to be great;

however, easements may be too costly in terms of property values and the costs of relocating the residential, structural or social function associated with the property.

The proposed action would have generally beneficial impact on balance. The potential impact of the installation of conservation solutions at does not differ substantially from that under the no-action alternative. The expansion of the floodplain easement option to include non-agricultural and improved land increases the potential to disrupt communities or neighborhoods by displacing residents, but it also offers an opportunity for the community to reduce the impact of natural disasters and the associated recovery cost, especially on improved properties. Expanding the defensibility criteria substantially increases access to potentially beneficial effects of the Program for economically disadvantaged or minority persons who may have been previously excluded. Similarly, the provision for funding up to 90 percent of the cost of EWP Program projects in limited-resource communities also decreases the potential burden on these communities and increases potential access to Program benefits.

5.3.5.3 Prioritized Watershed Planning and Management (Alternative 3)

The watershed planning and management approach proposed under this alternative allows watershed planning on a macro scale while providing the project funding and technical assistance outlined in the proposed action. This alternative includes pre-disaster planning and watershed management to help form a long-term vision of a community's land use priorities. The pro-active approach under this alternative could be expected to further enhance the benefit of reducing the risk to human health and property presented by the Proposed Action under Alternative 2.

This long-term vision would be achieved through a comprehensive planning process, integrating watershed management with land use planning. The process addresses environmental concerns as part of a community's long-term growth strategies. Coordinating floodplain/open space protection and comprehensive long-term growth plans will formulate better land use policies. Proactive approaches to land use and comprehensive planning, such as suggested by Berke (1998) are essential to prevent further disaster-induced loss. Tools such as easements and development regulating ordinances would help ensure that losses are minimized by preventing development on these lands.

Determining a taking, whether regulatory in nature or not, is a difficult task. The coordination of EWP Program components with land use regulation must be well managed. To avoid possible takings violations, the specific floodplain ordinances and easement purchases within the Program area should be carefully crafted. Takings claims must be reviewed case-by-case and definitive rules for judgment on them are lacking. Most closely resembling a standardized rule is the need to prove a "rational nexus" between public purpose and benefits received. Without proof of this connection, takings claims will be less defensible by the defendant (Owens, 1999).

Allowing farmers to continue using land with easements for haying is a form of farmland preservation. Permitting haying and/or other agriculture on lands with easements allows farmers to continue reaping some benefit from their land, aiding their operations fiscally. Typically using

Purchase of Development Rights (PDR) programs, farmers with land in disaster-susceptible areas may find new options in the EWP Program. Without relying on the selection process of many local governments and nonprofits that administer many PDR programs, farmers may be able to sell easements under the EWP Program.

Potential conflicts with the EWP Program may arise with the use of PDRs in floodplain areas. Farmers may purchase agricultural easements to preserve the right to farm, thus, prohibiting the return of the floodplain to its natural state. Farmers who are repeatedly flooded out may seek any type of easement offered to them. The easements could be from the EWP Program or through a traditional PDR program. Neither program will provide assistance in the case of future disasters. Depending on the valuation method used by the EWP Program, offers for the easements from competing bidders could be very similar or substantially different. An entity bidding for the easement under a traditional PDR program will usually use the difference between the market value and agricultural value to determine the asking price. Every easement negotiated under PDR programs is unique, and the restrictions vary depending upon the entity holding the easement.

If the entity purchasing the easement is a non-profit whose goal is farmland preservation, the easement will most likely allow continued farming and cropping. Thus, the farmer could continue to reap financial benefit from the crops while tempting fate for the next disaster to strike. If the non-profit or government entity has a different motive for protection, e.g. wetland protection, open space, the terms of the easement will vary and potentially have greater restrictions.

If a farmer chooses to purchase easements through a PDR program instead of EWP, it is likely that the land could continue to be cropped. Many agricultural easements allow the continued farming of land as the main premise behind farmland preservation efforts. This cropping could occur in an area where EWP is attempting to return the floodplain to its natural state. Thus, EWP might view the agricultural easements allowing cropping as incompatible. Also inherent in farmland preservation efforts is the desire to use agricultural easements to curb development and urban growth. While cropping is not a natural state, it is more compatible with EWP goals than a developed floodplain.

The overall urban development of an area can be affected by the EWP Program practices. Most relevant to Alternative 3, this planning, coordinated with local comprehensive plans as outlined above, would help reduce future risk to the community. Targeting a community's urban development to a location outside the floodplain, in coordination with regulations encouraging compact growth, would reduce overall risk from natural flooding hazards.

Using easements and a comprehensive watershed planning approach enables a community to maintain open space while managing urban growth. Open space advocates use the purchase of easements, through the PDRs or Transfer of Development Rights (TDRs), to limit the developable area within a community (Daniels and Bowers, 1997). These tools, coupled with regulations governing the type of development by area, help an urban area contain growth while protecting the natural areas needed to support the human population. The provision of adequate community services, including a clean water supply, results from watershed planning that incorporates a natural floodplain, wetlands, and habitat.

A planned approach to exercising easements minimizes problems associated with a project-by-project approach, such as when neighboring or adjoining properties are volunteered for the Program at different times under differing circumstances. Instead, with this alternative open spaces can be planned as integral elements of the area landscape.

Purchase of easements under this alternative may alter the composition or structure of a community by displacing residents. Easements could also alter land uses or break up of residential networks. These potentially adverse effects may be offset, however, by the more effective use of easement purchases as a part of a longer-term flood management and watershed planning approach.

An integrated approach to Program management allows for more efficient use of capital resources and the economic potential of the watershed, while minimizing adverse environmental effects. Existing community resources may be lost, but these losses are offset by increased recreational and educational use of the watershed. An important beneficial effect of this alternative is that it involves multiple Federal programs, local and state agencies, and stakeholders early in the planning process, increasing the potential for acceptance of a watershed management plan. This is especially important where multiple easements may be required as part of the proposed solution.

5.4 CUMULATIVE IMPACTS OF THE EWP PROGRAM

In addition to considering direct and indirect effects, the CEQ NEPA regulations require that an EIS consider "cumulative impacts." Cumulative impacts are the combined impacts on the environment from the incremental effects of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. The C-E-Q method used to evaluate cumulative impacts of the EWP Program alternatives is the same methodology that was used to analyze direct and indirect effects. The methodology used to determine which potential actions were included and how their incremental and cumulative effects were determined is discussed in detail in Appendix B.

NRCS determined that it was not feasible to evaluate Program impacts in every watershed in the United States where EWP practices might be employed. Consequently, EWP practices carried out as a result of sudden impairments in three example watersheds–the Buena Vista-Maury in Virginia, the Eighth Street Burn Area-Lower Boise in Idaho, and the East Nishnabotna in Iowa–were chosen for cumulative impacts analysis. The rationale for their selection (explained more fully in Appendix B) was that these three EWP sites were examples of the range of possible EWP practice situations. Buena Vista, VA and Boise represented the use of EWP practices in areas of potentially high interaction with a variety of land uses because of their interface between undeveloped, Federal, and state agency-managed land and urban settings and their steep-slope environments. East Nishnabotna represented an almost totally agricultural land use context.

The analysis below begins by describing what "other" types of actions were considered. Then, cumulative impacts are considered for each of the alternatives. For each alternative, that analysis begins by considering the cumulative impacts in each example watershed. Then, the program-wide implications of the watershed-specific analysis are discussed. The cumulative impacts of the alternatives are compared in Chapter 3.

5.4.1 Description of Other Actions

Choosing and evaluating the other federal and non-federal actions to be considered in the cumulative impacts analysis first involved defining spatial and temporal boundaries for the actions to be considered in the analysis. After this "scoping" process, the affected environment for cumulative impacts was described. The cumulative environmental consequences were determined for the appropriate spatially-and-time-bounded actions in the same way the direct and indirect effects were analyzed.

Most EWP practices are stream or floodplain-specific. Therefore, many of the "other" governmental actions that interact with them are also stream or floodplain-specific. Because of the regulated nature of floodplains and watercourses, many of these actions are associated with the actions of NRCS and other federal agencies, and with state or local government actions. The major exceptions are private actions that increase runoff or modify the hydraulic regime in the same watershed as the EWP activities. Typically, these are upland land-disturbing activities associated with agriculture and commercial and residential activities. Each of these types of other actions is described briefly below.

Other NRCS Actions. Other NRCS actions include past EWP activities in the same watershed as a current EWP action, particularly those on the same reach as the current EWP activity. Also included are past, present, or planned actions of other NRCS programs in the same watershed as the current EWP action, particularly those on the same reach as the current EWP practice.

Other USDA Actions. Other USDA actions include past, present, or planned actions of other USDA agency programs (*i.e.*, not including NRCS programs) in the same watershed as the current EWP action, particularly those on the same reach as the current EWP practice.

Other Federal Agency Actions. Other federal agency actions include past, present, of planned actions of other federal agency programs (*i.e.*, not including USDA programs) in the same watershed as the current EWP action, particularly those on the same reach as the current EWP practice. Chapter 2 and Appendix E contain information on these federal programs.

State and Local Government Actions. State government actions often result from state delegation of some or all aspects of the federal programs discussed above. However, many other state actions, and most local government actions, are smaller and even more site-specific than the federal governmental program actions discussed above. Again, the actions considered are those occurring in the same watershed as the EWP action, particularly those on the same reach as the current EWP practice.

Private Actions. Private actions can include all nongovernmental actions that increase runoff or modify the hydraulic regime in the same watershed as the EWP activities. Such private actions are the most site-specific of all actions considered in the cumulative impact analysis. However, because they are ubiquitous, all such actions in a watershed tend to interact and to be reflected in the overall characterization of the watershed's water quality. Therefore, all such actions are considered in the cumulative impact analysis.

5.4.2 Cumulative Impacts Under the Current Program (Alternative 1)

Cumulative impacts for the three example watersheds under the Current Program are analyzed on a watershed by watershed basis in 5.4.3.1. Program-wide implications are discussed in 5.4.3.2

5.4.2.1 Cumulative Impacts in the Example Watersheds

Cumulative impact analysis in each example watershed starts with describing the relevant impacts for the EWP practice or practices and determining the relevant watershed ecosystem components for biological resources in the watershed. The analysis then determines what other actions should be considered. Determining the cumulative impacts is accomplished through analyzing the spatial and temporal interaction between the impacts of these actions. Finally, areas of uncertainty that may affect the analysis are discussed.

5.4.2.1.1 Buena Vista and Maury River Watersheds, Virginia

The affected environment information for the Buena Vista-Maury River watersheds is presented in Chapter 4, Section 4.2. Additional, detailed environmental information about the watershed is found in Section D.3.2 of Appendix D.

Relationship of Cumulative Impacts in the Buena Vista Watershed and the Maury River Watershed

As noted in Chapter 4, the two watersheds differ significantly in that the Buena Vista watershed is primarily urban and recreational or part of the George Washington and Jefferson National Forests, while the Maury River watershed is primarily agricultural. EPA has characterized the Maury River watershed as having "less serious water quality problems" and "low vulnerability to stressors" (EPA, 1999a). In the absence of any demonstrated impairment of the Maury River watershed downstream of the four streams that constitute the Buena Vista watershed, there do not appear to be any significant cumulative environmental impacts from the actions in the Buena Vista watershed downstream in the Maury River watershed. Similarly, there do not appear to be sufficiently intense agricultural impacts upstream from the reach of the Maury River that flows through Buena Vista, VA, and constitutes the receiving stream for the four streams that comprise the Buena Vista watershed, to cause any significant cumulative biotic impacts in the Maury River.

Cumulative Biological Impacts

The relevant EWP impacts for beginning this analysis are those associated with cobble and tree-slide debris removal. These impacts can be divided into two categories: (1) impacts associated with site preparation and (2) impacts associated with sediment and cobble or tree-slide removal and disposal. Impacts associated with site preparation include the removal of vegetation and topsoil, which may increase stream temperature, decreased habitat, increased turbidity and sedimentation, increased pollution from heavy equipment, and modification of water chemistry through the addition of sediment, nutrients, and other pollutants. Impacts associated with debris removal include the direct effects of the removal of bottom materials, such as disturbance of habitat and nesting, turbidity and sedimentation impacts, migration blockage, and physical and chemical water quality reduction. (see Darnell, 1976). These impacts are described more fully in Section 5.2.2.

Biological Watershed Ecosystem Components

Based on the types of impacts described above, the following biologic watershed ecosystem components were identified at the locations indicated within the watershed and downstream: (1) warm-water fisheries in the extreme lower reaches of the four tributary streams and in the Maury River; and (2) sedimentation and turbidity in the four streams and into the Maury River and, possibly, downstream. No wetlands or threatened or endangered species were found in the relevant portions of these watersheds.

Analysis of Cumulative Biological Environmental Consequences

The governmental and nongovernmental actions that have the potential to interact cumulatively with the EWP practices performed in the Buena Vista watershed are outlined in *Table 5.4-1 -- Cumulative Actions – Buena Vista Watershed*. Cumulative biological environmental consequences of the proposed action and the related actions are summarized below in *Table 5.4-2 -- Summary of Cumulative Impacts for the Buena Vista Watershed*, found at the end of Section 5.6. The overall cumulative biological significance of all of the actions analyzed is discussed in the paragraph entitled *Summary of Biological Cumulative Environmental Consequences* following table 5.4-1.

