Appendix H:

Obtaining Permits to Remove a Dam

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1025 Vermont Avenue, NW, Suite 720
Washington, DC 20005
Tel: (202) 347-7550; Fax: (202) 347-9240
www.americanrivers.org

OBTAINING PERMITS TO REMOVE A DAM

Removing a dam from a river requires permits from state, federal and local authorities. These permits are generally required to ensure that the removal is done in a manner that is safe and minimizes short and long term impacts to the river and floodplain. Each state has different permit requirements, as does each local government. Below is a short summary of the types of federal, state and local permits that may be required for removal, followed by some general observations about how best to approach the permitting process for dam removal projects.

I. PERMITTING REQUIREMENTS

A. Federal Permits

1. Clean Water Act (CWA) Section 404 Dredge and Fill Permit: Most dam removals require a CWA Section 404 permit, issued by the U.S. Army Corps of Engineers (Corps) for dredging of a navigable waterway (33 U.S.C. §1344). A guideline pursuant to this statutory requirement establishes a policy of no net loss to wetlands.[1] In order to obtain Corps approval, the project: (a) should not cause or contribute to significant degradation of the waters or result in a net loss of wetlands; (b) should be designed to have minimal adverse impact; (c) should not have any practicable alternatives; and (d) should be in the public interest. In some cases, dam removal will result in a net loss of wetlands. To obtain a permit in these situations, the Corps will have to find that the benefits of dam removal outweigh the loss of wetlands.

2. Rivers and Harbors Act Permit: In conjunction with a CWA Section 404 permit, the Corps will issue a Rivers and Harbors Act Section 10 permit (33 U.S.C. §403). The Rivers and Harbors Act is administered by the Corps for federal activities affecting a navigable waterway. The Corps will issue the permit if there is no adverse impact on interstate navigation.

[1] Environmental Protection Agency and Department of the Army, Memorandum of Agreement Between the EPA and the Dep't of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (Feb. 6, 1990).

3. FERC License Surrender or Non-Power License Approval: If the dam to be removed is a hydropower dam regulated by the Federal Energy Regulatory Commission (FERC), the dam owner will have to apply for surrender of the FERC license or issuance of a non-power license. FERC can impose conditions on how the dam should be removed as part of this approval.

4. National Environmental Policy Act (NEPA) Review: Action by the Corps or FERC may require the preparation of an Environmental Impact Statement or Environmental Assessment pursuant to NEPA (42 U.S.C. §4321 *et seq.*). This document must examine the environmental impacts of the proposed activity and any alternatives. An opportunity for public comment is required as part of the NEPA review. Only a short form Environmental Assessment may be required if the dam removal is anticipated to have environmental benefits. A NEPA environmental document may already have been prepared as part of the process of deciding whether to remove the dam. If this is the case, it may not be necessary to prepare a new NEPA document, or only a supplemental document may be required.

5. Federal Consultations: As part of issuing their permits, the Corps and/or FERC may need to conduct the following consultations to meet the requirements of other federal laws:

    a. *Endangered Species Act Section 7 Consultation:* If threatened or endangered species are present at or near the dam, the Corps and/or FERC may need to consult with the US Fish and Wildlife Service and/or the National Marine Fisheries Service (NMFS) regarding the impact of the removal on these species. The removal should not destroy designated critical habitat of the species or result in the killing of any of the species. There may be some conditions imposed on the dam removal to avoid injury to the threatened or endangered species.

    b. *Magnuson-Stevenson Act Consultation:* The Corps and FERC may also need to consult with the NMFS pursuant to the Magnuson-Stevenson Act regarding the impact of the removal on any Fishery Management Plan developed by a Regional Fishery Management Counsel (16 U.S.C. §1855(b)(2)). This consultation is done to ensure that the removal will not adversely impact any essential fish habitat established in the Fishery Management Plan.

    c. *National Historic Preservation Act Compliance:* The Corps and/or FERC's activities may also trigger an obligation to assess the impact of the proposed action on historic properties pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. §470f). In assessing this impact, FERC and/or the Corps must consult with the State Historic Preservation Officer. Historic properties affected may range from newly exposed archaeological sites to the dam itself. The presence of a dam on the National Register of Historic Places (or eligibility for listing on the Register) does not automatically preclude removal. In many situations, proper documentation of the dam prior to removal may be sufficient to preserve the historical values of the dam (36 C.F.R. §800.1 *et seq.*).

6. State Certifications: The Corps and FERC decisions also trigger several federal statutes that require the state to issue a certification that the actions are consistent with the state's implementation of federal law.

   a. *Water Quality Certification:* In order for the Corps to issue a CWA Section 404 permit and/or for FERC to issue a license surrender order or non-power license, the state must issue a water quality certification pursuant to CWA Section 401 (33 U.S.C. §1341). This certification states that the proposed activity will not result in the violation of state water quality standards. The state may issue conditions for how the dam should be removed as part of its certification.

   b. *Coastal Zone Management Act Certification:* If the dam is located in the coastal zone, in order for the Corps and FERC to permit the dam removal, the state must issue a certification pursuant to the Coastal Zone Management Act (16 U.S.C. §§1451 *et seq*.). This certification states that the proposed activity is consistent with the state's approved coastal zone management program. Again, the state may issue conditions for how the dam should be removed as part of its certification.

B. State Permits

1. Waterways Development Permits: Some states have laws that regulate the development of their waterways for hydropower, navigation and other purposes. These laws are generally adopted to address construction of a new dam or alteration of an existing dam, but will also apply to dam removal.

2. Dam Safety Permits: Some states have regulations that require a permit for any activity that will affect the safety of a dam. Removal of a dam would require such a permit.

3. State Environmental Policy Act Review: Many states have an environmental impact review statute similar to the federal NEPA statute. The removal of a dam may trigger the state requirement to prepare an environmental impact document. Usually the federal and state requirements can be met by preparing the same environmental impact document.

4. Historic Preservation Review: Most states require that before any state permit is issued, historical and archaeological issues must be investigated and approved by the State Historic Preservation Officer. This review can usually be done in conjunction with the federal historical preservation review, described above.

5. Resetting the Floodplain: Most states will require review of any activity that might change the 100-year floodplain. The applicant may be required to determine the new elevation for the 100-year floodplain once the dam is gone. The Federal Emergency Management Agency would then use the analysis to create new maps.

6. State Certifications: See Section A.6 above for state certification requirements pursuant to federal laws.

C. Municipal Permits

1. Demolition Permits: The act of demolishing the dam's structure may require a demolition permit from the local municipality.

2. Building Permit: The construction of a cofferdam or the restoration of the riverbank may require a building permit from the local municipality.

II. TIPS FOR A SUCCESSFUL PERMITTING PROCESS

Because dam removal is a relatively new phenomenon, the permitting process for a removal can be difficult. Most state and federal agencies are not yet practiced at moving a restoration project such as dam removal through their permitting processes. For the most part, the relevant permitting requirements were designed for more destructive activities, and thus dam removal does not fit easily into the requirements. Below are some tips to help make the permitting process run more smoothly.

A. Scheduling Time for the Permitting Process

Expect dam removal projects to take longer than other construction efforts from beginning to end. The fact that dam removals are non-traditional at this point in time makes this a reality. More lead-time and effort should be scheduled into the permitting process to avoid delays and frustrations.

B. Establishing a Relationship with the Permitting Agencies

Because the dam removal will not likely fit easily into the permitting requirements, be honest and up front with the permitting agencies about what you plan to do. Seek the input and assistance of the key permitting agencies. One of the most critical elements of successful permitting is to always hold a pre-application meeting with key agency staff. Do this as soon as you have your project well thought out. This can be in the field, at the project site, or in their office. Seek their input and assistance.

Even though dam removal may not fit easily into the permitting requirements, recognize that permitting is a process with an established procedure. Do not attempt to circumvent the process, and do not deviate from the process that is laid out (unless you and the agency determine that a deviation is necessary). Understand the permitting timeline and stay within it.

Be especially careful to maintain good relationships with agency staff. Work to maintain a positive attitude. Do not provide inconsistent information. Remember that the people who issue permits are professionals who review permit applications every day. The different permitting agencies work closely with each other and are likely to be discussing your application. Have a single point of contact for your organization. A single spokesperson and point of contact for the group applying for a permit will help avoid confusion and maintain consistency of communication

C. Providing Information About the Proposed Project

Create clear and simple descriptions and drawings of the proposed project. Make the drawings to scale with dimensions clear. Remember these will be faxed from office to office for the review process. If it is not clear and simply stated, delay and confusion will result. Use project maps and diagrams to describe your project. Be certain to identify complicating conditions, schedules, seasonal constraints, *etc.*

Be sure to provide and discuss alternatives even though they are not your choice of approach. Make it clear why your chosen approach has been chosen. Remember that financial considerations will be only a minor consideration of the people conducting the review.

Assume the reviewers know nothing about your project. You deal with the details day to day, but the people reviewing the permit have an enormous backlog of permits they are working on. To them, this will be just another project.

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Appendix I:

Permitting Dam Removal: The State of (Several) States

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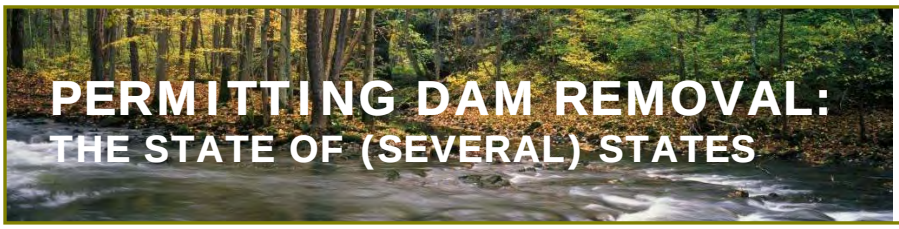

PERMITTING DAM REMOVAL:
THE STATE OF (SEVERAL) STATES

American Rivers
Thriving By Nature

Stephanie D. Lindloff, Director, Restoring Rivers Initiative,
American Rivers – Mid-Atlantic Region, 1 Danker Ave., Albany, NY 12206

Laura A.S. Wildman, P.E., Director, River Science Program,
American Rivers – Northeast Region, 20 Bayberry Road, Glastonbury, CT 06033

Note: This paper was presented at the Association of State Dam Safety Officials Annual National Conference held in Boston, Massachusetts September 10-14, 2006.

Dam owners and communities are increasingly considering the option of removing dams that are unsafe, obsolete or simply causing more harm than good. But as more dam removal projects are proposed, many states are finding that the application of existing permitting processes can be unreasonably complicated, time consuming, and expensive for both the applicant and regulatory authorities. Indeed, dam failures have occurred during the prolonged process of permitting their controlled removal.

Despite the removal of at least 200 dams in the past six years, many states consider dam removal to be a new concept. And, due to its multidisciplinary nature, permitting decisions often fall under the jurisdiction of several entities. This can result in a number of factors that further complicate the permitting process: how to address conflicting goals, procedures and requirements among relevant authorities; the application of technical or regulatory standards that may be inappropriate for dam removal and associated restoration activities; and, the perennial challenge of effective inter- and intra-agency coordination.

Several states are now seeking advice from counterparts that have proactively addressed the regulatory challenges associated with dam removal projects. Many such challenges and recommendations were acknowledged in "Dam Removal: A New Option for a New Century."[1] This report was collaboratively developed by twenty-six experts from across the nation who participated in a two-year long dialogue on dam removal that was convened by The Aspen Institute.

States that have experienced notable success in the regulatory and planning aspects of dam removal projects tend to have several commonalities. These characteristics are as follows:

Active and dedicated commitment to achieve dam safety

The removal of a dam eliminates a public safety hazard and the liability of dam ownership. Therefore, removal is an option that must be recognized and considered whenever a dam is at a decision point, such as the administration and enforcement of state dam safety standards, post-disaster response periods, and during watershed planning in general. For example, Pennsylvania Governor Edward G. Rendell and the Pennsylvania Department of Environmental Protection (PADEP) are considered national leaders in promoting dam safety.

[1] Aspen Institute. 2002. Dam Removal: A New Option for a New Century. The Aspen Institute, Program on Energy, the Environment, and the Economy. 68pp. Available at: http://www.aspeninstitute.org.

In 2004, the Association of State Dam Safety Officials recognized Governor Rendell with their National Award of Merit. In recent years, Pennsylvania has instituted, and follows through on, a variety of administrative and enforcement actions necessary to achieve dam safety. The state's dedication to achieving dam safety includes consideration of dam removal on a regular basis (i.e., no dam is the safest dam). As a result, Pennsylvania has removed more than 70 dams since just 2000. This is in clear contrast to the many states that do not even acknowledge dam removal as an option during enforcement or administrative actions, and therefore have removed few, if any, dams within the same period. As Pennsylvania has shown, states that provide dam owners with information about the range of options to achieve safe dam conditions enable dam owners to make fully informed decisions, and in some cases, that decision is to remove the dam.

Agency assistance in planning and funding

Given the relative newness of dam removal as an option, dam owners, consultants and the general public benefit greatly from any assistance that can be provided by regulatory agencies. Such assistance may be as basic as an agency fact sheet or web site with links to appropriate resources.

Comprehensive assistance is provided by agencies in Wisconsin[2], New Hampshire[3], Massachusetts[4] and Pennsylvania. These states have established programs that provide technical, regulatory and financial assistance to interested parties. Certainly, states that provide a dedicated grant or low-interest loan program for the purpose of achieving dam safety have experienced success in removing dams. However, it can be argued that agency assistance in seeking grant funding is equally important. In fact, this type of assistance has leveraged significant funding in states that have few dedicated state funds.

Pennsylvania again provides an excellent example. The Pennsylvania Fish and Boat Commission provides technical and financial assistance statewide under their Consultation and Grant Program for Fish Passage and Habitat Restoration. Interested landowners with dams or other blockages are eligible to request assistance for their dam removal project. The PADEP has also dedicated funding specifically for dam removal projects through a major bond initiative, disbursed via the "Growing Greener" competitive grant program. American Rivers, a national river conservation organization, was awarded $767,000 over three years (2003-2006) for allocation to projects throughout the state. This award has enabled American Rivers to assist in funding 53 dam removal or fish passage projects statewide. This highly successful program has leveraged over $3.4 million in matching funds from other state agencies, federal agencies, private foundations and additional funding sources. The PADEP is currently considering a $1.4 million proposal from American Rivers to continue and expand this successful program for another three years.

Predictable regulatory process

Applicants who propose to remove dams in states with minimal experience with dam removal often discover that the relevant regulatory agencies have difficulty in providing clear and consistent guidance on which to base the study and design of a permitable project. States must be better prepared to advise potential applicants of the regulatory requirements, necessary studies, consultations and approvals, and policies that may apply to a dam removal

[2] See http://dnr.wi.gov/org/water/wm/dsfm/dams/removal.html
[3] See http://www.des.state.nh.us/dam/damremoval/index.html
[4] See http://www.mass.gov/dfwele/river/

project. It is crucial for applicants to be aware of such requirements during the planning and design phase of projects. This enables the applicant and their consultant to plan and budget the project accordingly. For example, to address this need, the New Hampshire Department of Environmental Services has published "Guidelines to the Regulatory Process for Dam Removal Projects in New Hampshire."[5] This guidebook provides a comprehensive road map for potential applicants, their consultants, the general public and relevant regulatory entities.

Guidance documents on key issues

For any type of project, it is far more efficient and effective for agencies to develop guidance documents for technical or procedural issues that are commonly problematic in project design and planning, than to evaluate the appropriateness of the proposed approach on a project-by-project basis. Each dam removal project is unique, and agencies may easily become mired in the nuances of project specifics. Decisions based entirely on project specifics may not serve as appropriate guidance or precedent for similar issues on future projects. Therefore, because certain issues are likely to be common to many dam removal proposals (e.g., sediment management, historic preservation concerns, effects to wetlands), agencies are advised to develop policy guidance that will enable consistent decisions on projects of a similar type. For example, the New Hampshire Department of Environmental Services has published an "Evaluation of Sediment Quality Guidance Document"[6] and an accompanying document "Evaluation of Sediment Quality for Dam Removal."[7]

Single application package for permits and approvals

Properly removing a dam is generally considered to be an activity that requires a multidisciplinary approach to planning, design and implementation. Therefore, changing one portion of the project has the potential to affect other aspects of the project. In many states, multiple agencies and/or multiple divisions of the same agency have regulatory authority over different aspects of a dam removal proposal. Some states require applicants to submit separate applications and supplemental materials for each individual permit or approval. This approach can be confusing to the applicant, excessively expensive (e.g., preparation of plans at different scales), generally inefficient, and increases the likelihood of inconsistencies among the applications for the same project. The multiple application approach also has the potential to cause changes-by-jurisdiction that are ultimately not reflected or evaluated in an integrated fashion. This piecemeal approach to regulatory review can be especially problematic for multidisciplinary (and multi-jurisdictional) projects such as dam removal.

In contrast, states that have successfully implemented multiple dam removal projects often feature a joint permit application package (e.g., Wisconsin, Pennsylvania, New Hampshire). This approach typically features a single agency point-of-contact who is responsible for disseminating the application and materials to relevant authorities for review under their jurisdiction. This process is also more likely to provide coordinated inter-agency and intra-agency reviews and evaluations, rather than a piecemeal review-by-jurisdiction that may not adequately evaluate the project in full context.

[5] See http://www.des.state.nh.us/dam/damRemoval/Guidelines.pdf
[6] See http://www.des.state.nh.us/PDF/WD-04-9_Evaluation_of_Sediment.pdf
[7] Contact NH River Restoration Coordinator for a copy, (603) 271-3406.

Forum to address programmatic challenges

A final commonality among states with successful dam removal experiences is the establishment of an inter-agency and/or intra-agency forum to discuss and address programmatic challenges. Such a forum may include discussion of specific project proposals, but the overarching goal should be to provide the relevant authorities with an opportunity to voice concerns about issues on a programmatic level. The multidisciplinary and multi-jurisdictional nature of dam removal often presents a challenge to regulators. However, states that embrace this challenge as an opportunity to discuss programmatic issues have reaped benefits, often extending beyond the issue of dam removal specifically.

New Hampshire and Vermont have dam removal task forces that meet on a regular basis. These groups include representatives from a variety of state and federal agencies, as well as conservation organizations, local interests and academia. The forums provided by these meetings provide important (and all too rare) opportunities to discuss concerns such as conflicting authorities, interpretation and clarification of administrative rules, as well as issues to be addressed through collaborative activities.

OVERVIEW OF PERMITTING REQUIREMENTS FOR SELECTED STATES: Connecticut, New Hampshire, New Jersey, New York and Pennsylvania

The remainder of this paper provides a summary of permitting requirements for dam removal projects, beginning with a brief summary of federal permitting requirements, followed by a more detailed review of permitting requirements for selected states.

Readers who plan to undertake a dam removal project are strongly advised to confirm federal and state permitting requirements with the applicable regulatory agencies. Rules and regulations can change and some regulatory decisions may be determined on a case-by-case basis. This paper is not intended to be a definitive resource on permitting requirements for dam removal projects.

Federal Requirements

Federal Permits

Clean Water Act (CWA), Section 404 Permit. Most dam removals will require a CWA Section 404 permit issued by the U.S. Army Corps of Engineers (USACE) for activities involving the discharge of dredged or fill materials into waters of the United States, 33 U.S.C. 1344. Section 404(e) of the CWA allows for the issuance of general permits on a statewide basis, which operate in conjunction with applicable State regulatory programs. Several states have developed such "State Programmatic General Permits" (SPGP) which are commonly used for dam removal projects that meet the eligibility requirements of the particular SPGP.

Rivers and Harbors Act, Section 10 Permit. In conjunction with the Section 404 permit, the USACE will also issue a Section 10 permit for federal activities affecting navigable waterways, 33 U.S.C. 403. The permit will be issued if there is no adverse impact on interstate navigation.

FERC License Surrender or Non-Power License Approval. If the dam to be removed is a hydropower dam regulated by the Federal Energy Regulatory Commission (FERC), the dam owner will have to apply for surrender of the FERC license or issuance of a non-power license,

16 U.S.C. 799, 808(f). FERC can impose conditions on how the dam should be removed as part of this approval.

National Environmental Policy Act Review. Actions by federal agencies (e.g., permits, funding, technical assistance) may require compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq. NEPA requires that an Environmental Assessment (EA) be prepared to determine whether a proposed dam removal would have a significant effect on the quality of the environment. Depending on whether the project's impacts are considered significant, either a Finding of No Significant Impact (FONSI) would be issued or an Environmental Impact Statement (EIS) would be prepared.

Federal Consultations

As part of issuing federal permits and/or providing federal financial support or technical assistance, federal agencies may be required to conduct the consultations to meet the requirements of other federal laws, including but not limited to:

Endangered Species Act, 16 U.S.C. 1531-1543, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) if federally threatened or endangered species could be affected by the proposed action.

Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consider whether a proposed action may adversely affect Essential Fish Habitat (EFH), as identified in federal Fishery Management Plans, 16 U.S.C. 1855(b)(2). Federal agencies must consult with the NMFS regarding any action that may adversely affect EFH. NMFS must provide conservation recommendations to federal agencies regarding any action that would adversely affect EFH.

National Historic Preservation Act, 16 U.S.C. 470(f) and 36 C.F.R. 800, requires federal agencies to take into account the effects of their actions on historic properties. As part of the process, federal agencies must afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed action. The federal agency typically consults with the applicable State or Tribal Historic Preservation Officer and other consulting parties as part of the process.

State Certifications

In order for the USACE to issue a Section 404 permit, or for FERC to issue a license surrender or non-power license, the state must grant the following to certify that the proposed actions are consistent with the state's implementation of federal law.

CWA Section 401 Water Quality Certification. The state must grant or waive a water quality certification pursuant to Section 401 of the CWA, 33 U.S.C. 1341. This certificate states that the proposed activity will not result in a violation of state water quality standards.

Coastal Zone Management Act Certification. If the project would take place in the coastal zone, or have the potential to affect the coastal zone, the state must issue a certificate pursuant to the Coastal Zone Management Act, 16 U.S.C. 1451 et seq. This certification state that the proposed activity is consistent with the state's approved coastal zone management program.