Table 5.4-1 -- Cumulative Actions – Buena Vista Watershed

Federal Actions	State Actions	Local Actions	Private Actions
Other EWP Practices (Bank Armoring and Debris Removal) Elsewhere in Watershed NRCS Buena Vista Public Law 566 Project (flood control) USFS Geo. Washington Nat. Forest Mgmt. Plan Corps of Engineers Flood Wall Project (incl. Flood protection of City STP) FEMA Disaster Assistance Program	Va. Dept of Emergency Services Flood Mitigation Activities Va. Dept. of Transportation post-flooding road and infrastructure repair and construction	City post-flooding CDBG block grant for drainage repair City post-flooding riprapping City post-flooding street and utility repair City school construction project ; borrow area for floodwall project	Flood repair Riparian area construction and modification Upland construction and ground disturbing activity Commercial, industrial, agricultural, forestry, recreational, and residential land use activities

Summary of Cumulative Biological Environmental Consequences

As Table 5.4-2 at the end of this section indicates, because of either time frame separation or spatial separation within the watershed, under the No Action Alternative (the Current Program*)* cumulative environmental consequences of the EWP practices are modest. No indication has been found of any cumulative interaction that would adversely affect any of the fisheries watershed ecosystem components identified in either watershed. No wetlands or threatened or endangered species were found in the project area, or are thought to be adversely affected. Very little interaction was found for the turbidity and sedimentation watershed ecosystem components, and that interaction was found to be only short-term in nature. The overall contribution of the EWP practices to water quality and habitat degradation in the watershed was small and far less influential cumulatively than the other actions, particularly the private actions, which were too numerous to evaluate individually. Overall, the contribution of all actions to water quality and habitat degradation in the watershed were modest. This is consistent with the EPA watershed characterization summarized in *Table 4.5-2* in Chapter 4, which indicates that the Buena Vista and Maury River watersheds exhibit "low vulnerability to stressors" (EPA, 1999a).

Therefore, from a biological standpoint, neither watershed would appear to be highly enough stressed environmentally to demand extensive coordination of future EWP practices with other potentially interactive actions. Nor does it appear that it is necessary to favor less environmentally impacting practices, such as floodplain easements or critical area treatment, over the more traditional structural EWP practices used in 1995 in either watershed in order to maintain cumulative biological impacts at an acceptable level in either watershed.

For example, because of the highly urban nature of floodplain usage in the Buena Vista watershed, it is less likely that floodplain easements will play as important role there than they potentially may play in the more rural Maury River watershed. On the other hand, the possibilities of Program coordination presented by the interaction of the various activities would appear to offer mutual Program benefits and savings that should not be discounted in either watershed (*e.g.,* see also the discussion of socioeconomic impacts that follows). See table 5.4-2 for a summary of cumulative impacts in Buena Vista, VA.

Socioeconomic and Other Human Resource Cumulative Impacts

Socioeconomic and other human resources are analyzed separately from biological impacts because their interactions are not limited to the watersheds in which they occur.

Socioeconomic Impacts in the City of Buena Vista, VA

In general, any potentially adverse effects of EWP project activity on the socioeconomic conditions of the Buena Vista, VA community are balanced against potential benefits. Some potential for disruption of the local neighborhoods surrounding specific project sites is possible. However, the primary effect of these actions is the general benefit of protecting the residential and commercial properties immediately surrounding the project sites, restoration of damaged land areas, and the improved appearance of the surrounding area following restoration and repair activity.

The cumulative effect of EWP activity on the socioeconomically defined region corresponding to natural boundaries of the Maury Watershed is influenced by a number of factors. These include the economic value of the watershed as a source of production (agriculture and industry), tourism and other recreational uses, and residential use of the land. The direct economic contribution of construction related expenditures associated with EWP activity in the Buena Vista, VA community is not expected to have a noticeable effect when arrayed against the regional economy of the watershed area. Similarly, any direct physical effect would not be expected to extend beyond the immediate community. In its current configuration, the project does not change or alter the physical condition of the site beyond what existed prior to the flood event. As a result, the project represents no net loss or acquisition of economically productive land, or land that may be converted to desired social uses.

However, the overall effect of the project is to reduce the potential threat to existing property posed by the potential for additional flooding in the future and to improve the general appearance and utility of available land. The potential for increased development in the Buena Vista, VA area and by extension, other areas of the watershed region does follow from the effect of EWP activity. The direct benefit of the project is the enhancement of the desirability of the region as a place to live and invest for local residents. At the same time, the project contributes, along with other locally based programs, to the attractiveness of the area for new residents and investors, thus increasing development pressures on the watershed.

Table 5.4-2 -- Summary of Cumulative Impacts of the Buena Vista Watershed

Actions for Cumulative Impact Analysis	Action Time Frames	Geographic Relationships to EWP Practices	Summary of Individual Action Environmental Impacts	Cumulative Impact Contribution of Individual Action
EWP Practice on Chalk Mine Run, Pedlar Gap Run, and Lowry Run	1995	Not applicable	Minor short-term increases in turbidity and sedimentation confined to lower reach of Chalk Mine Run; long-term impacts to environment should be positive as a result of reestablishing the flow regime and reducing the impacts of flooding	Minor short-term increases in turbidity and sedimentation; long-term reduction in nonpoint source runoff
Other EWP Practices in Watershed (bank armoring on Pedlar Gap Run and Debris removal on Pedlar Run and Indian Gap Run)	1996	On same and nearby streams in Buena Vista watershed	Minor short-term increases in turbidity and sedimentation confined to lower reaches of streams; long-term impacts to environment should be positive as a result of reestablishing the flow regime and reducing the impacts of flooding	Unlikely – actions not sufficiently time-linked
Buena Vista Watershed Public Law 566 Project	Near Future	On same streams in Buena Vista watershed	Potential short-term adverse impacts to fisheries during construction; long-term impacts should be positive as a result of the reduction of nonpoint source runoff into the watershed	Unlikely – actions not sufficiently time-linked
George Washington and Jefferson National Forests Management Plan	Ongoing	Upstream of all EWP practices in Buena Vista watershed	Maximization of natural vegetation on the high relief topography, this management should minimize runoff from the headwaters and reduce the likelihood of interactive impacts on the lower reaches of the streams	Unlikely – minimal nonpoint source runoff; no interaction with trout fishery sensitive indicator because of spatial separation
U.S. Army Corps of Engineers Floodwall Project	1992-1997	Immediately downstream from EWP practice on lower Chalk Mine Run and approximately 1 mile downstream from other EWP practices	Loss of 0.6 acres of subaqueous bottom and associated benthos; modification of 25 acres of terrestrial habitat, including the removal of some riparian vegetation, which was subsequently revegetated for wildlife and aesthetic benefits; widening and improvement of riparian habitat at Glen Maury Park across the Maury River; temporary water quality deterioration during the construction of the floodwall (but improvement of water quality in the long-term through addition of pools and riffles for fishery enhancement and terrestrial vegetation for wildlife values)	Minimal – actions time-linked but short-term increases in turbidity are minor and siltation spatially separated except on Lower Chalk Mine Run; long-term reduction in nonpoint source runoff
FEMA Disaster Assistance for Hurricane Fran Flood	1996	In same areas of the Buena Vista watershed as the EWP practices	Short-term increases in turbidity and sedimentation during the repair and construction phases of these activities; long-term impacts should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Unlikely – actions not sufficiently time-linked
Virginia Department of Emergency Assistance Hurricane Fran Flood Assistance	1996	Same as above	Same as above	Unlikely – actions not sufficiently time-linked

Table 5.4-2 – Cont'd

Actions for Cumulative Impact Analysis	Action Time Frames	Geographic Relationships to EWP Practices	Summary of Individual Action Environmental Impacts	Cumulative Impact Contribution of Individual Action
Virginia Department of Transportation Post-Flooding Road and Infrastructure Repair	1996	Same as above	Same as above	Unlikely – actions not sufficiently time-linked
City of Buena Vista CDBG Block Grant for Neighborhood Flood Repair	1996	Same as above	Same as above	Unlikely – actions not sufficiently time-linked
City of Buena Vista Post-Flood Riprapping	1996	Same as above	Same as above	Unlikely – actions not sufficiently time-linked
City of Buena Vista Post-Flood Street and Utility Repair	1996	Same as above	Same as above	Unlikely – actions not sufficiently time-linked
City of Buena Vista School Construction at Floodwall Borrow Pit Area	Near Future	Upslope from EWP practices on Pedlar Gap Run	Same as above	Unlikely – actions not sufficiently time-linked
Flood Protection for City Sewage Treatment Plant	1992-1997	Downstream on Maury River from EWP practices	Same as above	Minor short-term increases in turbidity and sedimentation; long-term reduction in point and nonpoint source runoff
Flood Repair Activities	Ongoing	In same areas of the Buena Vista watershed as the EWP practices	Short-term increases in turbidity and sedimentation during the repair and construction phases of these activities; long-term impacts should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Minor short-term and long-term increases in turbidity and sedimentation
Riparian Area Construction and Modification	Ongoing	Same as above	Same as above	Minor short-term and long-term increases in turbidity and sedimentation
Upland Construction and Ground Disturbing Activity	Ongoing	Same as above	Same as above	Minor short-term and long-term increases in turbidity and sedimentation
Commercial, Industrial, and Residential Land Use Activities	Ongoing	Same as above	Same as above	Minor short-term and long-term increases in turbidity and sedimentation
Flood Related Business Closures	Ongoing	Downstream in the Buena Vista watershed from the EWP practices	Significant reduction in manufacturing out put and employment in Buena Vista community	Unlikely – EWP practices have very minor employment input into Buena Vista economy
Railroad Bridge Modifications to Remove Flow Restrictions	Near Future	Downstream on same reaches as EWP practices	Same as above	Unlikely – actions not sufficiently time-linked

Total watershed management utilizing a non-engineered approach, such as that proposed under Alternative 3, would have the potential to significantly affect both the patterns of land use in the local community and the social and economic structure of the community, as well. Essentially, the cumulative social effect becomes a value based trade off between maintaining the status quo of the local community through short-term, engineered solutions and potentially altering the natural characteristics of the watershed; or restoring the natural qualities of the watershed and potentially altering land uses and social practices in the watershed community.

Land Use Impacts

The effects of the EWP practices within Buena Vista will be more significant on a localized level. However, the combination of the floodwall and increased flow from unimpeded streams within the city may result in greater flooding downstream in the watershed. The land outside of Buena Vista, in Rockbridge County, is primarily rural agricultural (Rockbridge County Comprehensive Plan, 1996). Any downstream effects of flooding in the City will cause damage to agricultural and rural residential areas rather than major population centers. The closest population center to Buena Vista is the town of Glasgow, situated approximately 11 miles downstream. In that location, both industrial and residential uses are near the Maury River. However, it is unlikely that any major land use decisions in that community will be altered due to the diversion of waters from Buena Vista.

Upstream from Buena Vista lie primarily agricultural and forested lands. The portion of Rockingham County within the greater watershed is very low density. Its agricultural land is zoned at approximately 1 dwelling unit (DU)/75 acres, encompassing a large amount of the area within the study watershed. In addition to the agriculture, much of the land is national forest and has prohibitions on development. Approximately 20% of the land in the study area is rural residential, with the densities averaging 1(DU)/acre. Development within the area is prohibited within 500' of the 100-year floodplain, resulting in a relatively unencumbered riverbank. According to the County, activity in that area is relatively nonexistent, thus presenting little threat to Buena Vista downstream. (Crowder, 1999)

The portion of Augusta County within the watershed is also comprised of primarily agricultural land and national forest. Only a small pocket of relatively concentrated development within the watershed exists, centered on Criglersville. However, nearly all the development is residential in nature, with a small amount of commercial also present. The area is zoned for agricultural uses with minimum lot sizes of one acre. Some of the area is also designated as agricultural conservation. No formal regulations are part of this designation; it merely demonstrates the intent of maintaining the agricultural nature of the land. The development potential of the lands within the watershed are primarily limited by the provision of water and sewer. Currently, the utilities are at their maximum capacity, so future development is not likely. The comprehensive plan does not include any changes to the area; the current level of development is expected to remain the same. (Earhart, 1999)

Augusta County also has a floodplain overlay district article governing development and activity within this area. Due to its location upstream from the EWP sites in Buena Vista, any activities regarding damming or relocation of watercourses could be detrimental. However, the article prohibits any such action within the floodplain, flood fringe, or floodway. (Augusta County Floodplain Article, Undated) Thus, any downstream effects on Buena Vista in this portion of Augusta County shall be nearly non-existent.

Impacts to Historic, Cultural and Recreational Resources

The EWP DSRs did not note any historic properties located in the project areas. However, this does not mean that historic resources were not present, since several historic sites have been identified on Indian Gap Run and Chalk Mine Run (NRCS DSRs, 1995a). Also, as noted in Chapter 4, significant historic and cultural resources are found in the City of Buena Vista, and abound in Rockbridge County (Rockbridge County, 1996). Nevertheless, given the lack of any specific impacts to historic and cultural resources identified in carrying out the EWP practices, and the relatively modest impacts to these resources from the other actions identified for cumulative impact analysis, it does not appear that any significant interaction between the actions resulted in any significant cumulative impacts to historic and cultural resources. Further, it does not appear that any recreational resources were adversely affected by the cumulative affects of the actions analyzed.

Areas of Uncertainty that Affect the Cumulative Impacts Analysis

At least some areas of uncertainty were identified regarding most of the actions considered in the cumulative impact analysis. Most importantly, the environmental analysis performed on the EWP practice under review (NRCS DSRs, 1995a) was very rudimentary, consisting essentially of only an economic justification of the practice. In addition, EWP practices that were carried out in 1992 could not be analyzed because the records of those projects are no longer available (Biddix, 1999).

Environmental baseline information required for the analysis initially was drawn from the EPA evaluation of the Maury River watershed, of which the Buena Vista watershed is a subwatershed (EPA, 1999a). This information is more general in nature than would be ideal. Fortunately, much of the more specific information needed was available from the NRCS Buena Vista Watershed Final Plan-Environmental Impact Statement (NRCS, 1999b), the U.S. Army Corps of Engineers Environmental Assessment and Supplemental Environmental Assessment (Corps, 1990 and 1992), and the County of Rockbridge Comprehensive Plan (Rockbridge County, 1996).

The major problem in the Buena Vista watershed was in the area of private land use actions, where more specific information would be useful. In addition, a comparable level of comprehensiveness of information was not as available for the Maury River Watershed as for the Buena Vista watershed. Thus, the relationship of impacts in the Buena Vista watershed to impacts in the Maury River watershed is less well documented than would be ideal.

5.4.2.1.2 Eighth Street Burn Area-Lower Boise River Watersheds, Idaho

The affected environment information for the Eighth Street Burn Area-Lower Boise River watershed is presented in Subsection 4.5.2. Additional, detailed environmental information about the watershed is found in Section D.3.3 of Appendix D.