Connecticut

Dam-related activities in Connecticut are regulated by the Inland Water Resources Division of the Bureau of Water Management, which is a part of the Connecticut Department of Environmental Protection (CTDEP). The state has jurisdiction over "all dams . . . without

exception and without further definition or enumeration herein, which, by breaking away or otherwise, might endanger life or property." Connecticut has created a system that, at least on the state level, is somewhat integrated, tying dam permit issuance to several other requisite permits.

An applicant must first apply for a Dam Safety Permit,[8] which applies to all dams in Connecticut (excluding federally owned and operated dams). After submitting an application, the applicant must then provide public notice of intent to apply for the permit. CTDEP reviews the permit for safety, wetlands and fisheries considerations and will integrate any necessary permit conditions to address issues raised by the other agencies, including the disposal of contaminated sediments. Once CTDEP finds the permit acceptable, they will publish and distribute a Notice of Tentative Determination to approve the application to the public, the Inland Fisheries Division, wetland agencies and the planning, zoning and conservation commission of each town affected by the project.

The advantage to the applicant using this permit is that once the Dam Safety permit is approved, the applicant does not need to obtain a separate municipal Inland Wetland and Watercourse Permit[9] (necessary for work affecting wetlands), a Stream Channel Encroachment Line (SCEL) Permit[10] (a CTDEP permit necessary for any activity that temporarily or permanently alters the character of the floodplain or watercourse wherein SCEL lines are established), or a CTDEP Water Diversion Permit[11] (necessary for any alteration of the instantaneous flow of water).

Coastal permits are administered by CTDEP's Office of Long Island Sound Programs (OSLIP) and are necessary only if the project affects any tidal wetlands, coastal or navigable waters.[12] If so, the applicant must apply to OSLIP who will review the permit for wetland impacts such as erosion and sedimentation, current patterns and marine fisheries.[13]

Connecticut maintains a Natural Diversity Data Base and CTDEP permit approval requires a review to determine a project's potential impact on federal and state protected species and habitat. Initial review can be made by the applicant by following directions on the Natural Diversity Data Base website.[14] Further review by state wildlife and fisheries biologists is necessary only if a potential conflict is apparent.

New Hampshire

Dams in New Hampshire are regulated by the Department of Environmental Services (NHDES) Dam Bureau, which is located within the Water Division. NHDES has jurisdiction over dams that pose any artificial barrier, including appurtenant works, which "impound or divert water and which has a height of 4 feet or more, or a storage capacity of 2 acre-feet or more, or is located at the outlet of a great pond."

In 2001, the NHDES established a Dam Removal and River Restoration Program, and hired a program coordinator. This program has the goal of enabling an effective and efficient approach to dam removal. The program coordinator provides assistance to dam owners, communities, consultants and others throughout the dam removal decision-making, planning

[8] For details of Dam Safety Permit requirements, see 22a Connecticut General Statutes Ch. 446j, 401-411.
[9] See 22a Connecticut General Statutes, Ch 440, 36-45.
[10] See 22a Connecticut General Statutes, Ch 446i, 342-349
[11] See 22a Connecticut General Statutes, Ch 446i, 365-379.
[12] See 44 Connecticut General Statutes, Ch 44, 98
[13] See Rules of Connecticut State Agencies – RCSA 22a-30-10.
[14] See http://www.dep.state.ct.us/cgnhs/nddb/requests.htm

and implementation process. Individuals interested in removing a dam in New Hampshire should first contact the River Restoration Coordinator to discuss the proposed project.[15]

The need to establish this dedicated program and position evolved from the New Hampshire River Restoration Task Force, which was formed in January 2000. The Task Force formed to explore opportunities to selectively remove dams for the purpose of restoring rivers and eliminating public safety hazards. The Task Force is an initiative with diverse representation, including multiple state and federal agencies, conservation organizations, academia, and others. The River Restoration Coordinator convenes this group on a regular basis to discuss proposed and planned dam removal projects, as well as programmatic issues (e.g., improving inter-agency coordination, identifying funding opportunities, etc.).

The only state permit that is currently required for dam removal projects is from the NHDES Wetlands Bureau, which has jurisdiction of virtually all surface waters of the state. The Dam Bureau does not grant a permit for dam removals, but they do review and comment on each application, and an approval is required for the project. The Dam Bureau recently revised their Administrative Rules to reflect this aspect of their oversight; a new part addressing dam removal approvals was added to the rules.[16]

Applicants must file a Standard Dredge and Fill Application and an Attachment for Dam Removal Projects. The attachment was developed to elicit responses from applicants on the somewhat unique issues that may apply to a dam removal project. The application package must include documentation of consultation with the State Historic Preservation Office, the state offices that oversee protected species, and the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory for an assessment of potential effects to the riverine ice regime. Each of these agencies must decide whether it has an interest in the project, and if it responds in the affirmative, then the applicant must comply with the applicable regulations. Other bureaus and agencies may also review the application materials as necessary (*e.g.,* NHDES Watershed Management Bureau, NH Fish and Game Department).

The combination of a dedicated program within the NHDES, an increased understanding of dam removal among the regulatory agencies, and a "one-stop" permit application and regulatory process has resulted in a rapid increase of dam removal projects in New Hampshire in recent years. Since 2000, seven dams have been removed in the State of New Hampshire.

New Jersey

There are several state permitting requirements for dam removal in New Jersey including a dam safety construction permit, either a freshwater wetlands permit or a waterfront development permit, a water lowering permit, and a soil conservation district plan certification.

The N.J. Department of Environmental Protection (NJDEP) administers dam safety construction permits. All dams which raise the water level of a stream five feet or more (or eight feet or more in the Pinelands region[17]) fall under the auspices of the Safe Dam Act[18] and the associated dam safety standards,[19] which requires a permit to build, modify or remove such dams, unless the dams are otherwise exempt.

[15] See http://www.des.state.nh.us/dam/damremoval
[16] See NHDES Administrative Rules, Chapter Env-Wr 600
[17] For details on permitting requirements in the Pinelands region, see http://www.state.nj.us/pinelands/appli/.
[18] N.J.S.A. 58:4-1 et seq. and N.J.S.A. 13:1D-1 et seq.
[19] N.J.A.C. 7:20-1.1 et seq.

All non-exempt dams require a dam safety construction permit to breach or remove a dam. The permit application must include:[20]

- Design report including disposal of any spoil material.
- Plans for the control of sediment and upstream lake bed.
- Computations for the method and timing of lake dewatering.
- Demonstration that the breach will not adversely affect downstream flooding during the 10, 50 and 100-year storms.
- Proposed work schedule and methods.
- Description of the potential effects of the dam removal upon the environment and upon life and property downstream of the dam.
- Evidence that all adjoining property owners have received notification of the proposed removal and proof of publication of notice of the application in the local newspaper. Local landowners, residents and the local government all have the right to oppose the removal of a dam by filing a petition which then triggers a public hearing regarding dam removal. Following the hearing the NJDEP Commissioner will decide whether to allow the removal to proceed, and if not how to allocate the costs of dam maintenance among those opposing the removal.[21]

The NJDEP also administers Freshwater Wetland Permits – these are a series of general permits that authorize activities in wetlands. Dam removal is authorized under General Permit 18 (Dam Repair),[22] as long as temporary disturbance and adverse impacts are minimized using best management practices.[23] Dam removal is also potentially authorized under General Permit 16 (Habitat Creation and Enhancement) if the project's goal is to improve or create fish and wildlife habitat.[24]

For all inland waters, the freshwater wetland permit replaces the need for an Army Corps of Engineers permit; however in streams 1000 feet within the tideline, a CWA 404 permit from the Army Corps is still required.

For projects on tidal waterbodies, a Waterfront Development Permit is needed instead of a Freshwater Wetlands Permit. NJDEP administers the Waterfront Development Permits under the Waterfront Development Law, which regulates all development in and around tidal waterways.[25] Applications require project and environmental information as well as a public notice to property owners within 200 feet of the project.[26]

In the NJ pinelands area, dam removal requires a permit from the Pinelands Commission[27] instead of a freshwater wetlands permit. However, the Pinelands Commissions uses the same standards and criteria as the freshwater wetlands permit. Because the Pinelands are a specially protected region, all types of development require a public development permit from the Pinelands Commission.[28] Pinelands Commission staff review

[20] N.J.A.C. 7:20-1.7(h).
[21] N.J.S.A. 58:4-9,10.
[22] N.J.A.C. 7:7A-5:18.
[23] For Freshwater Wetlands General Permit applications, see http://www.state.nj.us/dep/landuse/forms/chkgpn25.pdf
[24] N.J.A.C. 7:7A-5.16.
[25] N.J.S.A. 12:5-3.
[26] N.J.A.C. 7:7A-7. See also: http://www.state.nj.us/dep/landuse/coast.html.
[27] N.J.S.A. 13:18 A-4.
[28] Pinelands Development Permits can be found at http://www.state.nj.us/pinelands/appli/.

applications to ensure that proposed projects do not adversely affect the natural and cultural resources of the Pinelands region.

A water lowering permit[29] is required from the NJDEP Division of Fish and Wildlife as part of the dam removal process and guidelines exist to plan the most appropriate method of drawing down an impoundment.[30] Applications are short and must be submitted at least one month before the dam removal.[31]

A soil erosion and control plan certification is required for all projects that disturb over 5000 square feet.[32] A certification application must be made to the appropriate Soil Conservation District.[33]

As part of the dam safety and freshwater wetlands permit process, the State Office for Historic Preservation is provided the opportunity to review the project to identify if there are any impacts to historic resources.

NJ has a low interest loan program for the restoration of dams. "Restoration" can include the demolition of a dam as well as rehabilitation and reconstruction.[34] Although priority for funding is given to high hazard dams,[35] recreation and conservation also receive priority points, and thus dam removal is eligible for funding.[36]

New York

New York has a Division of Environmental Permits within the Department of Environmental Conservation (NYSDEC) that coordinates and administers many of the state's environmental permits.[37] Applicants considering a dam removal project are advised to schedule a pre-application meeting with the NYSDEC Regional Permit Administrator to facilitate the permit application process.

Several state permits may be required to remove a dam in New York. However, all permits are part of the state's coordinated permit management system. This coordinated system is authorized under the Uniform Procedures Act[38] whereby one application – the Joint Application for Permit -- is submitted to address the several relevant permit requirements. This application package is then dispersed by the Division of Environmental Permits to all necessary reviewing agencies, such as the Dam Safety Office and Bureau of Fisheries.[39]

The Protection of Waters regulatory program[40] (also referred to as Article 15 program[41]) is designed to preserve and protect New York's streams, rivers and lakes. There are two primary permits under this program that will apply to most dam removal projects: (1) a dam safety permit, and (2) a permit for disturbance of bed and banks (if the dam is on a protected

[29] N.J.S.A. 23:5-29.
[30] See guidelines at: http://www.state.nj.us/dep/fgw/pdf/wtrlowerapp.pdf.
[31] Ibid.
[32] N.J.S.A. 4:24-39 et seq.
[33] A list of Soil Conservation Districts can be found at http://www.state.nj.us/agriculture/rural/natrsrc.htm#state
[34] N.J.A.C. 7:24A-1.7.
[35] N.J.A.C. 7:24A-5.1.
[36] More information on the loan program can be found at http://www.state.nj.us/dep/nhr/engineering/damsafety/engineer.htm.
[37] See: http://www.dec.state.ny.us/website/dcs/index.html
[38] Article 70 of the NYS Environmental Conservation Law, Implementing Regulations – 6 NYCRR Part 621.
[39] http://www.dec.state.ny.us/website/dcs/upa/index.html
[40] For information about the Protection of Waters program and permits see: http://www.dec.state.ny.us/website/dcs/streamprotection/index.html
[41] Article 15 of the NYS Environmental Conservation Law, Implementing Regulations - 6 NYCRR 608.

waterbody, which includes waters with use classifications of drinking, swimming, and trout waters).[42]

A dam safety permit is required for the modification of any dam, defined as any artificial barrier having a height equal to or greater than 15 feet or a maximum impoundment capacity equal to or greater than three million gallons. Exceptions to this include: (1) structures having a height equal to or less than six feet regardless of the structure's impoundment capacity, or (2) structures with an impoundment capacity not to exceed one million gallons regardless of the structure's height.[43]

The application for dam modification, in addition to the joint application form, requires submittal of Supplement D-1,[44] and requires that a professional engineer design and supervise the work. The application will be reviewed by the Dam Safety Section of NYSDEC's Bureau of Flood Protection. For all dam removals, the review will examine the method and sequence of the proposed work and the stability of the site after removal. For a partial removal, the review will also examine the safety and adequacy of the residual dam structure in comparison with applicable dam safety criteria.

NYSDEC must determine that the permit is in the public interest and that it meets the following standards for issuance:[45]

- The proposal is reasonable and necessary.
- The proposal will not endanger the health, safety or welfare of the people of the State of New York.
- The proposal will not cause unreasonable, uncontrolled or unnecessary damage to the natural resources of the state including soil, forests, water, fish, shellfish, crustaceans, and the aquatic- and land-related environment.

NYSDEC also reviews each application for a Protection of Waters Permit to determine whether the proposal is consistent with the standards for permit issuance, which requires consideration of the following:

- The effect of a proposal on natural resources such as fish and wildlife habitat, water quality, hydrology, and watercourse and waterbody integrity.
- Adequacy of project design and construction techniques.
- Operational and maintenance characteristics.
- Safe commercial and recreational use of water resources.
- The water dependent nature of a use.
- The safeguarding of life and property.
- Natural resource management objectives and values.
- Importance of the area for spawning or nesting.

New York has a state law, the State Environmental Quality Review Act (SEQR), which parallels the National Environmental Policy Act, and requires an environmental assessment form (EAF) or environmental impact statement (EIS) for certain local and state government actions, such as permit issuance and project approval.[46] Materials submitted pursuant to

[42] Contact the regional branch of the NYSDEC Division of Environmental Permits to determine if the waterbody of interest is classified as a protected water.
[43] NYS Environmental Conservation Law 15-0503.
[44] Permit applications can be found at: http://www.dec.state.ny.us/website/dcs/streamprotection/protwatdwnd.html
[45] 6 NYCRR 608.8.
[46] 6 NYCRR Part 617.

SEQR are included in the Joint Application for Permit. In reviewing the EAF or EIS, the agency will balance the social, economic and environmental impacts of the proposed project.

New York also has a state law, the State Historic Preservation Act (SHPA), which parallels the National Historic Preservation Act and requires review of any project that involves a state action (including permitting and funding).[47] Compliance with State and National Historic Preservation Acts is commonly handled as part of SEQR review process, when appropriate.

If the dam removal is within the boundaries of the Adirondack Park, additional permits may be needed and applicants should consult with the Adirondack Park Agency (APA).[48] A wetland permit is required for almost any project in a wetland within the park, and APA will evaluate the permit based the relative values of the wetland compared to any other environmental, economic or social benefits that may result from the proposed project.[49] Permits are not issued for wetland activity unless project benefits outweigh wetland benefits or unless certain protection criteria are met, such as minimal degradation.[50]

The National Flood Insurance Program (NFIP) contains construction requirements within mapped Special Flood Hazard Areas.[51] Because a dam removal nearly always causes a change in water surface elevation, it is an activity considered to be "floodplain development," which must be permitted by the town, city or village where the project resides. If the project results in an alteration or relocation of a watercourse, the applicant must notify adjacent communities, the State NFIP Coordinating Office, and the Federal Emergency Management Agency prior to any alteration or relocation. The applicant must assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.[52]

Encroachment into a regulatory floodway, as shown on the Flood Insurance Rate Map for the community, is prohibited unless it has been demonstrated through hydrologic and hydraulic analysis performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge (the 100-year flood or one percent annual chance flood). If a rise does result, the applicant must make appropriate application to the Federal Emergency Management Agency to formally revise the flood map.[53]

Finally, NYSDEC has established an informal Barrier Mitigation Subcommittee, within the Hydraulic and Habitat Modification (HHM) Workgroup, formed through the state's non-point source pollution program. This subcommittee is in the process of developing statewide criteria for assessing and prioritizing dams for removal, and identifying aspects of the regulatory process that would benefit from clarification or guidance specifically with respect to barrier mitigation projects (i.e., dam removal, fish passage, culvert retrofits, etc.).

Pennsylvania

To facilitate the removal of obsolete dams in the Commonwealth of Pennsylvania, the Pennsylvania Department of Environmental Protection (PADEP), Division of Dam Safety, has

[47] http://nysparks.state.ny.us/shpo/environ/index.htm
[48] See http://www.apa.state.ny.us/
[49] 9 NYCRR 578
[50] Ibid., and see http://www.apa.state.ny.us/documents/index.html
[51] Flood Insurance Rate Maps exist for local communities and can be found in the local community, at DEC regional or central offices, and at county planning offices.
[52] 44 CFR 60.3(6) and 44 CFR 60.3(7)
[53] 44 CFR 60.3(d)(3) and 44 CFR 60.3(d)(4)

instituted an expedited permitting process referred to as a "restoration waiver."[54] This process was initiated to make it easier and more affordable for dam owners to divest themselves of obsolete dams that can pose significant liabilities and safety hazards, as well as environmental damage. However, in order to qualify for the dam removal waiver, the removal of the dam must restore the river to its natural free-flowing condition. The steps are as follows:[55]

1. A pre-application meeting is held at the proposed dam removal site with the dam owner and representatives from PADEP, Pennsylvania Fish and Boat Commission (PFBC), County Conservation District, Army Corps of Engineers, and other relevant entities.
2. The dam owner must then submit to the PADEP a plan of the proposed removal, including a plan view and cross-sections necessary to complete the project. The plan should also include dimensions, channel lining specifications, and the proposed location of the spoil area.
3. PADEP will then:
   - Review the plan.
   - Conduct an environmental assessment. (Note: A dam permit may be required if significant environmental impacts will result from the removal.)
   - Provide general notification of the proposed project through the Pennsylvania Bulletin for a 30-day comment period.
   - Coordinate with the Pennsylvania Historical and Museum Commission regarding historic and cultural issues.
   - Coordinate the review of the proposed dam removal with the Pennsylvania Fish & Boat Commission and the Army Corps of Engineers.
   - May coordinate with PA Department of Conservation and Natural Resources, PA Game Commission, PFBC, and/or U.S. Fish and Wildlife Service if there are potential conflicts with State or Federal threatened or endangered species.
4. After the proposed dam removal is approved by PADEP, the following must be completed prior to dam removal:
   - The County Conservation District must approve an Erosion & Sedimentation Control Plan.
   - The Pennsylvania Fish & Boat Commission must be notified prior to removal.
   - A drawdown permit (if required) must be obtained from the Pennsylvania Fish and Boat Commission.
   - The PADEP must be notified 10 days before the project begins.
   - The local municipality must be notified at least 30 days before the project begins.
5. Upon project completion, the owner must notify PADEP that that the project is complete, and PADEP will conduct a final inspection of the dam removal site.

The Pennsylvania Fish and Boat Commission (PFBC) has authority to require fish passage structures on dams,[56] and dam removal is considered to be one option to facilitate fish passage. Under this authority, PFBC Division of Habitat Management provides technical and financial assistance statewide under their Consultation and Grant Program for Fish Passage and Habitat Restoration. Interested landowners with dams or other blockages are eligible to request assistance for their dam removal project. Landowners working in

[54] In general, see 25 Pa. Code 105.12(a)(11) and (a)(16) for more details.
[55] See www.dep.state.pa.us/dep/deputate/watermgt/WE/FactSheets/Dam/fs2120.htm
[56] 30 Pa. C.S. 3501(A).

conjunction with the PFBC and PADEP to remove or breach their dams typically qualify under the restoration waiver provision.[57]

The PADEP has also allocated a considerable amount of funding specifically for dam removal projects through their competitive Growing Greener grant program. American Rivers, a national river conservation organization, was awarded $767,000 over three years (2003-2006) to allocate to projects throughout the state. Through this award, American Rivers has assisted in funding 53 dam removal or fish passage projects statewide. This highly successful program -- *Free-Flowing Pennsylvania* -- has leveraged over $3.4 million in matching funds from other state agencies, federal agencies, private foundations and additional funders. The average cost for a dam removal project in Pennsylvania over the past three years has been $75,000. This highly economical result is largely due to the extensive first-hand experience of the applicable regulatory personnel (both state and federal-level), the demonstrated knowledge of the consultants and contractors, and the predictable and streamlined permitting process. A $1.4 million proposal from American Rivers to continue and expand this successful program is currently under consideration by the PADEP.

Acknowledgments

The state-by-state overview of this report was largely researched and written by Katherine Baer of American Rivers, with assistance from Margaret Bowman, formerly of the American Rivers and currently with The Pew Charitable Trusts.

[57] 25 Pa. Code 105.12 (a)(16).

Appendix J:

Paying for Dam Removal

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AMERICAN RIVERS

PAYING FOR DAM REMOVAL

A Guide to Selected Funding Sources

American Rivers

1025 Vermont Avenue NW, Suite 720 • Washington, DC 20005 • 202-347-7550 • www.americanrivers.org

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Part I. Introduction

Over the past 100 years, the United States led the world in dam building—blocking and harnessing rivers for a variety of purposes, including hydropower, irrigation, flood control, and water storage. The U.S. Army Corps of Engineers has catalogued approximately 75,000 dams greater than six feet along the waterways of the United States. Tens of thousands more small dams plug our rivers across the country.

While dams can benefit society, today science shows they also cause considerable harm to rivers. Dams change the chemical, physical, and biological processes of rivers all of which impact fish and wildlife. Dams block free-flowing river systems, hindering the flow of nutrients and sediments and impeding fish and wildlife migration. Dams also alter water temperatures and oxygen levels critical to good water quality and wildlife survival.

Many dams across the country have aged beyond their planned life expectancy, causing safety risks for communities downstream. The average life expectancy of a dam is 50 years, and a full one-quarter of all U.S. dams are now more than 50 years old. The American Society of Civil Engineers estimates that by the year 2020 that figure will reach 85 percent. In many cases, dam removal costs less than repairing an unsafe dam, especially where the benefits of the dam are marginal or non-existent.

Clearly dam removal is not appropriate for all—or even most—of the nation's dams. Many dams continue to serve public or private functions such as flood control, irrigation, and hydropower generation. This does not mean, however, that rivers should continue to be heavily impacted by these dams. Most dams across the country could be operated in a fashion that reduces their current negative impacts on the river. In hundreds of cases nationally, American Rivers and others are working to improve the operations of functional and economically viable hydropower dams through active participation in the federal licensing process. However, some dams cause such significant environmental damage that no amount of reoperation will alleviate the environmental harm. In many instances, dams no longer serve a purpose and may be abandoned. For these dams, where the environmental impacts of the dams outweigh the benefits, dam removal is often a reasonable and viable solution for restoring river functions.