Relationship of Cumulative Impacts in the Burn Area Watershed and the Lower Boise River Watershed

As noted in Chapter 4, the two watersheds differ significantly in that the Eighth Street Burn Area watershed was used primarily for grazing and recreation prior to the fire (with some mining, forestry, and residences in the area), while land use in the adjacent portion of the Lower Boise River watershed is primarily a commercial and residential urban area. However, even before the fire, and increasingly since, the private property portions of the area are under significant development pressures. As noted, EPA has characterized the Lower Boise River watershed as having “more serious water quality problems, but with “low vulnerability to stressors” (EPA, 1999b). Thus, in the absence of any demonstrated impairment of the Lower Boise River watershed downstream of Boise, there do not appear to be significant cumulative environmental impacts from the actions in the Boise watershed further downstream than perhaps in the immediate portion of the Lower Boise River watershed in the city itself.

Cumulative Biological Impacts

The relevant EWP impacts for beginning the analysis are those associated with “critical area treatment” practices (upland diversion, grade stabilization structures, critical area seeding, and the construction of debris basins). These practices have short-term and long-term impacts similar to those of debris removal, including creating access and grading, shaping, and re-vegetating affected areas by seeding or planting. The environmental consequences of all of these actions have been discussed in Sections 5.2.2, 5.2.3, 5.2.4, and 5.2.5.

Biological Watershed Ecosystem Components

Based on the types impacts described above, the following biologic watershed ecosystem components were identified at the locations indicated within the watershed and downstream: (1) warm water fisheries in the Lower Boise River; and (2) sedimentation and turbidity in the subwatershed streams, the Lower Boise River and, possibly, downstream.

Analysis of Cumulative Biological Environmental Consequences

The actions that have the potential to interact cumulatively with the EWP practices performed in the Boise watershed are outlined in Table 5.4.3.. Cumulative biological environmental consequences of the proposed action and the related actions are summarized in Table 5.4-4. The overall cumulative biological significance of all of the actions analyzed is discussed in the paragraph following Table 5.4.3.

Table 5.4-3 -- Cumulative Actions – Boise Watershed

Federal Actions	State Actions	Local Actions	Private Actions
Boise National Forest post-fire salvage timber sale Boise National Forest Management Plan BLM Boise Front ACC Plan Boise National Forest BAER Plan BLM Emergency Fire Rehabilitation Plan NPS Emergency Fire Rehabilitation Plan BIA Emergency Fire Rehabilitation Plan	Department of Disaster Services fire rehabilitation activities Department of Water Resources fire rehabilitation activities Department of Fish and Game fire rehabilitation activities Department of Lands fire rehabilitation activities Department of Agriculture fire rehabilitation activities Department of Transportation fire rehabilitation activities Department of Parks and Recreation fire rehabilitation activities Department of Veterans Affairs fire rehabilitation activities	Boise City Foothills Policy Plan Repair and reconstruction of Eighth Street road Other road and utility construction and repair projects	Grandfathered subdivisions in and adjacent to Burn Area Private fire repair activities Other upland construction and ground disturbing activity Commercial, industrial, mining, grazing, forestry, off-road vehicle recreational, and existing residential land use activities

Summary of Cumulative Biological Environmental Consequences

As Table 5.4-3 indicates, because of time frame linking and spatial proximity within the subwatersheds and in the reach of the Lower Boise River immediately downstream of the subwatersheds, under the No Action alternative (the Current Program) cumulative impacts are potentially significant in both watersheds. However, because of "low vulnerability to stressors" characterization in the EPA watershed characterization summarized in Table 4.5-4 in Chapter 4, there is no indication that such cumulative interaction that would adversely affect any of the fisheries watershed ecosystem components identified in either watershed (EPA, 1999b). No wetlands were found in the project area, or are thought to be adversely affected. Where sensitive or threatened or endangered species were found in the project area, mitigative measures were taken to ensure that no adverse impacts occurred (BLM, et al., 1996). Very little interaction was found for the turbidity and sedimentation watershed ecosystem components and that interaction was found to be only short-term in nature. The overall contribution of the EWP practices to water quality and habitat degradation in the watershed was small and far less influential cumulatively than the other actions, particularly the private actions, which were too numerous to evaluate individually. Overall, the contribution of all actions to water quality and habitat degradation in the watershed were modest. This is consistent with the "low vulnerability to stressors" characterization in the EPA watershed characterization.

Table 5.4-4 -- Summary of Cumulative Impacts for the 8th Street Burn Area and Lower Boise River Watersheds

Actions for Cumulative Impact Analysis	**Action Time Frames**	**Geographic Relationships to EWP Practices**	**Summary of Individual Action Environmental Impacts**	**Cumulative Impact Contribution of Individual Action**
EWP Practices on Cottonwood, Crane, Curlew, and Dry Creeks and Freestone and Hulls Gulches	1996-97	Not applicable	Minor short-term increases in turbidity at and downstream of all practices; long-term impacts to environment should be positive as a result of reestablishing the vegetation and reducing the impacts of runoff	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff
Bureau of Land Management (BLM) Salvage Timber Sale	1997	BLM Burn Area lands (in Burn Area watershed)	Minor short-term increases in turbidity; long-term impacts to environment should be positive as a result of reestablishing the vegetation and reducing the impacts of runoff	Same as above
BLM Boise Front Areas of Critical Environmental Concern (ACEC) Plan	Ongoing	BLM Boise Front lands (including part of Burn Area watershed)	Short- and long-term impacts should be positive as a result of more natural management resulting in the reduction of nonpoint source runoff into the watershed	Short- and long-term reduction in nonpoint source runoff should result in long-term positive interaction
Boise National Forest Management Plan	Ongoing (current plan adopted in 1990)	Boise National Forest (including part of Burn Area watershed)	Minor short-term increases in turbidity from runoff associated with limited grazing, hardrock mining, timber harvest, and off-road vehicle use; long-term impacts to environment should be positive as a result of increased efforts to combat the effects of these uses resulting in reestablishing vegetation and reducing the impacts of runoff	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff (livestock grazing removes flammable materials and reduces fire hazards)
Boise National Forest Burned Area Environmental Rehabilitation (BAER) Plan	1996-97	In National Forest portion of Burn Area watershed	Short-term increases in turbidity during the repair and construction phases of these activities; long-term impacts to environment should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff
BLM Emergency Fire Rehabilitation Plan	1996-97	In Burn Area watershed	Short-term increases in turbidity during the repair and construction phases of these activities; long-term impacts should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff
NPS Emergency Fire Rehabilitation Plan	1996-97	Same as above	Same as above	Same as above
BIA Emergency Fire Rehabilitation Plan	1996-97	Same as above	Same as above	Same as above
Idaho Department of Disaster Services fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above

Table 5.4-4 – Cont'd

Actions for Cumulative Impact Analysis	Action Time Frames	Geographic Relationships to EWP Practices	Summary of Individual Action Environmental Impacts	Cumulative Impact Contribution of Individual Action
Idaho Department of Water Resources fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Fish and Game fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Water Resources fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Fish and Game fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Lands fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Agriculture fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Transportation fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Parks and Recreation fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Idaho Department of Veterans Affairs fire rehabilitation activities	1996-97	Same as above	Same as above	Same as above
Boise City Foothills Policy Plan	Ongoing	Non-federal Boise Front Foothills lands (including part of Burn Area watershed)	Short- and long-term impacts depend on level of buildout in Foothills area; should be slightly negative to mildly positive depending on success of attempts to encourage more natural management, which could result in the reduction of nonpoint source runoff into the watershed	Short- and long-term increase or reduction in nonpoint source runoff depending on success of Plan; could result in either long-term positive or negative interaction
Repair and reconstruction of Eighth Street Road	1996-97		Short-term increases in turbidity during the repair and construction phases of these activities; long-term impacts should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff

Table 5.4-4 – Cont'd

Actions for Cumulative Impact Analysis	Action Time Frames	Geographic Relationships to EWP Practices	Summary of Individual Action Environmental Impacts	Cumulative Impact Contribution of Individual Action
Other road and utility construction and repair projects	Ongoing	Developed and developing portion of Burn Area and areas downslope	Same as above	Minor short- and long-term increases in turbidity
Private fire repair activities	1996-97	Developed portion of Burn Area	Short-term increases in turbidity during the repair and construction phases of these activities; long-term impacts should be positive as a result of the overall long-term reduction of nonpoint source runoff into the watershed	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff
Private upland construction, ground disturbing activity, and commercial, mining, grazing, forestry, recreational, and residential land use activities	Ongoing	Developed and developing portion of Burn Area and areas downslope	Short- and long-term impacts depend on level of buildout in Foothills area (particularly the buildout in two large grandfathered subdivisions); could be negative to mildly positive depending on success of attempts to encourage more natural management, which could result in the reduction of nonpoint source runoff into the watershed	Short- and long-term increase or reduction in nonpoint source runoff depending on success of Plan; could result in either long-term positive or negative interaction

Because both watersheds are relatively highly stressed environmentally, the extensive coordination of past (and hopefully future) EWP practices with other potentially interactive actions appears well warranted, in order to reduce the likelihood of significant cumulative impacts. Less environmentally impacting practices, such as the critical area treatments employed, appear to have been the appropriate choice over more traditional structural EWP in order to maintain cumulative biological impacts at an acceptable level in either watershed. Floodplain, or perhaps more properly "floodway" easements, or other similar land use controls, may also be useful practices in this context, particularly in the rapidly developing areas where "grandfathered" subdivisions occur. See Table 5.4-4 at the end of Section 5.6 for a summary of the cumulative impacts in the Boise Foothills area.

Socioeconomic and Other Human Resource Cumulative Impacts

Socioeconomic and other human resources are analyzed separately from biological impacts because their interactions are not limited to the watersheds in which they occur.

Socioeconomic Impacts in the City of Boise

The communities that lie within the Lower Boise Watershed represent a mix of urban and non-urban residential patterns identified with the City of Boise, its suburban expansion, and the more rural qualities of the upper drainage area of the watershed. In addition to the economic value of agricultural products, the watershed represents a significant economic and social influence on the surrounding communities in the form of recreation and tourism income that is supported by a number of parks, trails, and educational facilities located within the watershed. Especially sensitive, though more indirectly affected, the continuing viability of the city's northern suburbs and downtown core is dependent on the management and control of potential flooding.

The primary economic benefit associated with the watershed lies in the value of the private and public uses that have been made of the watershed region for the benefit of the local community. The installed EWP practices require some permanent commitment of land to flood control requirements and do not recover any additional land beyond what had existed prior to the 1996 fire. However, the improved visual quality of the affected area in conjunction with the increased value of the existing restored natural acreage and protected urban residential and commercial areas represents a significant beneficial contribution to the continuing viability of the watershed communities. Installed EWP practices contribute to existing plans for local development by restoring and protecting the residential communities north of the city in the Boise Foothills region. An increased potential for urban runoff may be associated with this expansion.

The Upper Boise Watershed region is representative of a situation in which the installed EWP practices are implemented in the more rural areas of otherwise metropolitan counties. The need to intervene in these rural and natural areas of the watershed in order to protect and enhance the value of urban property downstream is comparable to the situation found in the Antelope Valley of California. Here, another relatively rural area, located within the metropolitan county of Los Angeles, is also the subject of EWP activity. In both cases, the need to alter the natural contours of the watershed region in order to protect land and the existing property of major urban centers is a consideration. Also of importance is the potential for a differential impact on small rural landholders in order to assure the social investment in higher valued residential, commercial and industrial properties in the developed urban core.

Restoration of the land through re-vegetation, along with the elimination of potential threat through flood control practices, increases the desirability of the land for expanded urban development and subsequently the expanded growth of the city of Boise into the more natural areas of the watershed.

Land Use Impacts

Land development patterns in Boise are typical of many cities, sprawling into open space areas surrounding the urban core. Both residential and commercial development are encroaching on the naturally sensitive areas of the Boise watershed. The foothills surrounding the city, as well as the floodplain bisecting the urban core, both warrant protection from further development and degradation. Land use decisions in the watershed rest on policy to protect and strengthen the natural reserves. The EWP practices in place affect the types of development throughout the watershed. Without these practices coupled with policy plans of local governments, the expansion of Boise would be threatened. The EWP practices positively impact the overall land use of the area, allowing residential and commercial areas of Boise to be protected from further disaster.

Boise has taken several steps to protect the natural areas, thus safeguarding the future of the urbanized uses. Through its comprehensive plan, Boise has identified the protection of the floodplains and foothills as primary environmental concerns. Several methods, such as floodplain conservation easements, are proposed as potential policy action points for conserving these resources. In addition to these policies, the EWP practices aid in the protection of the resources from an engineering perspective. Projects are aimed at engineering solutions to reduce erosion and runoff.

Boise has adopted a Foothills Policy Plan in order to control the amount of development in the foothills areas surrounding the city, thus preventing further degradation of the natural vegetative cover. The Plan was initiated and developed by the City of Boise in the early 1990s. The primary impetus for the policy plan was the massive burn in the 1950s that consequently resulted in mass wasting and flooding of the City. At the time of the Eighth Street Burn, the Foothills Policy Plan was not formally adopted, yet it was nearly complete. (Eggleston, 6/15/99) It is a formal amendment to the comprehensive plan, and it is the primary guiding force for development within the area to the east/northeast of the city. (Foothills Plan, 1997)

The Plan establishes policies to control the amount and location of development within the Foothills area. Keeping development out of environmentally sensitive areas such as steep sloped hillsides, floodplains, and animal habitat is a primary goal aimed at preventing future degradation of the area. In protecting the entire watershed through stricter development controls, the likelihood of future fire-induced disasters is less likely. These controls will limit the development options for some land uses, while others will be encouraged. The limiting of employment, office, and commercial centers within the foothills area will hopefully result in a higher concentration of the uses in the established urban core of Boise. According to Ada County, Boise is attempting to prevent further sprawl into the foothills and concentrate growth in the developed areas of the city. (Nilsson, 6/25/99)

A majority of the land addressed under the plan lies outside of the City of Boise. Yet neighboring jurisdictions such as Ada County have also adopted the Plan until separate plans addressing individualized development circumstances can be developed. Ada County wants to discourage growth in the foothills, and supports the city’s strategies for focused growth. Ada County is currently near the adoption process of its own policy plan. The plan would limit the size of developments, prohibiting large planned developments within their jurisdiction. (Nilsson, 6/25/99) The County will withhold the provision of urban services to areas within the Foothills in order to discourage development.