A. Need for Dam Removal Funding

Removing dams for environmental benefits and to address unsafe and unwanted dams is still a relatively new phenomenon. Dam removals have been documented since the early 1900s—including a large number removed in just the last decade[1]—and many more are undocumented. In part this reflects America's aging dam infrastructure; in part, it reflects significant changes in land uses and the structure of our economy, which has reduced our need for certain dam functions, as well as a growing concern about river ecology.

Many local communities, natural resource agencies, and environmental advocates want to remove selected dams that have outlived their purpose, are unsafe, or have costs that outweigh their benefits. The decision to remove a dam is often driven by safety concerns, but there may be compelling environmental and economic concerns as well. In many cases, dam removal saves significant taxpayer dollars compared to repair or environmental mitigation costs. On average, removal costs were only 37 percent of the estimated dam repair costs for 10 dams profiled in the

[1] See *www.damremovaltoolkit.americanrivers.org* and click on "Case Studies of Completed Dam Removals" for the most up-to-date list of dams and the year they were removed.

report, *Dam Removal Success Stories: Restoring Rivers Through Selective Removal of Dams that Don't Make Sense* report.[2]

Finding funding for removal is a significant impediment to removing dams that don't make sense. There are almost no funding programs dedicated specifically to dam removal (Wisconsin is an exception). However, many federal, state and local government programs intended to improve water quality, protect or enhance wildlife habitat, restore natural resources or alleviate dam safety concerns can be used to finance dam removals. In addition, there are many sources of private funding, such as corporate environmental damage mitigation funds (these funds may be government-administered) that can be used to remove dams. For example, dams in Maine, Wisconsin, Pennsylvania, and other states have been successfully removed using creative approaches that combine multiple types of public and private financing.

The information provided in this report is cause for both concern and optimism. The lack of dedicated funds for dam removal foretells an increasing problem as dams across the country age and the need for investment in repair and removal becomes more critical. It also exposes the potential for a significant lost opportunity. As we better understand the negative impacts that dams have on rivers, fish and wildlife, and water quality, removal of dams that don't make sense can be a simple, cost-effective way to alleviate many of the problems associated with dams. It would be very unfortunate and short-sighted to miss these restoration opportunities simply because of the lack of funds for dam removal.

At the same time, the information provided in this report is cause for optimism. Until dedicated funds for dam removal can be developed, there are a variety of opportunities for financing some dam removals. By thinking creatively and being willing to combine a variety of funding sources, dam removal has been, and can be, financed through existing pools of funding. These existing pools of funding will not be able to address all of the current and future dam removal needs, but they will be able to make significant improvements to rivers through financing priority dam removals.

B. Purpose and Contents of this Report

The purpose of this report is to present information on federal, state, local, and private funding mechanisms that can be used to finance dam removal and associated river restoration. It is designed to be used as a tool by anyone who is seeking funds to finance removal of a dam that does not make sense—dam owners, government officials, non-governmental groups, individuals, *etc*. We hope that this report can provide people with resources, points of contact and ideas for developing creative financing packages for dam removal.

Because funding sources are limited and evolving, this report does more than simply list the available funding sources (though it does provide this information in Appendices A and B). In addition, this report provides general information about dam removal funding that can help people understand available—and potential—funding options. This may be useful both in crafting a funding package for an individual dam removal and in identifying potential new sources for dam removal funding.

[2] This figure is based on dam repair estimates and actual total removal costs for 10 of 25 case studies from the December 1999 report *Dam Removal Success Stories: Restoring Rivers Through Selective Removal of Dams that Don't Make Sense* prepared by American Rivers, Friends of the Earth, and Trout Unlimited. The 10 case studies for which this information was available are: the Baraboo, Clyde, Kennebec, Milwaukee, Pleasant, Santa Fe, and Willow Rivers, Souadabscook Stream, and Cold and Whitestone Creeks.

This general information is provided in two ways. First, Part II provides information about the types of dam removal funding available from federal, state, and private sources. Second, Part III presents an analysis of the financing of 25 dam removals profiled in the *Dam Removal Success Stories: Restoring Rivers Through Selective Removal of Dams that Don't Make Sense*, a report released in 1999 by American Rivers, Friends of the Earth, and Trout Unlimited. Although this analysis is limited to the 25 case studies in the *Dam Removal Success Stories* report, it provides some perspective on the types of funding that can be obtained for dam removal.

Finally, Part IV of this report provides some general information about the cost of dam removal. This information is provided to offer guidance in estimating the potential cost of a dam removal project so that an appropriate level of funds can be raised.

The pace of dam removal is accelerating around the country. And the approaches used to finance these removals are expanding as well. Thus, this report is a work-in-progress. It will be updated as new information becomes available. American Rivers welcomes any new information regarding dam removal financing to share with others around the country. For comments, questions, or to share new information about dam removal financing, please contact Margaret Bowman or Elizabeth Maclin at American Rivers, 202-347-7550, or by email: *mbowman@amrivers.org* and *emaclin@amrivers.org*.

C. For Additional Information About Funding Sources

The following are other resources that provide information about funding for river protection and restoration, and dam removal.

- U.S. General Services Administration's *Catalog of Federal Domestic Assistance* (CFDA): *www.gsa.gov/fdac*
- U.S. Environmental Protection Agency's (EPA) *Catalog of Federal Funding Sources for Watershed Protection*: *www.epa.gov/owowwtr1/watershed/wacademy/fund/html#contents*
- U.S. EPA Finance Page: *www.epa.gov/epahome/finance.htm*
- Internet resource jointly developed by agencies of the U.S. Departments of Agriculture and Interior, The Partnering Institute, Colorado Rural Development Council, and the Sonoran Institute, *Conservation Assistance Tools*: *www.sonoran.org/cat/default.asp*
- U.S. EPA's *American Heritage Rivers Catalog of Success*: *www.epa.gov/rivers/services*
- White House Task Force on Livable Communities' *Enhancing Water Resources*: *www.livablecommunities.gov/toolsandresources/water_resources.htm*
- River Network's *Directory of Funding Sources for Grassroots River and Watershed Conservation Groups*: *www.rivernetwork.org/rnpublic.htm#dfund*
- River Network's *Directory of Funding Sources for Grassroots River and Watershed Conservation Groups in New England and New York*: *www.rivernetwork.org/nedirect.htm*

D. For Additional Information About Dam Removal

American Rivers has developed a Resource Center of material regarding removal of dams that don't make sense. This on-line center includes:

- General information about dams;
- Background on the development of today's dam removal movement;
- Database of completed dam removal projects;
- Case studies of both successful removals and current dam removal campaigns;

- Frequently asked questions about dam removal;
- Dam removal cost information;
- Ecological benefits and impacts of dam removal;
- Permitting for dam removal;
- Decommissioning of FERC-regulated hydropower dams;
- Information about dam safety issues;
- Research opportunities in dam removal; and
- Links to other organizations with information about dam removal.

Additional resource materials are being developed for the Dam Removal Resource Center, including:

- Dam removal engineering options;
- Making the right dam removal decision;
- The economics of dam removal; and
- Non-structural or low-impact alternatives to dams.

To obtain copies of these materials, or for other information about dam removal, please contact Margaret Bowman or Elizabeth Maclin at American Rivers or view our web page at *damremoval.americanrivers.org*

Margaret Bowman
Senior Director, Dam Programs
mbowman@amrivers.org
or
Elizabeth Maclin
Associate Director, Dam Programs
emaclin@amrivers.org

American Rivers
1025 Vermont Ave. NW, Suite 720
Washington, DC 20005
202-347-7550

Part II. The Role of Different Sectors in Funding Dam Removal

Funding for dam removal can come from a variety of sources. Many dams have been removed with direct funding from federal, state, tribal or local governments that either own the dams, have responsibility for abandoned structures, or have funding for river restoration. The private sector, particularly corporations, has also played a critical role in financing dam removal projects. This section provides a brief overview of the role each sector can play in financing dam removal. More detailed information about federal and state funding programs is available in Appendix A and B to this report.

The information provided in this section and the associated appendices are undoubtedly incomplete. We expect there have been numerous dam removal funding arrangements of which we are unaware. In addition, the roles of the varying sectors in dam removal are evolving rapidly and may change significantly over the next few years. We welcome corrections or additions to the information provided in this section, and will update it periodically.

A. Federal Funding

Federal funding for dam removal can come from: (1) existing federal funding programs; (2) general budgets of federal agencies; (3) federal Congressional appropriations specific to a particular dam; (4) natural resource damage assessments and other mitigation funds; (5) decommissioning funds and other mitigation under the Federal Energy Regulatory Commission licensing process; and (6) in-kind federal assistance in the form of studies, technical assistance, and direct assistance by branches of the Armed Services.

1. Existing Federal Funding Programs

There is no dedicated funding source at the federal level for removal of dams for ecological or recreation reasons, nor is there a dedicated source for repair or removal of unsafe dams at the federal level. Nevertheless, there is a remarkable array of federal programs and dollars that can be tapped for both removal and associated costs. Although some dam removals have been funded directly through one federal source, many dam removals have creatively combined monies from many sources.

Many of the federal funding programs provide grants to individuals and nonprofit organizations as well as state and local governments. Matching requirements are included with many federal funding sources—that is, most federal funding programs require a certain percentage of project costs to be borne by non-federal funding sources. These match requirements can sometimes be difficult for local communities to meet, particularly since most federal programs do not allow matching with other federal funds. In some programs, more flexible matching fund rules are beginning to take hold. For example, the U.S. Department of Transportation's TEA-21 Recreational Trails program (potential funding for riverfront restoration work related to a dam removal), allows other federal funds to be used to match up to 95 percent of program grants. The Army Corps of Engineers also has liberal rules that allow up to 80 percent of the match required under its Aquatic Ecosystem Restoration and Modifications for Environmental Improvements programs to come from in-kind contributions.

To date, natural resource agencies, such as the U.S. Fish and Wildlife Service (Interior Department), the U.S. Environmental Protection Agency, National Marine Fisheries Service (Commerce Department) and the Natural Resources Conservation Service (Agriculture

Department) have provided the most grant funding for the direct physical demolition costs of dam removal. The most frequently tapped federal grant programs for dam removal include: Partners for Fish and Wildlife (U.S. Fish and Wildlife Service), Challenge Grants (National Fish and Wildlife Foundation), Community-Based Restoration (National Marine Fisheries Service), Chesapeake Bay Program's Fish Passage Workgroup (U.S. EPA), and Wildlife Habitat Improvement Program (Natural Resources Conservation Service).

Many of these programs make grants on a competitive basis, and the demand for funds is much greater than the supply. For example, the Natural Resources Conservation Service's Wildlife Habitat Incentives Program (WHIP) program provides funding for up to 75 percent of habitat improvements on private lands and has been used to remove some dams. Demand for WHIP funds has been so great that the program exhausted the available $50 million in funding appropriated for 1997-2000 in two years.

Existing federal funding programs are discussed in more detail in the "Guide to Selected Federal Funding Sources," which can be found in Appendix A.

2. General Budgets of Federal Agencies

Some federal agencies have general budget funds that can be used to help finance dam removals, studies associated with dam removals, related restoration work, and the like. For example, the Bureau of Reclamation (Department of Interior) has provided funding from its general budget to study removal of the Matilija Dam on the Ventura River in southern California. These funds are likely to be limited, but they can help to initiate a dam removal study, provide part of the funding needed for dam removal in combination with other funds, or fully fund a small dam removal project.

Some agencies may also have general budget funds to repair or remove dams that they own. For example, both the National Park Service and U.S. Forest Service have a policy to "maintain them or drain them," directing that dams on their lands either be properly maintained and serving a useful purpose, or be removed.

3. Specific Federal Congressional Appropriations

A number of federal agencies can be authorized by Congress to remove specific dams, including the Army Corps of Engineers, Bureau of Reclamation, and National Park Service. Usually, this funding is for dams owned by the agency and/or located on agency lands. However, funds have also been appropriated for removals that are not on agency property. Each project must be specifically authorized and Congress generally must appropriate specific funds to the authorized project before the dam can be removed. For example, in 1992 the National Park Service was authorized by Congress to purchase two dams from private dam owners on the Elwha River in Olympic National Park in Washington. The dams block migratory salmon and steelhead runs and cause other impacts to the river system. Appropriations to purchase and remove the dams are actively being pursued. In another example, in 1999 Congress authorized $10 million for the Army Corps of Engineers to remove the Embrey Dam on the Rappahannock River in Virginia. The Army Corps is currently conducting a feasibility study for the dam removal and has committed to removing the dam by 2002.

4. Natural Resource Damage Assessments and Other Mitigation Funds

The federal government collects fines for damages to natural resources through violations of the Clean Water Act, the Superfund Act (CERCLA), the Oil Pollution Act, the National Marine Sanctuaries Act, and the Endangered Species Act. The Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration assess damages, levy fines, and conduct restoration efforts related to oil spills and hazardous chemical releases. These agencies and the National Fish and Wildlife Foundation, a quasi-governmental non-profit organization, act as trustees for the violation fines, which are used to fund restoration efforts. Damage assessments and other mitigation funds have been an important source of funding for dam removals in watersheds where environmental violations have occurred. For example, natural resource damage assessment funds from an oil spill were used by the U.S. EPA's Chesapeake Bay Program to notch the Little Falls Dam on the Potomac River near Washington, DC.

Sometimes, funds are established in advance of the actual environmental impact as mitigation for a proposed project under agreements negotiated between federal or state regulators and the private or public facilities or landowners they regulate. In a number of cases, these funds have been used for dam removal and related restoration efforts. For example, $2.5 million for the removal of the Edwards Dam on the Kennebec River in Maine was funded by the Bath Iron Works Corporation as mitigation for a planned 17-acre expansion of its shipbuilding facility into the Kennebec River.

5. Decommissioning Funds and Other Mitigation Under the Federal Energy Regulatory Commission Licensing Process

The Federal Energy Regulatory Commission (FERC) has the authority to license the operation of most non-federal hydropower dams. FERC is charged with balancing economic interests and the environment when granting a license. Many licenses across the country, which can be issued for 30 to 50 years, are coming up for renewal in the next few years. There are at least five potential avenues for funding dam removal through the FERC relicensing process[3]:

(a) required modifications to existing facilities;
(b) required removal of a dam;
(c) removal or restoration of *other* dams as mitigation for continued operation;
(d) specific dam decommissioning funds; and
(e) general dam decommissioning funds.

(a) *Required modifications to existing facilities*. Through the FERC relicensing process, applicants can be required to make necessary modifications to dam structures or operations to improve environmental conditions impacted by the dam. This can take the form of modifications to dam structures, such as fish passage, or operations requirements, such as flow release levels and timing that more closely approximate natural river flows. Depending on the cost of the required modifications and the value of the hydropower produced, the applicant may choose to voluntarily remove the dam as the more economically rational choice. This occurred recently with the Condit Dam on the White Salmon River in Washington, which was required by FERC under a new license to provide passage for salmon whose migration had been blocked by the dam. In September of 1999, a voluntary agreement

[3] For more information about decommissioning of FERC-regulated hydropower dams, see *runningrivers.americanrivers.org*.

among the Yakama Nation, PacifiCorp, environmental groups, and state and federal fishery agencies was reached to remove Condit Dam as a less expensive alternative to fish passage.

(b) *Required removal of the dam.* FERC can deny a dam owner's application to relicense a dam and require that the dam be removed. This occurred for the first time when FERC denied a relicense application for the Edwards Dam in Maine and ordered the dam removed at the owner's expense because the environmental benefits of removal overwhelmingly outweighed the economic benefits of the hydropower produced at the dam. [4]

(c) *Removal or restoration of other dams as mitigation for continued operation*. Approving an application to relicense a dam can be conditioned on the applicant paying to remove other dams on the same or connected rivers as mitigation for being allowed to continue operating the present hydropower dam. The dams to be removed may or may not be owned by the licensee. For example, on the Menomonee River in Wisconsin and Michigan, a public utility agreed to remove one dam it owned that was no longer economically viable, as well as a smaller dam on a tributary to the river that it did not own, as part of the environmental mitigation for relicensing eight other hydropower dams.

(d) *Specific dam decommissioning funds*. FERC has the authority to require a dam owner to establish an individual decommissioning fund to finance future removal of a dam. However, to date, FERC has never ordered a dam owner to establish such a fund.

(e) *General dam decommissioning fund*. FERC or Congress also could establish a general dam decommissioning trust fund financed by all dam owners to be used to remove dams whose owners are unable to maintain their license and cannot undertake dam removal without financial assistance. Under the trust fund approach, all FERC licensees would be required to provide funding either in a one-time payment, or over time to a general decommissioning funding pool as a condition of license renewal.

6. In-Kind Federal Assistance

There are many different forms of in-kind (*i.e.*, non-monetary) assistance provided by federal agencies. First, some federal natural resource agencies manage grant programs that have already been used for dam removal and related restoration projects (*e.g.*, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Natural Resources Conservation Service). Many of these staff offer specific expertise in fisheries, aquatic ecosystem restoration and dam deconstruction and replacement of infrastructure that can be useful even if they do not provide funding for dam removal.

Second, the U.S. Armed Services are another potential source of donated labor and equipment for dam removal. For example, a group of U.S. Marines recently demolished a dam on the Little River in North Carolina as a training exercise. During the summer of 2000, an Air Force team from Texas removed the East Machias Dam, in East Machia, Maine under the auspices of Coastal America.

[4] The Edwards Dam was subsequently removed through voluntary settlement agreement.

B. State Funding

State governments play an important part in funding dam removals through various dam safety and river restoration grant programs. Generally, states have funded dam removals for: (1) safety concerns and/or (2) environmental concerns, such as water quality, fish passage, or habitat improvement.

Nearly all states have dam safety inspection and compliance programs, often housed in the state's chief water or natural resources agency.[5] Their task is to assess the structural soundness of public and private dams, and to ensure that necessary repairs are made to ensure against a loss of life or property from dam failure. In instances of an imminent threat of dam failure or dams with other safety concerns, many states have emergency authorization procedures to provide funds to repair or remove dams that pose a hazard. Typically, states use general revenue contingency funds for these emergency removals, and often the state will attempt to recoup the costs from the dam owner.

The impetus for dam removal in many states has come from natural resource departments whose primary interest is improving fisheries, recreation, and overall river ecology. These agencies use a variety of line-item budgets, state natural resource grant programs, and federal grant programs, as well as local government and private party funding to pay for dam removals and river restoration. There is also increasing interest in the role that dams and their operation may play in water quality. In Ohio on the Cuyahoga River, for example, several dams are being considered by Ohio EPA for removal as the most practical and cost-effective means to meet dissolved oxygen water quality standards.

In general, state funding can come from one of the following sources:

(1) State legislative appropriations for specific dam removals;
(2) Program budgets of state natural resource or environmental protection agencies;
(3) Dedicated dam safety funding;
(4) Dedicated funds for habitat improvement, river restoration, or fishery enhancement;
(5) State bond acts;
(6) Special revenue funds;
(7) Electric utility restructuring funds; and
(8) In-kind assistance.

1. State Legislative Appropriations for Specific Dam Removals

Many dams have been removed at the state level using direct legislative appropriations for a specific dam removal project. For example, in 1994 the Minnesota Department of Natural Resources requested an appropriation from the Minnesota State Legislature to remove the Welch Dam on the Cannon River. The legislature appropriated $80,000 and the actual cost of the dam removal was only $46,000, less than 40 percent of the estimated removal cost of $120,000.

[5] For a list of state dam safety officials, please see *damremovaltoolkit.americanrivers.org* and click on "State Agencies with Regulatory Authority Over Dams."

2. Program Budgets of State Agencies

In some instances, state natural resource agencies allocate funds from their budgets to pay for dam removals and related river restoration. In these cases, the dams are often owned by the state (*e.g.*, in a state park or other state facility) and removal is generally the most cost-effective option to address safety or environmental concerns being caused by the dam. In some cases, state agencies will also use funds from their own budgets to remove privately owned dams if there are compelling environmental benefits, dam safety concerns, or both.

3. Dedicated Dam Safety Funding

A number of states have generated small dam repair funds from application and other fees that can be provided as grants or loans to owners of priority unsafe dams to defray repair costs. In some states, such as Wisconsin, these repair funds can also be used for removal.

Few states provide any dedicated funding to repair or remove dams that are unsafe. Those that do include Maine, Massachusetts, New Jersey, Ohio, Utah, and Wisconsin. Each provides some form of grants or loans to repair unsafe dams or dams otherwise in need of rehabilitation (*e.g.* irrigation or water storage dams). In every case, there is no prohibition against using the funds for dam removal.

4. Dedicated Funds for Habitat Improvement, River Restoration, or Fishery Enhancement

A number of states have applied dedicated funds for habitat improvement, river restoration, or fishery enhancement to dam removal projects, including California, Connecticut, Maine, Michigan, New Hampshire, North Carolina, Ohio, and Pennsylvania, and Wisconsin. These funds are often created through special legislation to establish a dedicated funding source for natural resource protection and restoration. Some funds are general in nature, but increasingly, programs are specifically targeted toward water resources, rivers and lakes. Dedicated funds are financed in a variety of ways—through bond acts and special revenues (see below), through specified revenue stream allocations (*e.g.*, sales taxes or lottery revenues), or through a specified amount or percentage of state budget surpluses. For example, North Carolina's Clean Water Trust Fund applies 6.5 percent of the state's budget surplus, or a minimum of $30 million, each year to a trust that is used to fund grants to local governments and nonprofit organizations to enhance or restore degraded waters, protect unpolluted waters, contribute to a network of riparian buffers and greenways, or all three.

5. State Bond Acts

Many states have passed special referenda or legislation to issue bonds for the creation of dedicated funds for natural resource protection, including Alabama, Arizona, California, Colorado, Florida, Illinois, New Jersey, New York, North Carolina, and Oregon among others.[6] In many states a portion of these funds is dedicated to water resource and river protection, which could include dam removal. In March 2000, for example, California voters approved a $2.1 billion parks bond and a $1.97 billion water bond by nearly two-to-one margins. Of that, $95 million is specifically dedicated to river protection and an additional $25 million will be spent to acquire and restore salmon habitat, including dam removal projects.