Cumulatively, the EWP practices aid in the protection of the foothills ecosystem and the City of Boise. The impacts on areas adjacent to the foothills may inconvenience adjacent residential areas for the short-term, however, the long-term result of a vegetated watershed outweighs any negatives incurred through the clean-up process after the disaster event. The long-term effect of the EWP practices in the Boise watershed is best reflected in the different policy plans developed by different jurisdictions throughout the region. The plans envision the protection and return of natural vegetation to the foothills in order to protect all of the Boise area. These plans were developed through inter-jurisdictional efforts in many cases, and reflect similar goals. While Boise's Foothills Policy Plan does not provide for complete protection of the foothills area, it balances the needs of a growing city with increased natural disaster planning.

Areas of Uncertainty That Affect the Cumulative Impacts Analysis

At least some areas of uncertainty were identified regarding most of the actions considered in the cumulative impact analysis. However, the environmental analysis performed on the EWP practices under review (NRCS DSRs, 1995b) in the Interagency Fire Rehabilitation Report (BLM, et al., 1996) was carried out in a NEPA format and therefore was relatively thorough. Several environmental groups raised questions about the adequacy of NEPA consideration of the fire and fire rehabilitation impacts, particularly the visual and recreational impacts of proposed sediment detention dams, and threatened NEPA litigation (Eastman, 1997; Feldman, 1997; Lucas, 1996). NRCS correspondence with the individuals and groups involved, and the lack of ensuing litigation, indicates that those concerns were largely eliminated (Kiger, 1997a and 1997b).

In addition, the major source of information on affected environment in-stream water quality, from the EPA watershed analysis (EPA, 1999c), is also relatively general in nature. As a result, the environmental baseline information required for the analysis, while generally sufficient for the qualitative level of analysis performed here, ideally would have been more detailed. This is particularly the case where information regarding residential development in the lower Eighth Street Burn Area above the Lower Boise River, where more specific information on the private land-use actions would be beneficial. In this regard, the most useful information on private actions came from discussions of land use issues with the City Planning Department (Eggleston, 1999).

5.4.2.1.3 East Nishnabotna River Watershed, Iowa

The affected environment information for the East Nishnabotna River watershed is presented in Subsection 4.5.3. Additional, detailed environmental information about the watershed is found in Section D.3.4 of Appendix D.

Cumulative Biological Impacts

The relevant cumulative impacts for analysis are those associated with levee repair and woody debris removal. These impacts can be divided into two categories: (1) impacts associated with site preparation and (2) impacts associated with construction and dredging (soil disturbance, debris removal, and disposal). These impacts are described in Sections 5.2.2, 5.2.3, and 5.2.5 above.

Biological Watershed Ecosystem Components

Based on the types of impacts described above, the following biologic watershed ecosystem components were identified at the locations indicated within the watershed and downstream: (1)

warm water fisheries in the East Nishnabotna River; (2) wetlands in the East Nishnabotna River; and (3) sedimentation and turbidity in the East Nishnabotna River (and possibly downstream after its confluence with the West Nishnabotna River). The location of these watershed ecosystem components and their areas of influence within the watershed are shown on *Figure 5.4-3 -- Map of the East Nishnabotna River Watershed*.

Analysis of Cumulative Biological Environmental Consequences

The connected, similar, and cumulative governmental and nongovernmental actions that have the potential to interact cumulatively with the EWP practices performed in the East Nishnabotna watershed are outlined in *Table 5.4-5 -- Cumulative Actions – East Nishnabotna River Watershed*. Cumulative biological environmental consequences of the proposed action and the related actions are summarized at the end of Section 5.6 in *Table 5.4-6 -- Summary of Cumulative Impacts for the East Nishnabotna River Watershed.* The overall cumulative biological significance of all of the actions discussed is discussed in the paragraph entitled *Summary of Cumulative Biological Environmental Consequences* following Table 5.4-5.

Table 5.4-5 -- Cumulative Actions – East Nishnabotna River Watershed

Federal Actions	State Actions	Local Actions	Private Actions
Public Law 566 projects in Fremont County (flood control) FEMA levee repair and floodplain structure removal and relocation NRCS Floodplain Easements	Emergency Management Agency levee repair, floodplain structure removal and relocation activities Department of Transportation bridge, culvert, highway, and road replacement, construction, and repair	City and Drainage District levee repair, floodplain structure removal, and drainage modification activities	Development in Fremont County in vicinity of levee repair EWP Private flood repair Riparian area construction and modification Upland construction, ground disturbing activity, and commercial, industrial, agricultural, forestry, recreational, and residential land use activities

Summary of Cumulative Biological Environmental Consequences

As Table 5.4-6 indicates, because of either same or similar time frames or spatial positioning within the watershed, under the No Action Alternative, cumulative environmental contributions of the EWP practices themselves are not significant. Moreover, their interaction with other actions in the watershed have not caused significant measurable overall watershed environmental deterioration at the present time (EPA, 1999c). No indication has been found of any cumulative interaction that would adversely affect any of the fisheries watershed ecosystem components identified. No threatened or endangered species were found in the project area so none would have been adversely affected. While debris was burned on site, there is no indication of any significant enough air pollution condition to have resulted in any cumulative effect. In addition, the EPA watershed characterization summarized in Table 4.5-5 in Chapter 4 indicates that the East Nishnabotna River watershed exhibits “low vulnerability to stressors” (EPA, 1999c).

Table 5.4-6 -- Summary of Cumulative Impacts in the East Nishnabotna River Watershed

Actions for Cumulative Impact Analysis	Action Time Frames	Geographic Relationships to EWP Practices	Summary of Individual Action Environmental Impacts	Cumulative Impact Contribution of Individual Action
EWP Practices on East Nishnabotna River	1998	Not applicable	Minor short-term increases in turbidity at and downstream of all practices; long-term impacts to environment should be positive as a result of reestablishing the vegetation and reducing the impacts of runoff	Minor short-term increases in turbidity; long-term reduction in nonpoint source runoff
NRCS Floodplain Easements	Ongoing	In same watershed, adjacent to and downstream from Riverton State Game Management Area	Short-term and long-term reductions to turbidity and sedimentation as a result of reestablishing the vegetation and reducing the impacts of runoff	Modest but significant improvement in wetlands and riparian habitat; enlargement and improvement to wildlife habitat in Riverton State Game Management Area
FEMA, state, and local government efforts to remove structures from floodplain	Ongoing	Upslope from the EWP practices, both upstream and downstream	Positive short-term and long-term impacts resulting from more natural vegetation and less land disturbing activity in floodplain	Modest but significant improvement in aquatic, wetlands, and riparian habitat if activities continue
Agricultural land uses	Ongoing	Upslope from the EWP practices, both upstream and downstream	Predominant agricultural use of watershed (approximately 90% of land area) results in short- and long-term soil runoff that contributes to turbidity and sedimentation upstream and downstream of all practices, as well as wetland and riparian vegetation losses; many activities have significantly modified hydrologic regime of stream	Significant short- and long-term increases in turbidity and sedimentation, loss of aquatic habitat and wetlands through hydrologic modification of river and tributary streams
Commercial and residential land uses	Ongoing	Upslope from the EWP practices, both upstream and downstream	Very minor land use in watershed (less than 1% of land area, but concentrated in floodplain area) results in short- and long-term contribution to turbidity and sedimentation upstream and downstream of all practices (one potential development in and near floodplain is in close proximity to levee repair project near city of Shenandoah)	Modest but potentially significant short- and long-term increases in turbidity and sedimentation
Public Law 566 Projects	Ongoing	At various locations in the East Nishnabotna River Watershed	Minor short-term increases in turbidity and sedimentation at and downstream of all practices; long-term impacts to environment should be positive as a result of reducing the impacts of runoff	Minor short-term increases in turbidity and sedimentation; long-term reduction in nonpoint source runoff

Thus, the cumulative impacts of the EWP levee repair practices and the debris removal do not appear significant at the watershed level. The overall contribution of the EWP practices to water quality and habitat degradation in the watershed was small in and of itself and far less influential cumulatively than the other actions, particularly the private actions, which were too numerous to evaluate individually. Overall, the contribution of all actions to water quality and habitat degradation in the watershed were modest. This is consistent with the EPA characterization that the watershed exhibits "low vulnerability to stressors."

However, wetlands losses from both intentional and unintentional actions of numerous individual farmers in the watershed appear to be a serious concern. These impacts result from drainage system modification and wetlands filling and draining, and from agricultural runoff as well. These impacts appear to be cumulative both in the short-term and long-term.

Therefore, from a biological standpoint, the watershed would appear to be highly enough stressed environmentally to recommend extensive coordination of future EWP practices with other potentially interactive actions. In addition, it appears that less environmentally impacting practices, such as floodplain easements or critical area treatment, are preferable to the more traditional structural EWP practices used in 1998 in order to maintain cumulative biological impacts at an acceptable level in either watershed.

The possibilities of Program coordination presented would appear to offer a high degree of mutual Program benefits and savings that should not be discounted. In particular, the combined efforts of FEMA, its Iowa emergency management organization, and the local drainage districts to purchase land in the floodplain for the removal of structures and the reestablishment of normal floodplain hydrology and riparian vegetation would appear to be well suited for augmentation by a floodplain easement purchase program similar to the pilot project carried out by NRCS in Jasper County, IA.

However, while these actions should be beneficial to the watershed, it is not possible to predict from the information available at this time whether these improvements in the EWP Program in combination with other Federal, State, and local programs would reduce the wetlands losses below the level of significance. Therefore, implementation of this alternative should include sufficient monitoring of the environmental resources that are significantly affected at present to determine how well they recover as the current stresses are reduced. See Table 5.4-6 at the end of Section 5.6 for a summary of the cumulative impacts in the East Nishnabotna watershed.

Socioeconomic and Other Human Resource Cumulative Impacts

Socioeconomic and other human resources are analyzed separately from biological impacts because their interactions are not limited to the watersheds in which they occur.

Socioeconomic Impacts in the East Nishnabotna Watershed Communities

In the present decade, flooding and flood related damage has had a significant impact on the economic and social life of the community defined by the East Nishnabotna Watershed. The individual cities and residential settlements in this predominately rural area are generally smaller and have fewer resources available to address emergency related conditions. Although older and more stable in terms of growth and residence patterns, the continuing viability of these communities, as well as their attractiveness as a place to live and invest, is potentially threatened by the impact of repeated flooding.

The cumulative impact of the EWP practices within the watershed region, considered as a whole, does not represent a major change to the social environment. Including debris removal efforts in Montgomery County, bank erosion practices in Page County, and levee repair in Fremont County, EWP actions were primarily directed toward restoration of the affected communities to pre-flood conditions and contributed to the recovery of economically productive, agricultural acreage that is important to the local economy. The direct benefit of the project is to remove the potential threat to the areas affected. EWP installed practices contribute, along with other regional efforts, to the continuing viability of the local community.

In addition to EWP practices within the watershed, efforts are being made to remove and relocate the most severely damaged residential and other properties. These efforts have the potential to significantly affect social conditions in the local communities by removing residents, or altering the structure or patterns of everyday life. By contrast, EWP practices are less intrusive in the social life of the community, but do require a long-term commitment of resources to maintenance. In addition, while the immediate threat is removed, a potential does exist for future damage to residential, agricultural, or other economically productive land that may result if these structures should fail in the future. Because communities in this region are more established and have deep historical roots, short term, less intrusive practices may be especially attractive. However, in coordination with other agencies active in flood control efforts in the East Nishnabotna region, EWP easement practices also represent a viable alternative.

Land Use Impacts

The EWP practices in the E. Nishnabotna watershed have several different effects on land use decisions of various jurisdictions. Levee repair and debris removal within the watershed are both aimed at creating natural, unimpeded flow of the E. Nishnabotna. Different development decisions by the various counties and cities along the river will largely depend upon the integrity of the EWP practices. The level of land use planning varies between the jurisdictions, some having more progressive policies towards environmental area protection.

The central portion of the watershed encompasses three different counties and several small rural communities. The majority of the communities' economies rely on agriculture, situated on or near the river and its floodplain. (Page County Comp Plan, 1996) This close proximity to the river causes the effects of the EWP practices to play a major role in the stability of the land uses within the communities. While much of the land near the floodplain is primarily agricultural, other uses also appear in various locations throughout the watershed. Industrial, commercial, and residential uses are all within close proximity to the potentially affected areas. If EWP practices were not in effect, these areas could flood more easily, causing adverse impacts to life and property.

Montgomery County is one jurisdiction lacking any development regulations regarding floodplains. Recognizing this deficiency, the County states that development in these hazardous areas is at one's own risk. (Montgomery County Comp Plan, 1996) Without intact levees and unimpeded river flow, this flooding would increase, further endangering the community within the area. Despite lacking these regulations, the County does not appear to be considering major changes in its land use policy. Some land in and around the floodplain is currently zoned for industrial development, permitting various uses. The comprehensive plan does not address any intended changes to protect the lands near the river; thus, EWP practices will continue to expand. Neighboring Page County's land use policies address building within the floodplain and its immediate area. While most land near the floodplain is zoned agricultural, industrial and residential uses also exist. (Page County Zoning Map, 1997) The County's comprehensive plan addresses the need to keep inappropriate development out of the floodplains, while also promoting the preservation of prime agricultural soils for agricultural use. Most areas along the E. Nishnabotna in the county are used as agriculture, yet some locations between the cities of Shenandoah and Essex are zoned industrial. The plan envisions reverting some of the lands zoned as industrial back to agricultural. However, some industrial uses will remain in this corridor. (Page Comp Plan, 1996) Due to the presence of these industrial locations, the integrity of the EWP practices is necessary for protection during natural events. Without the nearby EWP practices, industrial lands could be inundated during a flood, resulting in a loss of property.