[6] In 1999, 90 percent of all state-wide and local open space acquisition ballot initiatives were passed, for a combined total of $1.8 billion in new dedicated funding, according to a study by the Land Trust Alliance, www.lta.org.

6. Special Revenue Funds

Some states are also dedicating all or a portion of revenues from fishing stamps and special license plates for river protection and restoration, including dam removal. States with special water resource or river protection license plates include Connecticut, Maryland, Ohio, Pennsylvania, and Virginia among others. Connecticut and Ohio both have used revenues from these funds to pay for dam removals.

7. Electric Utility Restructuring Funds

Many states are currently grappling with electric utility restructuring, and have either passed, or are working on legislation that governs how public utilities and power generation facilities will be managed in the future. The restructuring of the electric industry will have significant impacts on the nation's rivers due to changes in incentives for hydropower dam owners (*e.g.*, repeal of certain federal subsidies). One significant result of the deregulated market is the increasing risk of uneconomic dams being abandoned by dam owners and left for the state to manage. Stranded cost recovery treatment of dam removal expenses could be one approach for addressing the problem of dams abandoned due to a move to a competitive market. An analogy to dam removal cost recovery is recovery of nuclear facility decommissioning costs. However, unlike with dam removal, nuclear facilities are required by law to collect funds from ratepayers for future decommissioning. Dam owners that find themselves with an uneconomic dam due to the transition to a competitive market have had no legal obligation to collect dam removal funds. Thus, there is a compelling need for recovery of these dam removal expenses now, during utility deregulation. Otherwise, states cannot ensure that adequate funding will exist to address unsafe and environmentally damaging abandoned dams that need to be removed. Funds for dam removal could be obtained either through a stranded cost recovery mechanism or through a general systems benefit fund.

8. In-Kind Assistance

There are many different forms of in-kind (*i.e.*, non-monetary) assistance provided by state natural resource and other agencies. First, many staff offer specific expertise in fisheries, aquatic ecosystem restoration engineering, and dam deconstruction and replacement of infrastructure that can be useful even if the state does not provide direct funding for dam removal. In some instances, these agencies and staff may even provide free or low-cost labor and equipment (*e.g.*, construction equipment and crews) to assist with a dam removal.

Second, states can provide a valuable service by taking title to a dam between the time it transfers ownership from the original dam owner and removal. By taking title to the dam, the state alleviates some liability issues associated with removal, thus lowering overall costs. The State of Maine has been willing to play this role with several dam removals, even though the removals were financed with non-state funds.

C. Local Government Funding

In general, less is known about municipal funding of dam removal, in part because municipalities have provided relatively little funding for dam removal to date; in part, because the information on local activities is difficult to track. Local utilities have provided large sums for several dam removals, although most of these contributions were mitigation under federal and state environmental regulations. This may signal an opportunity for local communities to work with wastewater utilities, for example, to selectively remove dams that can significantly improve water chemistry and stream quality.

Many dams are owned by local governments, but most communities have given relatively little attention to dam removal unless there are pressing dam safety or other concerns. For example, Baraboo, Wisconsin removed its Waterworks Dam when the dam failed a public safety inspection and it was determined that removal would be one-third the cost of repair. The Baraboo Water Utility paid half the cost of the removal; the other half was financed with a grant from the Wisconsin Department of Natural Resources. Although there was initial public opposition to removing the dam, the community now appreciates the positive changes to the river environment, and it is working to remove other Baraboo River dams.

There is a growing general interest at the local level in restoring rivers. In 1999, more than 100 county, township, and municipal open space bond referenda were placed on ballots across the country, 92 of which were passed. Most of the ballot initiatives were focused on parks and open space acquisition, but many communities will use at least a portion of open space funds to protect and restore rivers.

D. Private Sector Funding

The private sector, particularly corporations, has been a very important source of funding for dam removal. Sources of private sector funding include: (1) dam owners that pay to remove their own dams; (2) private industry that pays for removal as mitigation or fines for other actions; (3) non-profit organizations; (4) private donors, both foundations and individuals; and (5) other creative possibilities.

1. Dam Owners Pay for Removal

In some cases, dam owners pay to remove their own dams. Dam owners may pay for removal themselves for a variety of reasons as described below.[7]

(a) *Dam safety compels removal.* A dam owner may remove its dam to alleviate dam safety problems. This could be voluntary, where the dam owner concludes that dam removal is the least expensive way to address the dam safety problem. It could also be mandatory where the dam safety officer concludes that the only way to alleviate the safety problem is removal.

(b) *Mitigation for environmental impacts.* Sometimes, dam owners may be compelled by federal and state regulatory agencies to remove a dam in order to address environmental concerns, such as water quality or endangered species impacts.

[7] This section focuses on private dam owners, including corporations and individuals that may currently be using, or once have used, dams for power generation, water supply or other purposes. More information about removal of municipally-owned dams is referenced in Section C: Local Government Funding above.

(c) *General liability concerns*. A dam owner may choose to remove a dam to alleviate any future liability concerns, including attractive nuisance problems (*e.g.*, children or others playing on or near the dam) and dam failure risks. This may be a voluntary action or the dam owner may be required to add fencing and other safety measures and may decide that removal is cheaper and safer in the long run.

(d) *FERC requires removal.* There are several circumstances under which the Federal Energy Regulatory Commission (FERC) may require a hydropower dam owner licensed and regulated by FERC to remove a dam at its own expense. First, the licensee may be required to remove a dam immediately to address a dam safety concern. For example, FERC ordered the removal of Mussers Dam in Pennsylvania due to significant dam safety problems. Second, the licensee may be required by FERC to pay for dam removal at relicensing to address a compelling environmental or other concern, as was the case with the Edwards Dam in Maine. Third, FERC may require a dam owner to mitigate for the dam's environmental impacts by removing one or more dams on the same or connected rivers as mitigation for continued operation of the existing dam. Fourth, the hydropower dam owner may be required to set aside a fund for possible future removal, as a condition of the grant of its license (also see "Decommissioning Funds and Other Mitigation Under the Federal Energy Regulatory Commission Licensing Process" in Section A: Federal Funding above).

(e) *Electric utility restructuring funding.* As the electric industry is deregulated, some hydropower dams may become uneconomical and owners may surrender their operating license and abandon the dam. Restructuring may provide opportunities for states or the federal government to ensure that funds are available to remove these abandoned dams through stranded cost recovery or a systems benefit fund. (For a more detailed description of this approach, see also "Electric Utility Restructuring Funds" under Section B: State Funding.)

(f) *Tax benefit of donation of dam and/or associated lands*. Dam owners may benefit from a tax deduction for the donation of a dam or associated lands along a river. In most cases, these donations are made to a government entity or non-profit organization, such as a land trust, which will remove the dam and/or protect and restore the donated lands along the river. These donations may be used, in turn, by the recipient as a match for other state and federal funding for dam removal and river restoration.

(g) *Desire to improve river habitat and ecosystem.* Sometimes, dam owners may choose to contribute some or all of the cost of removing a dam on their property because they have a desire to improve recreation, fishing, or river habitat.

(h) *Public relations value.* Corporations and other dam owners may also receive a substantial public relations benefit from removal of a dam (or donation for that purpose) because they are helping to improve the quality of the river ecosystem.

2. Private Industry Fines or Mitigation Payments

Several dam removals have been funded through environmental penalties and mitigation.[8] Private industry mitigation falls into three primary categories: (a) mitigation for other planned projects in

[8] For the purposes of this report, such payments were counted as corporate contributions when they were fines or mitigation made directly to a federal or state agency for the explicit purpose of dam removal. In some cases grants were made from general environmental mitigation funds (e.g., for oil spills) such as those administered by the National

the watershed; (b) dam removal as mitigation for a specific environmental violation; and (c) use of general environmental violation funds for dam removal.

(a) *Mitigation for other planned projects in the watershed*. In some instances, dam removal occurs as mitigation for other planned projects in the same watershed. For example, a public utility in Waterbury, Connecticut provided $1 million in funding for the removal of two dams as well as fish passage improvements to other dams on the Naugatuck River as mitigation for future water quality violations during wastewater treatment plant construction. (See Part III, Section C. "Examples of Funded Projects" for more information on this project.) The key to leveraging this dam removal financing approach is to ensure that state regulators assign a high priority to dam removals that can significantly improve water quality, habitat, and the overall health of river ecosystems as an appropriate and valuable mitigation for other environmental impacts.

(b) *Dam removal as mitigation for a specific environmental violation*. In instances where an environmental violation has already occurred—such as violation of a water quality standard or wetland protection regulation—dam removal may be identified as a specific mitigation because of the environmental benefits offered to the river.

(c) *Use of general environmental violation funds for dam removal.* The federal government collects fines from private parties responsible for damage to natural resources through violations of the Clean Water Act, the Superfund Act (CERCLA), the Oil Pollution Act, the National Marine Sanctuaries Act, and the Endangered Species Act. These fines have been, and can be, used to fund dam removals and associated river restoration activities in the same watershed, even if the dam removal is unrelated to the original harmful activity and environmental damage. (See "Natural Resource Damage Assessments and Other Mitigation Funds" under Section A: Federal Funding above for more information on environmental violations as a funding source.)

3. Nonprofit Organizations

In general, the total dollar value of nonprofit organization contributions to financing dam removals has been very small. However, nonprofit groups—such as, river and watershed groups, anglers, boaters, and environmental councils—often provide in-kind assistance for dam removals. Often, it is these groups that promote the idea of removing a dam, build community support, search for alternative sources of funding, raise matching funds, and donate volunteer labor for the dam removal and associated restoration work. These in-kind contributions can often be used as a match for federal or state funding. Many nonprofit organizations also have been directly involved in obtaining the funds needed for dam removal.

Nonprofits can also be sources of funding themselves. For example, the American Sportfishing Association (ASA) directly supports river restoration efforts, such as dam removal through a grants program available to state and local governments, and other nonprofits. Through its Fish America Foundation, ASA has invested more than $3 million in North America on projects to improve water quality and fish populations, including dam removal and other forms of fish passage.[9]

Fish and Wildlife Foundation, and these were counted as government funds. Although they originated as corporate fines and payments, they were not explicitly designated for dam removal projects.

[9] For more information about the FishAmerica Foundation grants program, contact American Sportfishing Association at 703-519-9691, or see *www.asafishing.org/programs/conservation/fishamerica*.

Another example of direct nonprofit funding for dam removal is the work of a group called FISH (Facilitators Improving Salmonid Habitat). This group has acquired dams and helped to remove them. They have used such approaches as providing a tax benefit to private individuals who donate a dam at its appraised value as a charitable donation (see Sec. D 1 (f) "*Tax benefit of donation of dam and/or associated lands"* above). And they have purchased dams from private owners for the cost of the legal fees the owner will incur to remove the dam.

4. Private Donors – Foundations and Individuals

Private charitable foundations have provided limited funds for dam removals across the country. Generally, foundations focus their giving on local projects. For example, the Great Lakes Protection Fund—a private foundation created through an endowment of funds from states bordering the Great Lakes—has helped to pay for dam removals in the Great Lakes basin. The National Fish and Wildlife Foundation (NFWF) is another example of a private, quasi-government organization that manages funds from federal agencies, such as the Fish and Wildlife Service and Natural Resources Conservation Service. NFWF makes grants to support local natural resource protection and restoration efforts, including dam removal.