The protection of lands near Shenandoah in Fremont County also largely depends upon the adjacent EWP practices. As previously mentioned, lands intended for industrial development may possibly expand when the comprehensive plan update is complete. The rezoning of agricultural land to industrial uses would result in possible detrimental effects to new development occurring near the river. Thus, the EWP levee repair would be necessary to protect any possible losses of developed property.

Areas of Uncertainty That Affect Cumulative Impacts Analysis

Some areas of uncertainty were identified with respect to most of the actions considered in the cumulative impact analysis. Most importantly, the environmental analysis performed on the EWP practice under review (NRCS DSRs, 1998) was very rudimentary, consisting essentially of only an economic justification of the practice. The most useful information on private actions came from discussion of land use issues with the regional planning agency (Hall, 1999). Unfortunately, at this time no specific information has not been gathered on the Public Law 83-566 projects carried out by NRCS in the watershed. Thus, the cumulative relationship of impacts in the entirety of the East Nishnabotna watershed is more problematic than would be desirable.

5.4.2.2 General Implications of Cumulative Impacts (Alternative 1) Program-Wide

Under the No Action Alternative (Current Program), cumulative environmental contributions of the EWP practices themselves in the three example watersheds typically were not significant because of the absence of either same or similar time frames and/or spatial positioning within the watershed relative to the occurrence of the other actions. Moreover, the interaction of EWP practices with other actions in their respective watersheds typically was not found to have not resulted in significant measurable overall watershed environmental deterioration. This is consistent with the respective EPA watershed characterizations (EPA, 1999c).

The overall contribution of the EWP practices to water quality and habitat degradation in all three watersheds was found to be small in and of itself and far less influential cumulatively than the other actions. This was particularly the case with regard to the many small private actions that were found to be far too numerous to evaluate individually but relatively important cumulatively.

However, where a watershed is significantly stressed from other sources, the contribution of EWP practices, though small, could contribute to significant negative cumulative impacts. The wetlands losses from both intentional and unintentional actions of numerous individual farmers in the East Nishnabotna watershed are instructive with regard to this potential. In the East Nishnabotna watershed, drainage system modification, wetlands filling and draining, and agricultural runoff have led to significant wetlands losses that appear to be cumulative both in the short-term and long-term. The sediment and turbidity contributions of EWP practices, while not significant themselves, were found likely to have interacted with the other actions to contribute to the wetlands losses.

Therefore, from a biological standpoint, where a watershed appears to be highly enough stressed environmentally to be found "vulnerable" by EPA, coordination of future EWP practices with other potentially interactive actions would appear highly advantageous. In addition, it appears that less environmentally impacting practices, such as floodplain easements or critical area treatment, would be preferable in these situations to the more traditional structural EWP practices that have been used in the past, in order to maintain cumulative biological impacts at acceptable levels.

5.4.3 Cumulative Impacts Under the Proposed Alternative (Alternative 2)

Alternative 2 contains 15 elements designed to improve the EWP Program and incorporate new restoration practices. These elements would be expected to influence cumulative impacts as follows:

Eliminating the terms "exigency" and "non-exigency" would be intended to speed up the overall EWP process while allowing more time for the DSR team to evaluate EWP site. This could result in a reduction of the short-term negative EWP contribution to cumulative impacts. However, this change would work in combination with the next requirement, which might tend to limit its application.

Stipulating that "urgent" and "compelling" situations be addressed immediately upon discovery would allow immediate action when life- or property-threatening situations occur. This might result in a slightly greater short-term negative EWP contribution to cumulative biological impacts from the immediacy of applying the EWP practice selected and a slightly larger positive EWP contribution to socioeconomic impacts from the perspective of reduced losses and increased contribution of funds to the local economy. Long-term impacts would likely remain the same.

Setting priorities for funding of EWP practices would place some additional emphasis on T&E species and cultural resources, thus tending to lessen the short-term negative EWP cumulative impact contribution to cumulative biological impacts. However, since NRCS would still follow FEMA and state emergency agency direction, these potential lessened impacts might not materialize. Long-term impacts would likely remain the same.

Establishing a cost-share of up to 75 percent for all EWP projects (up to 90 percent for projects in limited resource areas) would make the Program more readily available in lower income communities. This could result in higher short-term positive EWP cumulative socioeconomic benefits to communities, particularly low-income communities. Long-term benefits could be positive as well.

Stipulating that practices be economically, environmentally, and socially defensible (with criteria for meeting these requirements) would tend to lengthen the process over that of the Current Program, which is less extensive in this respect. While conforming with these requirements should result in more environmentally beneficial decisions, the decisions might take more time. Thus, short-term impacts of the EWP practices might be increased and the long-term impacts decreased by this requirement.

Improving disaster-recovery readiness through training, interagency coordination, and planning would likely result in decreased short-term and long-term effects through improving the response capabilities of NRCS and other personnel charged with implementing EWP practices.

Allowing repair of impairments to agricultural lands using sound conservation alternatives would likely result in a short-term increase in runoff-related impacts and a long-term decrease in such impacts. However, the emphasis on structural solutions might result in slight decreases in downstream wildlife habitat values.

Limiting repair of sites to twice in a ten-year period would likely result in continued damages as landowners continue to try to make it work.

Eliminating the requirement of multiple beneficiaries would likely result in quicker and more efficient use of available resources and allow those resources to be more environmentally protective than at present. This could reduce both short-term and long-term impacts from EWP practices.

Applying natural stream dynamics and bioengineering to EWP practice design would likely have much more positive effects on reducing short-term erosion impacts. Long-term impacts should be slightly less as a result of more environmentally sensitive conservation practice implementation.

Simplifying purchase of agricultural easements should result in greater usage of such easements. The more natural uses encouraged by these easements should result in reduced short-term and long-term water quality impacts and improved habitat.

Repairing enduring conservation practices would be likely to result in reduced short-term and long-term erosion but, as a result of likely associated bank-hardening, aquatic, wetland, and floodplain habitat values might be somewhat reduced.
Cooperatively funding parts of projects would likely result in greater cooperation between the various agencies involved. This could result in more efficient use of available resources and allow those resources to be more environmentally protective than at present. This could reduce both short-term and long-term impacts from EWP practices.

Allowing certain EWP practices to be performed away from streams and in uplands would be limited to allowing the removal of floodplain deposition on cropland and tornado debris from uplands. Therefore, this change would not be likely to result in more natural uses of the floodplain and more emphasis overall on repairing upland flood damage. However, this change could be beneficial both to upland and floodplain habitat protection and upgrade in the limited circumstances where it applies.

Purchasing easements on non-agricultural lands would tend to place more protection in those areas. This could have positive impacts on protecting such areas. However, this might result in more intensive use of the associated agricultural lands, which could increase both short-term and long-term runoff impacts from those lands.

While some of the elements would continue to favor structural, engineering methods and rapid response to sudden impairments, the net thrust of the Program improvements would favor the evolution of a more nonstructural, environmental approach. A substantial majority of the components would appear to directly favor the latter approach. Thus, the thrust of the EWP Program would continue to evolve in this direction.

5.4.3.1 Cumulative Impacts of Alternative 2 in the Example Watersheds

Applying the Program changes proposed in Alternative 2 to the example watersheds, the likely changes in context and intensity of impact can be estimated qualitatively.

5.4.3.1.1 Buena Vista-Maury River Watersheds, Virginia

The lack of time-linking of the identified actions in the Buena Vista watershed makes it unlikely that measurable decreases in cumulative impacts would be able to be found for those actions. Moreover, the disproportionate impacts of the other actions in the watershed in relation to the impacts of EWP practices makes it difficult to reduce cumulative impacts in the watershed through the EWP changes included in Alternative 2 alone.

However, there may be measurable decreases in cumulative interaction with the ongoing construction and ground disturbing activity and commercial, industrial, and residential land use activity in the riparian and upland areas of the Buena Vista watershed. These decreases could result from better DSR evaluation of the need for bank armoring that might result in the establishment of stream buffers in floodplain easement areas as EWP funds become available for non-agricultural lands.

There also might be a slight reduction in the short-term impacts of debris removal through the employment of less intrusive techniques of natural stream dynamics and bioengineering approaches to these practices. More cooperation between the various agencies involved in flood restoration could result in floodplain critical areas determinations and removal of structures and reestablishment of natural vegetation in key areas, which could reduce the cumulative contribution of future EWP practices. Such approaches might lead to greater socioeconomic short-term impacts as a result of increased resettlement. However, the long-term socioeconomic impacts could be more positive as a result of increased property values on property that becomes less flood-prone.

5.4.3.1.2 Eighth Street Burn Area-Lower Boise Watersheds, Idaho

The potentially cumulative actions were considerably more time-linked in the Eighth Street Burn Area watershed than in the Buena Vista watershed discussed above. Again, the disproportionate impacts of the other actions in the watershed in relation to the impacts of EWP practices makes it difficult to reduce cumulative impacts in the watershed through the EWP changes included in Alternative 2 alone.

However, despite the greater potential for interaction of impacts in this watershed, there would be a high likelihood of measurable decreases in cumulative interaction with the other federal agency actions (BLM, NFS, NPS, BIA) and state actions (Department of Disaster Services, Department of Water Resources, Department of fish and Game, Department of Lands, Department of Agriculture, Department of Transportation, Department of Parks and Recreation). Moreover, this decrease could occur despite the higher than normal coordination that developed between the federal and state agencies in this instance as a result of local public pressure and congressional interest in the effects of the fire.

In particular, there might be a significant reduction in the short-term impacts of special area treatment through the employment of less intrusive fluvial geomorphological and bioengineering approaches to these practices. However, given the extensive development pressure in this watershed, it might be very difficult to apply these less environmentally intrusive EWP approaches, despite the efforts of the Boise Foothills Policy Plan. The development of the two large, grandfathered subdivisions could establish precedent that would be difficult to overcome through local government land use control. More successful growth-slowing efforts in the watershed would result in a different development scenario, which might have extensive cumulative socioeconomic implications. However, it is unlikely that these changed growth patterns would adversely affect the overall growth prospect, and if the Foothills Policy Plan resulted in a perception of better quality of life in the community and enhanced recreation potential, economic growth might be spurred.

Thus, despite these potential difficulties outlined above, the incremental Program changes should reduce long-term cumulative impacts in all but the most severe natural disasters. However, activities that are not included in Alternative 2, such as limiting of uses that may result in maninduced fires in this area and instituting more effective natural range fire reduction strategies, might be required to reduce the threat of catastrophic fires to the point where long-term cumulative impacts would be measurably more unlikely.

5.4.3.1.3 East Nishnabotna Watershed, Iowa

All of the other actions identified in the East Nishnabotna watershed were time-linked and the potential for significant cumulative detrimental impacts to wetlands were identified under the No Action Alternative. The incremental Program changes proposed for Alternative 2 could help reduce the EWP practice contributions to cumulative impacts in the watershed. The most beneficial aspect of the Alternative 2 changes to the EWP Program would likely result from potentially greater usage of floodplain easements in the watershed. In particular, simplifying easement purchase requirements and purchasing easements on both agricultural and non-agricultural land, in conjunction with local government efforts to move structures out of the floodplain could substantially improve the buffering of upslope sediment loss that is having a significant effect in producing wetlands loss in the main stream and tributaries.

Allowing repair of impairments to agricultural lands using sound engineering alternatives could be used in this watershed in a similar manner to a floodplain easement taken in Missouri, where a setback levee was used to create wetlands while at the same time protecting adjacent agricultural lands. This type of combination of protecting natural and agricultural land uses may be necessary in intensely agricultural watersheds like the East Nishnabotna.

Other elements of Alternative 2, such as setting more conservation-oriented priorities for EWP practices, requiring environmental defensibility, improving disaster-recovery readiness, and limiting repair of sites to twice in a ten-year period would likely result in reducing the use of structural practices even more and thereby reduce the short-term impacts of implementing structural practices.

However, the sheer magnitude of the differential between EWP practice impacts in the watershed and the impacts of the other practices, particularly the nearly ubiquitous agricultural practices, would make it impossible for the reduction of the EWP practice impacts to have a substantial impact on reducing cumulative impacts, even with the modest coordination of the EWP Program with other emergency and watershed-related that would occur in this Alternative.

5.4.3.2 General Implications of Alternative 2 Cumulative Impacts Program-Wide

It does not appear that the Program changes that would be incorporated in Alternative 2, which would be incremental rather than programmatic, would either enlarge or reduce the context in which cumulative impacts would be experienced. Thus, cumulative impacts of the EWP practices would, as under the Current Program Alternative, still occur the 8-digit HUC Buena Vista and Eighth Street Burn Area watersheds and the 12-digit HUC East Nishnabotna watershed. As a result of the Program elements that would be incorporated in Alternative 2, the reduced cumulative inputs from the EWP practices would produce smaller impacts in the example watersheds, particularly at the 8-digit HUC levels, as discussed in the three example watershed analyses above.

Those lessened impacts would have a higher likelihood of being measurably positive in ecologically stressed watersheds, such as the East Nishnabotna watershed. However, it is important to stress that the disproportionate impacts of the other actions in the watershed in relation to the impacts of EWP practices would make it impossible to reduce cumulative impacts in the watershed through the EWP changes included in Alternative 2 alone.

The results of the analyses of the three example watersheds cannot be scaled up to a National analysis. However, the results of the analysis in the three example watersheds lead to several implications for the overall EWP Program. First, the proposed Program elements would result in overall improvement in the environmental performance of EWP practices themselves. Second, the additional coordination between NRCS and other federal, state, and local agencies under this alternative would result in more efficient use of both NRCS resources and the resources of the other agencies where detrimental impacts to watersheds are concerned. Third, NRCS might find it advantageous to take the differences that the three example watersheds exhibit into account in formulating its plans, should Alternative 2 be selected for implementation. This is implicit in the formulation or the new Program elements, which deal with a larger mix of agricultural and non-agricultural uses than has the traditional EWP Program.

5.4.4 Cumulative Impacts Under Prioritized Watershed Planning and Management (Alternative 3)

Alternative 3 contains 5 elements designed to integrate the EWP Program into the broader NRCS mission and mandate of watershed management. These elements would be expected to influence cumulative impacts as follows:

- *Continuing to deliver EWP project funding and technical assistance to address immediate threats to life and property* would continue to allow immediate action when life- or property-threatening situations occur. This might result in a slightly greater short-term negative EWP contribution to cumulative biological impacts from the immediacy of applying the EWP practice selected and a slightly larger positive EWP contribution to socioeconomic impacts from the perspective of reduced losses and increased contribution of funds to the local economy. Long-term impacts would likely remain the same.

- *Instituting the 15 improvements and expansion of Alternative 2 noted above* would have the effects on cumulative impacts discussed in Section 5.4.3.

- *Facilitating locally led pre-disaster planning efforts* would address recurrent EWP practices in watersheds with a history of frequent disasters by categorizing such watersheds as high in a high-medium-low hierarchy of all of a state’s watersheds. This should result in a preplanning effort that would reduce the short- and long-term impacts of the EWP practices in those high risk, high impact watersheds. To the extent that Alternative 2 level disaster-recovery planning in medium- and low-priority was not adversely affected, the effects should be positive in those watersheds as well.

- *Funding priority watersheds in each state for pre-disaster planning and management* would coordinate EWP preparation and implementation better in these priority watersheds, which should substantially reduce the short- and long-term impacts from future natural disasters if the preventive measures of the following element were successfully implemented.

- *Coordinating pre-disaster planning and management efforts with Federal, state, and local agencies and interested stakeholders* would implement preventive and restorative practices that take watershed functions and values into account and integrate NRCS programs with the overall EWP Program goals. This effort would involve purchasing floodplain easements on a stepwise, proactive, risk-reducing basis as an integrated part of overall watershed management, combining the EWP Program with other programs that enhance watershed values. Those watershed values would include fish and wildlife habitat improvements.

This alternative is a comprehensive approach that would fully address cumulative impacts in a NEPA-based analysis approach. Unlike the incremental approach of Alternative 2, Alternative 3 would approach watershed environmental impacts programmatically and cumulatively. This approach should result in substantial reductions, not only of EWP contributions to cumulative watershed impacts, but of potentially all of the other actions as well, depending on how well local government and private stakeholders are involved.

5.4.4.1 Cumulative Impacts in the Example Watersheds

Applying the Program changes proposed in Alternative 3 to the example watersheds, the likely changes in context and intensity of impact can be estimated qualitatively.

5.4.4.1.1 Buena Vista-Maury River Watersheds, Virginia

Under Alternative 3, minimum short-term turbidity impacts would occur to aquatic and wetlands and floodplains resources. This would result from improvements to both impairment minimization and restoration practices as NRCS improvements in expanded EWP practices and the P.L. 566 Project made increased use of techniques to create and maintain more natural conditions in these areas. If other federal and state agency programs (e.g., USFS, Corps, FEMA, VDES, VDOT, and City of Buena Vista) were implemented in a more coordinated manner, these impacts should be reduced even more. This emphasis on planning should improve terrestrial habitat on a larger scale. Thus, areas outside of the floodplain and stream corridors might be converted into natural areas. This could enhance overall property values in the City (particularly those properties adjacent to these improved environmental amenities) to a greater extent than under the other two alternatives. Where impacts to socioeconomic and other human resources are concerned, as discussed in more detail above, shifts in Program emphasis might result in a markedly different mix between agriculture and other uses in the larger Maury River watershed, as more extensive use might be made of conservation practices in both flood-prone and non-floodprone areas. Thus, under this alternative, more extensive areas outside of the floodplain and stream corridors might be converted into natural areas. This, in turn, combined with watershed prioritization, could lead to lessened damages to watersheds from sudden impairments in future natural disasters. The Buena Vista watershed would clearly be high priority watershed in this hierarchy.

5.4.4.1.2 Eighth Street Burn Area-Lower Boise Watersheds, Idaho

Under Alternative 3, minimum short-term sedimentation and turbidity impacts would occur to aquatic and wetlands and floodplains resources. This would result from improvements to both impairment minimization and restoration practices as NRCS improvements in expanded EWP practices made increased use of techniques to create and maintain more natural conditions in these areas. If other federal and state agency programs (e.g., USFS, BLM, FEMA, NPS, BIA, and City of Boise) were implemented in a more coordinated manner, these impacts should be reduced even more. This emphasis on planning should improve terrestrial habitat on a larger scale. Thus, areas outside of the floodplain and stream corridors might be converted into natural areas. This could enhance overall property values in the City (particularly those properties adjacent to these improved environmental amenities) to a greater extent than under the other two alternatives. Where impacts to socioeconomic and other human resources are concerned, as discussed in more detail below, these shifts in Program emphasis might result in even more development pressure on the watershed, as discussed below. Thus, under this alternative more extensive areas outside of the floodplain and stream corridors might be converted into natural areas. This, in turn, combined with watershed prioritization, could lead to lessened damages to watersheds from sudden impairments in future natural disasters. However, under this alternative, implementation of viable development management plans, such as the Boise Foothills Policy Plan, would be vital to help control induced growth. The Eighth Street Burn Area watershed would clearly be high priority watershed in this hierarchy.

5.4.4.1.3 East Nishnabotna Watershed, Iowa

Under Alternative 3, minimum short-term sedimentation and turbidity impacts would occur to aquatic and wetlands and floodplains resources. This alternative would be the most likely to reduce or eliminate the significant wetlands loss currently being experienced in the watershed. This would result from improvements to both impairment minimization and restoration practices as NRCS improvements in expanded EWP practices (particularly a greatly expanded use of conservation easements throughout the watershed) and Public Law 566 projects made increased use of techniques to create and maintain more natural conditions in these areas. If other federal and state agency programs (e.g., Corps, FEMA, Iowa DOT, and local governments) were implemented in a more coordinated manner, these impacts should be reduced even more. This emphasis on planning should improve terrestrial habitat on a larger scale. Thus, areas outside of the floodplain and stream corridors might be converted into natural areas. This could enhance overall property values in the small communities (particularly those properties adjacent to these improved environmental amenities) to a greater extent than under the other two alternatives. Under this alternative, more extensive areas outside of the floodplain and stream corridors might be converted into natural areas. This, in turn, combined with watershed prioritization, could lead to lessened damages to watersheds from sudden impairments in future natural disasters. Improvements in existing land use planning are vital, and would be more likely to occur under this alternative. The East Nishnabotna watershed would probably be high priority watershed in this hierarchy; given the stressed nature of the watershed, indicated by the wetlands losses it continues to experience, it should be afforded high priority under proactive Alternative 3 whether or not it has a history of past EWP or not simply for its cumulative impacts situation.

5.4.4.2 General Implications of Alternative 3 Cumulative Impacts Program-Wide

As with the incremental changes involved in Alternative 2, it does not appear that the programmatic changes that would be involved in Alternative 3 would either enlarge or reduce the context in which cumulative impacts would be experienced. There also was no indication in any of the example watersheds that the changes in intensity that the Alternative 3 Program improvements would institute would result in impacts being experienced outside of the example watersheds. However, there is a possibility that the direct and indirect impacts of the improved EWP practices would be reduced enough not to interact with other actions even inside the 8-digit HUC watersheds.

Those reduced impacts would have a still higher likelihood of being measurably positive in ecologically stressed watersheds, such as the East Nishnabotna watershed. However, it is still important here to note that the disproportionate impacts of the other actions in the watershed, in contrast to the impacts of EWP practices, would make it difficult to reduce cumulative impacts in the watershed, even if direct and indirect EWP impacts would be reduced under Alternative 3 coordination efforts.

As with the other two alternatives, the results of the analyses of the three example watersheds cannot be scaled up to a national analysis. However, the results of the analysis in the three example watersheds lead to several implications for the overall EWP Program. First, the proposed Program elements would result in the best overall improvement in the environmental performance of EWP practices themselves. Second, the additional coordination between NRCS and other federal, state, and local agencies under this alternative would result in the most efficient use of NRCS resources and the resources of the other agencies where detrimental impacts to watershed are concerned. Third, NRCS should reap benefits by taking the differences that the three example watersheds exhibit into account in formulating its plans in Alternative 3 to prioritize watersheds not only according to their disaster risks, but also to factor in the extent to which the watershed already exhibits stress from other actions, as the East Nishnabotna watershed demonstrates.

5.4.5 Summary of the Cumulative Impacts of the Alternatives

Table 5.4-7 summarizes the cumulative impacts of the EWP alternatives. The contribution of the effects of EWP practices to cumulative impacts on watershed ecosystems, based on the analysis of the example watersheds, were minimal under all three EWP Program alternatives. However, in the East Nishnabotna River watershed, where wetlands are already highly stressed according to EPA, the overall cumulative impacts were found likely to be significant. Therefore, EWP environmental evaluations should pay particular attention to watershed health indicators in order to limit potential cumulative impacts to acceptable levels.

Because the requirements for protection of Federally-protected resources in watersheds are for the most part site specific, EWP restoration work may be one of the best ways to protect those resources that would otherwise be threatened. This is particularly true of cultural resources, where EWP work might not only remove threats to the property directly but also protect the environmental setting where the property is located. In the case of T&E species as well, EWP work may be a necessary part of habitat maintenance as a species recovers, although in the long term, not desirable as a necessity to survival. In some instances, easements might provide a better solution for ensuring habitats are available that are conducive to a species recovery.

Alternative 1 (No Action Alternative) would not change cumulative impacts from their present levels. For aquatic resources, there would continue to be minor turbidity, sedimentation, and flow altering effects from restoration practices. These effects would add in the long term to the slow decline of watershed health in some watersheds and to more rapid decline in others. For wetlands, riparian areas, and floodplains, minor effects from restoration practices would continue to occur and would add to the habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline.

Human communities like the City of Buena Vista would continue to benefit from protection of their homes and businesses and would continue to derive income from performing EWP restoration practices although minor community disruptions may occur. Major floodwork by the USACE and NRCS at Buena Vista have combined to help sustain the viability of the community in the face of repeated recent flood damage, a community that has seen a marked industry decline because of the floods and other factors. The viability of agricultural communities such as that along the East Nishnabotna and of rural fringe communities such as Boise Hills, depend in large measure on damage restoration and preventative measures. In the long term, however, the cumulative drain on local, state, and Federal resources to maintain any such communities that are repeatedly threatened may lead to sufficient impetus to seek longer-term solutions. Agricultural easements that are part of the current program are likely to be major parts of this solution.

Alternative 2 (the Proposed Action) involves EWP program improvement and expansion. Under this alternative, NRCS would emphasize more environmentally sensitive implementation of EWP practices and would expand the types of watershed impairments to activities away from streams, upland debris sites, enduring conservation practices, and others. Fifteen specific program changes would improve the EWP program and incorporate new restoration practices. For aquatic resources, there would be a reduction in minor turbidity, sedimentation, and flow altering effects from restoration practices. This would diminish the degree to which any of these adverse effects would add in the long term to decline of watershed health. In some watersheds these improved practices may even slow or reverse some of the decline. For wetlands, riparian areas, and floodplains, there would be some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the EWP work may reverse such a trend. Better coordination with other federal, state, and local agencies and additional projects approved should result in less overall habitat destruction.

Human communities would continue to be protected in the short term but a greater emphasis on agricultural easements and introduction of improved lands easements should provide better long-term solutions than repetitive repair work where repeated damages occur. Shifts in program emphasis may result in slightly different mix between agriculture and other uses as easement lands increase.

Table 5.4-7 Summary of Cumulative Impacts of the EWP Alternatives

Environmental Resource	Alternative 1 – the No Action Alternative – Continue the Current Program	Alternative 2 – The Proposed Action – EWP Program Improvement and Expansion	Alternative 3 – Prioritized Watershed Planning and Management
Impacts to Aquatic Resources	Minor effects from restoration practices would continue to add to long-term declines in quality of aquatic habitat. These effects may be important in watersheds stressed by other factors such as development. Easements should help slow declines in some cases.	Upgrade in restoration practices would diminish any adverse effects and may slow long-term declines in quality of aquatic habitat. Expanded easement program would also help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality of aquatic habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Wetlands and Floodplains Resources	Minor effects from restoration practices would continue to occur and would add to habitat loss and loss of natural floodplain functioning that are a contributing part of general watershed decline. Agricultural easements may mitigate these effects in some watersheds.	Some reduction in minor effects from restoration practices, which would reduce the rate of habitat loss and loss of natural floodplain functioning. In some portions of watersheds the better designed EWP work may reverse such a trend. Expanded easement program would help slow or reverse this situation in some watersheds.	Upgrade in restoration practices and focused locally-led watershed management would be best way to slow long-term declines in quality and acreage of wetland, riparian, and floodplain habitat. Expanded easement program could be used as an integrated part of watershed restoration program.
Impacts to Socioeconomic and Other Human Resources	Life and property would continue to be protected but longer term solutions to repeated damage would not be a major consideration. Minor income would be derived from performing restoration practices, but resources may be inefficiently used.	Life and property would continue to be protected but longer term solutions to repeated damage would begin to be a major consideration, especially with use of improved lands easements. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.	Life and property would continue to be protected but better organized and funded longer term solutions to repeated damage would be the major consideration. Minor income would be derived from performing restoration practices. Shifts in program emphasis may result in slightly different mix between agriculture and other uses.

Alternative 3 would tend to minimize EWP program impacts because it would be the most proactive and integrative EWP approach to disaster recovery and damage avoidance. It would allow maximized use of more environmentally beneficial EWP practices by focusing the resources of NRCS and other entities in disaster-prone watersheds. Here, restoration design based on the principles of natural stream dynamics and bioengineering would likely cause the most marked reductions in degradation of stream hydrology and habitat. When used in conjunction with purchase of floodplain easements in these more highly stressed watersheds, some substantive abatement or reversal of watershed degradation is possible. In less seriously stressed watersheds, use of these practices and easements would help maintain watershed integrity. NRCS and other technically cognizant agencies would need to take adequate steps during the locally-led conduct of the watershed plan to ensure all decisions are well-informed decisions, made with the best available scientific information and soundest technical advice to help avoid decisions made simply because they appear on first inspection to be heading in the right direction.

5.5 Unavoidable Impacts of the Proposed Action

Certain effects cannot be avoided if the proposed action is implemented. Affected streams, floodplains, and certain watershed upland areas will be altered by EWP restoration practices. In certain instances, to remove threats to life and property, some adverse environmental consequences may result. Any substantial adverse impacts would be limited to the immediate site and near downstream environments and limited to the short term. Procedures to ensure the environmental defensibility of EWP practice designs should minimize the likelihood of these effects occurring.

Certain structural practices, including armoring and woody structures, would be used for bank restoration where the circumstances warrant their use. These sites may remain as undesirable visual elements of the outdoor environment for a short period until the sites again support vegetation. Some of the hard-engineered structures may not re-vegetate. The shift in emphasis under the proposed action to employment of bioengineering practices that incorporate live plantings should minimize the number of instances where this is a long term effect.

Impacts of purchasing floodplain easements on agricultural lands and on improved lands should be beneficial, restoring portions of floodplain environments to their natural functions. These purchases may disrupt the socioeconomic situation of some rural communities in the short term and may introduce minor changes in the longer-term. However, in broader economic terms, this shift should tend to diminish demands on the Federal and state governments, and local communities to pay for flood fighting and to repair or compensate for disaster damage.

5.6 Effects on Productivity, Resources, and Energy

5.6.1. Short-term use versus long-term productivity of the environment

EWP restoration practices are employed to protect life and property and, to do so, incorporate designs that attempt to restore a locality to pre-disaster conditions and that forestall the erosive forces of the natural environment. They are employed to maintain land and improvements that are of value to human communities, that otherwise would be altered by natural forces. The natural environmental productivity of these protected locations is not achieved so long as their use is continued for human endeavors. The floodplain easement portion of the EWP Program is an attempt to mitigate that use to restore the long-term productivity of floodplain and related environments.

5.6.2 Irreversible or irretrievable commitments of resources

Money and staff-hours used to implement the EWP Program are an irretrievable commitment of Federal resources regardless of which alternative is selected. However, decisions on the commitment of these resources are made on a case-by-case basis, with the option available in every case to not commit the resources.

5.6.3 Energy requirements and conservation potential of various alternatives and mitigation practices

Fossil fuels are used to power the trucks and heavy equipment used to clear debris and install EWP restoration practices. Because the level of required disaster response is unpredictable from year to year, it is not possible to predict what the energy requirements would be. To the extent that easements are purchased that eliminate repetitive repair requirements at sites, the overall energy demands of the EWP Program would diminish.

5.6.4 Natural or depletable resource requirements and conservation potential of various alternatives and mitigation practices

The natural or depletable resource requirements of the EWP Program, other than the fossil fuel requirements, include rock for riprap and gabions, trees for rootwads and log revetments, and live trees and shrubs for plantings. These are obtained as available from local sources, and if necessary, from more distant suppliers. The supply of these materials far outweighs the demands that are likely to occur.

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None given.

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CONSULTATION AND COORDINATION

Council on Environmental Quality NEPA regulations at 40 CFR 1502.25 require that *to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and other environmental review laws and executive orders. The draft environmental impact statement shall list all Federal permits, licenses, and other entitlements, which must be obtained in implementing the proposal. If it is uncertain whether a Federal permit, license, or other entitlement is necessary, the draft environmental impact statement shall so indicate.*

At the programmatic level, NRCS is not seeking the site-specific studies or individual project permits noted in the regulations, but in a more general way has involved other agencies in development of the EWP PEIS and integration of environmental requirements in its decisionmaking, which will affect decisions made at EWP sites in the future. NRCS has involved other Federal agencies, including the U.S. Forest Service, U.S. Fish and Wildlife Service, EPA, CEQ, FEMA, and the U.S. Army Corps of Engineers, in defining the EWP Proposed Action and alternatives and in reviewing early drafts of the PEIS. NRCS has taken care to ensure that the concerns of those agencies have been well considered in all aspects of the proposed Program. A large part of the improvement NRCS proposes to make in the EWP Program is in terms of better communication, coordination, and planning with Federal, State, and local agencies in implementing EWP restoration work and easements and in protecting T&E species, cultural resources, wetlands, and other sensitive resources and helping in general to restore watershed health.

Coordination with other agencies in emergency restoration work is described in the PEIS in Chapter 2, improvements in coordination in Chapter 3. Appendix A presents the details of agency participation in the scoping process for the PEIS and presents the programs and responsibilities of other agencies that are relevant to NRCS meeting its coordination and consultation responsibilities. The cumulative impacts analysis presented in Chapter 5 describes how actions of other agencies factor into the cumulative impacts of the EWP Program in selected example watersheds and Alternative 3 proposes a watershed based program that would involve an enhanced level of coordination with other agencies. Consistent with its mission and resources, NRCS will continue to seek ways to improve its programs in terms of agency consultation and coordination.

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Environmental Review Coordinator/Watershed Specialist	Georgia Department of Natural Resources	GA
Environmental Review Coordinator/Watershed Specialist	Guam Environmental Protection Agency	GU
Environmental Review Coordinator/Watershed Specialist	Hawaii Department of Natural Resources	HI
Environmental Review Coordinator/Watershed Specialist	Idaho Department of Fish and Game	ID
Environmental Review Coordinator/Watershed Specialist	Illinois Department of Natural Resources	IL
Environmental Review Coordinator/Watershed Specialist	Indiana Department of Environmental Management	IN
Environmental Review Coordinator/Watershed Specialist	Iowa Department of Natural Resources	IA
Environmental Review Coordinator/Watershed Specialist	Kansas Department of Health and the Environment	KS
Environmental Review Coordinator/Watershed Specialist	Kentucky Department of Environmental Protection	KY
Environmental Review Coordinator/Watershed Specialist	Louisiana Department of Environmental Quality	LA
Environmental Review Coordinator/Watershed	Maine Department of Environmental Protection	ME

Specialist		
Environmental Review Coordinator/Watershed Specialist	Maryland Department of Natural Resources	MD
Environmental Review Coordinator/Watershed Specialist	Massachusetts Department of Environmental Protection	MA
Environmental Review Coordinator/Watershed Specialist	Michigan Department of Natural Resources	MI
Environmental Review Coordinator/Watershed Specialist	Minnesota Department of Natural Resources	MN
Environmental Review Coordinator/Watershed Specialist	Mississippi Department of Environmental Quality	MS
Environmental Review Coordinator/Watershed Specialist	Missouri Department of Natural Resources	MO
Environmental Review Coordinator/Watershed Specialist	Montana Department of Environmental Quality	MT
Environmental Review Coordinator/Watershed Specialist	Nebraska Department of Environmental Quality	NE
Environmental Review Coordinator/Watershed Specialist	Nevada Department of Environmental Protection	NV
Environmental Review Coordinator/Watershed Specialist	New Hampshire Department of Environmental Services	NH
Environmental Review Coordinator/Watershed Specialist	New Jersey Department of Environmental Protection	NJ
Environmental Review Coordinator/Watershed Specialist	New Mexico Environment Department	NM
Environmental Review Coordinator/Watershed Specialist	New York Department of Environmental Conservation	NY
Environmental Review Coordinator/Watershed Specialist	North Carolina Department of Environment and Natural Resources	NC
Environmental Review Coordinator/Watershed Specialist	North Dakota Fish and Game Department	ND
Environmental Review Coordinator/Watershed Specialist	Ohio Department of Natural Resources	OH

Environmental Review Coordinator/Watershed Specialist	Oklahoma Department of Environmental Quality	OK
Environmental Review Coordinator/Watershed Specialist	Oregon Department of Environmental Quality	OR
Environmental Review Coordinator/Watershed Specialist	Pennsylvania Department of Conservation and Natural Resources	PA
Environmental Review Coordinator/Watershed Specialist	Puerto Rico Department of Natural Resources	PR
Environmental Review Coordinator/Watershed Specialist	Rhode Island Department of Environmental Management	RI
Environmental Review Coordinator/Watershed Specialist	South Carolina Department of Natural Resources	SC
Environmental Review Coordinator/Watershed Specialist	South Dakota Department of the Environment and Natural Resources	SD
Environmental Review Coordinator/Watershed Specialist	Tennessee Department of Environment and Conservation	TN
Environmental Review Coordinator/Watershed Specialist	Texas Natural Resource Conservation Commission	TX
Environmental Review Coordinator/Watershed Specialist	Utah Department of Environmental Quality	UT
Environmental Review Coordinator/Watershed Specialist	Vermont Department of Environmental Conservation	VT
Environmental Review Coordinator/Watershed Specialist	Virgin Islands Department of Planning and Natural Resources	VI
Environmental Review Coordinator/Watershed Specialist	Virginia Department of Environmental Quality	VA
Environmental Review Coordinator/Watershed Specialist	Washington State Department of Ecology	WA
Environmental Review Coordinator/Watershed Specialist	West Virginia Department of Environmental Protection	WV
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Glossary

Agricultural Land — Any land in agricultural uses such as crops, pasture, or haying.

Armoring — The practice of installing erosion control and stream bank protection measures. Examples include loose rock riprap, gabions, rootwads, and revetments.

Beneficiary — Recipient of the advantages, tangible or intangible, gained by the installation or construction of a system or works for one or more given purposes.

Benthos — The community located at the bottom of a body of water.

Benthic — Relating to organisms or processes in the benthos.

Biota — Collectively, the plants, microorganisms, and animals of a certain area or region.

Brush Mattress — A live construction that places living branches close together to form a mattress-like cover over the ground. This mattress is intended to grow and protect the bank from erosion.

Causal Flow Diagram — Flowchart that illustrates a series of actions and the cascade of effects from those actions

Channel — A natural or artificial waterway that periodically or continuously contains moving water. It has a definite bed and banks that confine the water.

Channel Capacity — Volume of water a stream channel can transport.

Channel Structure — The physical components of a stream channel such as a low-flow channel, sinuosity, stream gradient and substrate type.

Check Dam — A small dam constructed in a drainageway across a slope or at the toe of a slope to reduce downslope erosion by restricting flow velocity.

Cobble — Sediment particles larger than pebbles and smaller than boulders. Usually 64-256 mm (3-8 inches) in diameter.

Codified Rule — A regulation in the Code of Federal Regulations implementing a law. The EWP rule is a codified rule.

Community Services — Services provided by a local government funded by tax revenues. Examples include police, water, sewer, recreation, schools, and fire protection.

Comprehensive Plan — A general policy plan that guides a jurisdiction in its future policy decisions; some include, but are not limited to — land development, protection of the environment, provision of housing, transportation, and recreation; document is not legally binding, and is merely a policy guideline.

Contour Felling — Cut tree placed in horizontal position on side slope to divert and slow water flow.

Contour Trenching — Ditch-like trenches dug in horizontal position on side slope to divert and slow water flow and store accelerated soil erosion.

Conveyances — A means of transport (such as drainage ditches or pipelines).

Cost Sharing — A publicly financed program through which society, as a beneficiary of environmental protection, shares part of the cost of pollution control with those who must actually install the controls; in Superfund, the Government may pay part of the cost of a cleanup action with those responsible for the pollution paying the major share.

Cultural Resources — (also **Heritage Resources**) Remains or records of districts, sites, structures, buildings, neighborhoods, objects, and events from the past; may be historic, prehistoric, archeological, or architectural in nature; cultural resources include historic properties as defined by the National Historic Preservation Act, but also include other tangible and intangible resources such as traditional cultural places and practices, folkways, traditions, landscapes, etc.

Dam — Any artificial barrier which impounds or diverts water. A dam is generally considered hydrologically significant if it is (1) one and one quarter feet (0.4 meters) or more in height from the natural bed of the stream and has a storage of at least 15 acre-feet, or (2) has an impounding capacity of 50 acre-feet or more and is at least six feet (2 meters) above the natural bed of the stream.

Damage Survey Report (DSR)— A summary document of the evaluation conducted for an EWP practice (it is not intended to be a substitute for that evaluation).

Debris — Any material, organic, or inorganic, floating or submerged, moved by a flowing stream or water body.

Debris Basin — Structure used in stream channels to control large flows of water and debris. The debris basin causes ponding, which slows the water velocity and allows debris to settle out.

Defensibility — The combined beneficial effects of a alternative exceed the combined adverse effects and the alternative is (1) in compliance with federal, state and local laws, (2) Acceptable to affected individuals and communities, (3) effective in protecting the natural resources, (4) complete with all the necessary components, and (5) efficient in achieving the desired outcome.

Deferred Assessment (use-value) — Farmland assessed at the agricultural value rather than market value.

Deposition — The settlement of material out of the water column and onto the streambed or floodplain. Occurs when the flowing water is unable to transport the sediment load.

Dewatering — Diverting water so operations can be completed in-stream under relatively dry conditions.

Dike — An artificial embankment constructed to prevent flooding.

Disaster Assistance Recovery Training Team (DART)— A national team established to provide training to states to enable a state to effectively and efficiency respond a watershed emergency.

Disaster Prone — A watershed would be considered disaster-prone if it is repeatedly damaged by similar disasters. Recurring flood damages would be the most common example in this case.

Diversion — The taking of water from a stream or other body of water into a canal, pipe, or other conduit.

Easement — The right of a person, government agency, or public utility company to use public or private land owned by another for a specific purpose.

Eligibility — Qualified to participate or be chosen; something warranting EWP action, meeting criteria of impairment and defensibility.

Eligible Impairment — Impairment that warrants EWP action.

Eligible Practice — Practice meeting eligibility requirements that is funded for installation

Eligible Site — Site meeting criteria of impairment and defensibility; A threat of life and property exists under a disaster declared by the State Conservationist.

Emergency Measures — Actions implemented to remove or reduce hazards created by a natural disaster to safeguard life and property.

Environmental Impacts — The likely effects of a natural occurrence or proposed project, activity, or policy on the environment, both positive and negative.

Environmental Justice — Fair treatment of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies, fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength levels.

Erosion — The wearing down or washing away of soil and land surface by the action of water, wind, or ice.

Estate Tax — A tax levied on one's personal estate at the time of death.

Exigency — Situation when the near term probability of damage to life or property is high enough to demand immediate Federal action.

Farmland Preservation — The use of conservation easements and economic programs to maintain the continued viability of agricultural operations and protect farmland from being sold for development.

Fasine — A securely bound, thick roll consisting of live or dead branches, coir, or other organic or inorganic material.

Federal Disaster Assistance — Assistance available to communities through several federal programs for post-disaster needs.

Field Office Technical Guide — Technical reference source used by field offices in providing guidance to owners and operators of agricultural land.

Financial Assistance — Money used to build an NRCS practice.

Fine Sediment — Mineral and organic particles smaller than 6.3 millimeters.

Fishery — A population of fish or shellfish in a waterbody. It may be naturally self-sustaining or augmented by hatchery-raised fish. The species may or may not be of recreational value.

Floodplain — The lowland which borders a river, usually dry but subject to flooding. Also the portion of a river valley which has been inundated by the river during historic floods.

Floodplain Conservation Easement — Permanent legal agreement between a landowner and a public agency or private, non-profit conservation organization; residential, industrial, and commercial development and subdivisions are not allowed in a floodplain; these restrictions are binding on all future owners if the property and are enforced by the agency or conservation organization which holds the easement.

Floodplain Deposition — The settlement of material out of the water column floodplain.

Floodplain Easements — Acquisition of a perpetual, legal interest in property that limits owner's use of the land in order to reduce flood damage claims and provides benefits for wildlife habitat and floodplain hydrology.

Floodplain Ordinance — Local ordinance, often part of a zoning ordinance that establishes restrictions for development and uses within the designated floodplain and/or floodway.

Floodplain Restoration — Returning natural floodplain function by removing or not repairing structures that impede flooding. It may also include changes in land use and vegetation planting in the floodplain easement.

Floodproofing — Often referring to elevation building requirements. Elevating structures within an existing floodplain to FEMA-designated one foot above flood stage.

Fluvial — Of or pertaining to rivers; produced by river action.

Gabion — A large wire-mesh basket filled with stone and placed along streambanks and streambeds of smaller streams for stabilization and grade control.

Geomorphology — The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and of the history of geologic changes as recorded by these surface features.

Geotextile Fabric — Material used in soil bioengineering to stabilize banks and to retard soil erosion, often used beneath riprap or with vegetative plantings.

Gravel — Sediment particles larger than sand and ranging from 2 to 64 mm in diameter.

Groundwater — Water found in that portion of the soil that is always saturated or below the water table.

Habitat — A place where a biological organism lives. The organic and non-organic surroundings that provide life requirements such as food and shelter.

Habitat Structure — The organization of an animal, plant, or human's natural surroundings in which they live.

High Density Development — Higher number of dwelling units per unit of land.

Hydraulic Capacity — see channel capacity

Hydrologic Units — System used by the United States Geologic Survey to divide the United States and the Caribbean into 21 major resource regions (2 digit units), 222 sub-regions (4 digit units), 352 accounting units (6 digit units) and 2,150 cataloging units delineating river basins usually greater than 700 square miles (8 digit units).

Hydrology — The applied science concerned with the waters of the earth, their occurrences, distribution, and circulation through the unending hydrologic cycle (precipitation, consequent runoff, infiltration, and storage; evaporation; and condensation). It is concerned with the physical and chemical reaction of water with the rest of the earth, and its relation to the life of the earth.

Imminent Threat — A subsequent natural occurrence of the same intensity or less would cause significant damage to property and/or threaten human life.

Immotile — Not moving or not intended to be moved.

Impoundment — A water body that is formed by the construction of a dam or a dike system.

Infiltration — Movement of water through the soil surface into the soil.

In-kind Services — A barterlike arrangement by sponsors to provide their portion of the cost share in labor or materials, as opposed to cash.

Installed Practice — see practice

In-stream Flow — Pertaining to the flow of water in a river or stream.

Interdisciplinary Team — The NRCS team of preparers of the EWP PEIS who analyzed EWP Progam impacts on watershed ecosystems and human communities. The ID Team fulfills the requirements of CEQ regulations at 40 CFR 1502.6 Interdisciplinary preparation--Environmental impact statements shall be prepared using an inter-disciplinary approach that will insure the integrated use of the natural and social sciences and the environmental design arts (section 102(2)(A) of the Act). The disciplines of the preparers shall be appropriate to the scope and issues identified in the scoping process (Sec. 1501.7).

Land Management Plan — Policy plan that details the long-term vision of land uses and their ecological effects for a natural area.

Levee — An embankment built along a watercourse to prevent high water from flooding the adjacent land.

Limited Resource Community — An area, where (1) housing values are less than 75 percent of the state housing average value, <u>and</u> (2) per capita income is 75 percent or less than the median income of the nation, <u>and</u> (3) unemployment is twice the U.S. average over the past three years based upon the most recent national census information available. This can be determined in the pre-disaster planning phase and applies to the entire county regardless of the income of the particular community.

Locally-led Measure — Actions for which the impetus lies in the hands of the local community.

Low Density Development — Lower number of dwelling units per unit of land.

Non-agricultural Land — Land not classified as agricultural in the EWP Program or local planning ordinances.

Non-exigency — Situation when the near-term probability of damage to life or property is high enough to constitute an emergency but not sufficiently high to be considered an exigency.

Non-point Source Discharge — A source of water pollution that originates from a broad area, such as agricultural chemicals applied to fields or acid rain.

Nutrient — Any substance assimilated by living things that promotes growth; term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

Operation and Maintenance — Once a practice is installed, a responsibility exists for maintenance.

Overburden — (a) The upper part of a sedimentary deposit, compressing and consolidating the materials below. (b) The loose soil or other unconsolidated material overlying bedrock, either transported or formed in place.

Overwash Area — Water that flows behind structures such as dams, dikes, or levees. The water gets out of its "confinement".

Planned Development — Development usually in whole or in part residential, as one unit on one parcel of land.

Point Source Discharge — A source of water pollution that originates from a single point, such as an outflow pipe from a factory.

Pollutant —Something that makes one's surroundings physically impure or unclean.

Practice — A particular action used in the EWP Program at a site to mitigate effects of natural disasters.

Presidentially-declared Disaster — The President of the United States declares a disaster, invoking the Federal Emergency Management Agency (FEMA). Some of these disasters trigger the affected State Conservationist to invoke the EWP Program.

Preventative Measure — Measures undertaken to minimize damage to a watershed should a natural disaster occur in the future.

Project Sponsor — A legal subdivision of a state government, a state agency, any other governmental entity, a qualified Indian tribe or a tribal organization that has a legal interest in or responsibility for the values threatened by a watershed emergency and is capable of carrying out any O&M responsibilities which may be required. A sponsor is not required for the purchase of the floodplain easements.

Property — Permanent improvements such as homes, businesses, farmsteads, and conservation practices.

Quasi-judicial Decision — Land use decision that requires a fact-finding hearing of the case. Decisions must be made on evidence.

Rational Nexus — This is determined between the ends of a goal and the means by which it is achieved. Benefits must be related to the way in which they were achieved.

Reach — The length of a river between two gauging stations. More generally, any length of a river.

Reach and Flow — The unimpeded, out-of-bank flow of the river over the floodplain.

Recovery Measure — A restoration practice

Recovery Work — Work done to install restoration practice.

Revetment — A facing of stone, wood, or natural materials, placed on a bank as protection against wave action or currents.

Riffle — A rocky shoal or sandbar lying just below the surface of a waterway; choppy water created by such sandbars and shoals is also referred to as a riffle.

Riffle-pool Structure — Physical structure of a stream channel, as flows pass through reaches of faster moving, turbulent riffles and slower moving pools.

Riparian — Pertaining to rivers and their banks.

Riparian Stream Border — (also **Riparian Zone**) The border or banks of a stream; although this term is sometimes used interchangeably with floodplain, the riparian zone is generally regarded as relatively narrow compared to a floodplain; duration of flooding is generally much shorter, and the timing less predictable, in a riparian zone than in a river floodplain.

Riprap — A layer, facing, or protective mound of stones placed to prevent erosion, scour, or sloughing of a structure or embankment. Also refers to the stone used.

Road - Arterial Road — Provides vehicle access to large land areas, and usually connects with other arterial (major) roads or public highways.

Road - Collector Road — Intermediate links that connect major heavily traveled, multiple-purpose arterial routes with a single resource local road.

Road - Local Road — Connects terminal facilities such as log landing and recreation sites with forest collector roads or public resource local roads.

Rock Weir — An in-stream structure consisting of a series of boulders placed across a channel and anchored to the streambed or streambank to control water flow.

Rootwad — The root mass of the tree, often embedded in streambanks for stabilization and grade control.

Runoff — Drainage or flood discharge which leaves an area as surface flow or as pipeline flow, having reached a channel or pipeline by either surface or sub-surface routes.

Sand — Mineral particles ranging from 0.0625 to 2mm (0.0025 to 0.08 inch) diameter; 0.03 inch is the normal lower limit at which the unaided human eye can distinguish an individual particle.

Scope — The range of actions, alternatives, and impacts to be considered in an EIS.

Scoping — Process used to determine, through public involvement, the range of issues that the planning process should address.

Scour — Concentrated erosive action of flowing water in streams that removes material from the bed and banks.

Sediment — Soil particles that have been transported and/or deposited by wind or water action.

Sedimentation — When soil particles (sediment) settle to the bottom of a waterway.

State Historic Preservation Office (SHPO) — Office that supports the State Historic Preservation Officer, appointed by the governor to oversee the State Historic Preservation Program.

Silt — Slightly cohesive to noncohesive soil composed of particles that are finer than sand but coarser than clay, commonly in the range of 0.004 to 0.0625 mm.

Single-Family Development — The development of land consisting entirely of single-family residential units. Single family is often defined as a dwelling in which no more than 2 or 3 unrelated people reside together.

Soil-bioengineering — Technique of using live plantings for stream and watershed stabilization.

Special Use Permit — Permit required in order for a special use to be allowed in a zone not regularly allowing such a use. (e.g. airport in a general agricultural zone)

State Conservation Engineer — A registered professional engineer who has authority over all NRCS-conducted engineering work.

State Conservationist — NRCS principal responsible for all NRCS activities in the state.

State Office — State NRCS headquarters

State Technical Committee — Representatives of USDA, other federal and state agencies, and local groups interested in agriculture that help set priorities and provide guidance for NRCS programs. Members are invited by the State Conservationist.

Streambank — The portion of the channel cross-section that restricts lateral movement of water. A distinct break in slope from the channel bottom.

Subdivision — The division of land, lot, tract, or parcel into two or more lots, parcels, plats, or sites, or other divisions of land for the purpose of sale, lease, offer, or development, whether immediate or future. The term shall also include the division of residential, commercial, industrial, agricultural, or other land whether by deed, metes and bounds description, lease, map, plat or other instrument

Sudden Impairment — Result of natural occurrence or short-term combination of occurrences

Taking — The taking of private property for a public use without the owner being "justly compensated" (usually, paid fair market value) for his or her loss.

Tax base — Fiscal base in a community from which services are provided. Different land uses contribute and demand varied amounts to the tax base.

Technical Assistance — The labor and expertise of NRCS used to build a practice.

Terrace — A flat adjacent to the river in alluvial valleys created by the abandonment of the floodplain.

Threat — The endangerment of life and property.

Tiles — Sub-surface drainage structures placed in agricultural fields to reduce opportunity for ponding and to stabilize soil to prevent saturation.

Timber Cribbing Structure — A structure of logs placed along streambanks and streambeds of smaller streams for stabilization and grade control.

Tribal Organization — Any American-Indian tribe defined in section 4 of the Indian Self-Determination and Educational Act.

Turbidity — The reduction of transparency in water due to the presence of suspended particles.

Upgradient — Upstream or uphill

Urban Core — Center of urban activity with in a metropolitan area.

Urban Services Area — Area within an urban jurisdiction which planning studies show to be most adaptable to the extension of municipal services such as street, sewers, and water.

Urbanized Area — Geographic area with a population of 2,500 or more; number of people used in this definition may vary, with some countries setting minimum number of people anywhere from 10,000 to 50,000.

Urbanizing Development — Shifting of rural communities to more urban ones, demanding increased levels of urban services; process involves linking timing and sequencing development to capital improvements; and integrating the development plan, the capita improvement budget, and zoning ordinance.

Urgent and Compelling Situation — A situation where <u>immediate</u> response is required to protect against an imminent threat to lives and/or property.

Watershed — Land area that drains into a stream; area of land that contributes runoff to one specific delivery point; large watersheds may be composed of several smaller "subsheds", each of which contributes runoff to different locations that ultimately combine at a common delivery point.

Watershed Emergency — a natural occurrence creates an imminent threat to life and/or property. For the watershed to be eligible for assistance, the imminent threat to life and/or property must exceed what existed before the event occurred.

Watershed Impairments — The situation when the ability of a watershed to carry out its natural function is reduced to the extent of creating and imminent threat to life or property.

Watershed Uplands — Portions of watershed that do not directly adjoin a permanent stream channel but may lie near intermittent streams or groundwater.

Watersheds and Wetlands Division — USDA, NRCS Headquarters Division with oversight and disbursement authority for Emergency Watershed Protection Programs.

Wetland — Any number of tidal and non-tidal areas characterized by saturated or nearly saturated soils most of the year that form an interface between terrestrial (land-based) and aquatic environments; include freshwater marshes around ponds and channels (rivers and streams), brackish and salt marshes; other common names include swamps and bogs.

Willow Stake — Live willows that are tampered or inserted into the earth to take root and produce vegetative growth.

Woody Debris — Debris caused by a natural disaster affecting wooded areas such as forests or other vegetation.

Zoning — A mechanism that seeks to establish different land uses in different areas of a community in order to minimize conflict between them; the technique is used to establish the authorized use for different parcels of land (e.g. residential, industrial, commercial) throughout a community.