In some instances, private individuals have contributed funds to remove a specific dam, although information about these cases is scarce. In the case of individual charitable donations, the donor may or may not own property near the dam, but may simply choose to contribute to dam removal because they want to improve recreation, fishing, or riverine habitat. As selective removal of dams that don't make sense becomes more common, private donations may become an important funding source for local projects. This is a trend that has occurred in the land conservation movement, resulting in a significant number of acres protected through private contributions.

5. Other Creative Possibilities

There are a number of other financing options that have not been tried, but that could provide valuable sources of funding for dam removal. Among these ideas are: (a) Funding by the commercial fishing industry; (b) Insurance for dam safety; (c) Funding by Native American tribes; and (d) In-kind assistance by construction and engineering companies.

(a) *Funding by the commercial fishing industry*. The commercial fishing industry has a major stake in removing dams, which are the primary impediment blocking many fish species from migrating to areas where they naturally feed and reproduce. Funding from the fishing industry for dam removal could provide an effective means of protecting its own economic interests.

(b) *Insurance for dam safety*. As the nation's dam infrastructure ages, dam safety is a significant concern. A private insurance product could be developed that would pool relatively low-cost premiums paid by dam owners. These pooled premiums would be available to individual policyholders in the event of a dam failure, or a dam structure determined to be unsafe. Such insurance could be used to fund removal or repair and replacement, and it could be required by state regulatory agencies or be offered on a voluntary basis.

(c) *Funding by Native American tribes*. Many tribes have fishing rights that are significantly affected by dams. Thus, tribes may have a direct interest in, and potential sources of funding for, dam removal. For example, the Oneida tribe in Wisconsin is using revenues from its casinos to buy back ancestral lands along rivers and protect and restore floodplains. Tribes

might use a similar approach to protect their fishing rights by removing dams and improving the fisheries from which those rights are drawn.

(d) *In-kind assistance by construction and engineering companies*. As dam removal becomes more common, it provides a potential new business opportunity for construction and engineering firms. Providing some in-kind assistance is a low-cost way for these firms to market their capabilities by demonstrating their expertise with dam removal. For firms that do not have such experience, offering free or low-cost assistance in the form of labor and equipment is a good way to learn more about the new field of dam removal.

Part III. How Dam Removals Are Funded: Observations on Past Dam Removal Funding Packages

This section provides some general observations on how dam removals are funded by analyzing 25 in-depth case studies profiled in the report, *Dam Removal Success Stories: Restoring Rivers Through Selective Removal of Dams that Don't Make Sense* report co-authored by American Rivers, Friends of the Earth, and Trout Unlimited (available online, please see *damremovaltoolkit.americanrivers.org* and click on "Case Studies of Completed Dam Removals" and then click on "Dam Removal Success Stories Report"

This analysis may be useful for people interested in how dam removal funding packages for dam removal have been crafted in the past and for those who want to develop new funding sources. For those who are simply seeking ideas and points of contact for existing funding sources, other sections of this report may provide more useful information.

In general, information on dam removal financing is imprecise and difficult to obtain. We examined the available information on each case study and spoke with people knowledgeable about each dam removal to learn more about who paid for these projects. The *Dam Removal Success Stories* case studies offer good examples of the size and type of dam removals occurring around the country. However, 25 is a small sample, and not necessarily representative of the entire range of dam removals. Therefore, we caution against using this analysis for more than general observations. The analysis reveals some interesting facts, but we cannot assume that these findings will prove true for future dam removals. Also, as interest builds in restoring rivers by removing unwanted and unsafe dams, new funding trends will certainly emerge.

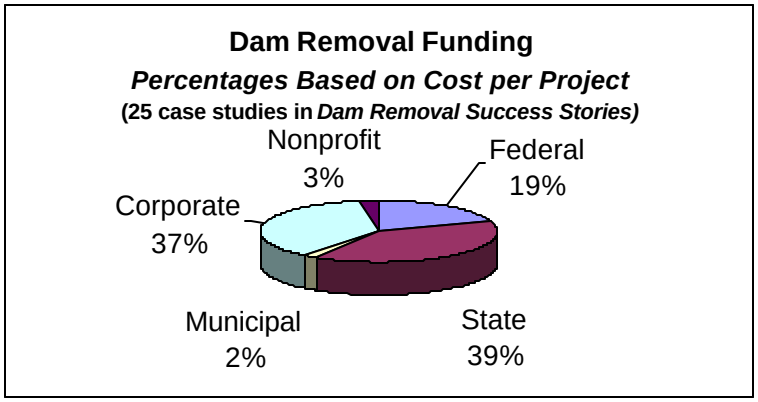
A. Funding Sources Vary with Dam Size and Complexity

Financing a dam removal effort frequently resembles a patchwork quilt. Whole projects are often stitched together from federal, state, and local appropriations and grants, mitigation funds, corporate agreements, and private donations of cash and labor. Resource agencies and river advocates are becoming more adept and creative at leveraging less obvious pots of money. As dam removals and related restoration projects become more ambitious, it seems likely that the patchwork will become more complex. For example, removal of the Grist Mill dam on Souadabscook Stream in Maine involved grants from the U.S. Fish and Wildlife Service, the Natural Resources Conservation Service, and the National Fish and Wildlife Foundation, a local corporate donation, individual and nonprofit group contributions, work crews funded through Americorps, countless volunteer labor hours, and other in-kind contributions.

That said, it is interesting to note that of the 25 dam removals studied, over half of the dam removals were actually funded from a single source. In each of the single-source cases, funding came from states or corporations. In ninety percent of these cases, dam removals less than $200,000 was funded by state appropriations or grant programs. Corporations funded all of the single-source dam removals greater than $200,000. In general, direct appropriations to federal and state governments are critical for dam removal, as are corporate contributions. Often, these corporate contributions are compensation or mitigation for a proposed action that may cause environmental damage in other parts of the watershed.

B. Government and Corporate Funding Sources Are Most Important

The following analysis considered the relative share of total dam removal costs[10] paid by federal, state, and local governments, corporations, and nonprofit organizations. To ensure that several very expensive projects did not skew the analysis and misrepresent a sector's overall involvement in funding dam removals, each project's costs were treated with equal weight (*i.e.*, a sector's relative share of costs paid were considered the same whether the dam removal cost $50,000 or $250,000).[11]



Federal and state governments together provided over 58 percent of the total costs for each dam removal across all the projects studied (Figure 1). State governments were the most important funding source, accounting for 39 percent of dam removal costs across all 25 cases.

Figure 1

For dam removal projects greater than $1 million, however, the state share dropped to 18 percent (Figure 2). Conversely, for dam removal projects under $1 million, state governments accounted for nearly half of all dam removal costs paid (Figure 3).

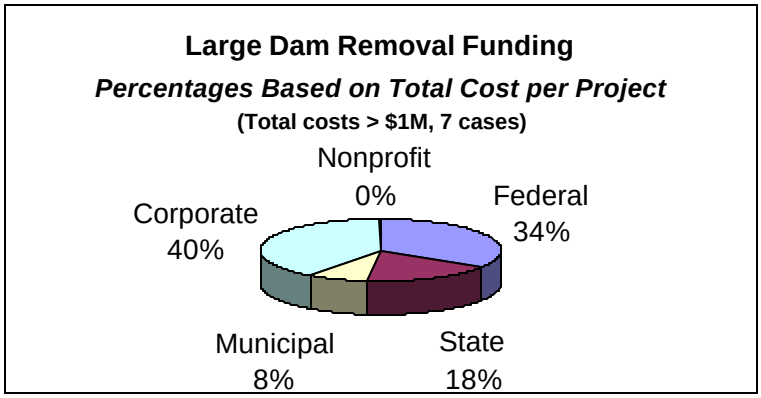


Figure 2

Federal agencies funded 19 percent of dam removal costs across the 25 projects studied (Figure 1). However, the federal share increased to 34 percent for projects greater than $1 million (Figure 2). This may reflect the fact that (1) larger, costlier dam removals are often either related to federally-owned dams, such as the Bluebird

[10] Dam removal costs cited here include deconstruction costs and other direct costs, such as replacement of infrastructure, where this information was available. In general, these figures do not reflect staff time unless billed as a direct expense, or other indirect costs.

[11] When project size is *not* treated as being of equal weight, the percentages change significantly from those shown in the graphs above. Without equal weighting, the relative shares of total dam removal costs paid is as follows. For all 25 case study dam removals: 47% corporate, 34% federal, 17% state, 2% municipal, and 0% nonprofit, respectively (see Figure 1 for comparison). For large dam removal projects (greater than $1 million total costs): 45% corporate, 35% federal, 16% state, 3% municipal, and 1% nonprofit, respectively (see Figure 2 for comparison). For small dam removal projects (less than $1 million total costs): 46 % corporate, 14% federal, 36% state, 0% municipal, and 4% nonprofit, respectively (see Figure 3 for comparison).

Dam on Ouzel Creek in Rocky Mountain National Park; (2) the dam removal was so expensive that no other entity could afford to pay for the project. The federal government played a relatively small part in dam removal projects under $1 million, accounting for just 14 percent of total costs paid (Figure 3). There are several possible reasons. First, the federal government has tended to allocate large sums directly to important dam removals on federal lands. Second, it may be too difficult or cumbersome for local projects to access federal funds in smaller denominations, aside from grant programs. Third, federal agencies' habitat restoration grant programs are just beginning to be used for dam removal, and these projects must compete with many others for limited funds. The federal percentage in smaller projects may increase in the future as more dams are removed using habitat restoration grant programs.

Municipalities and non-profit organizations combined contributed five percent or less to dam removal costs across all projects, even when equalized for project size (Figure 1). Yet, that figure does not adequately capture the role of the municipal and non-profit sectors. Both play an invaluable role because they can advocate for (and in some cases oppose) dam removal, and are often the creative force behind accessing and patching together funding from multiple sources. Furthermore, non-profits and local governments often leverage significant and essential in-kind contributions of labor and materials without which many dam removals could not be accomplished.

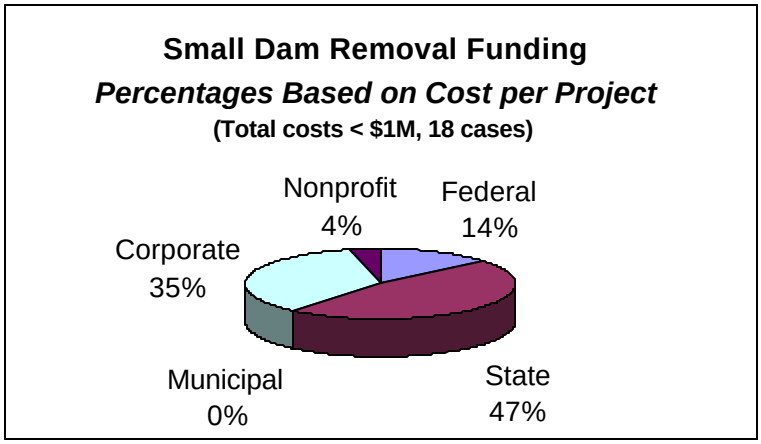


Figure 3

Overall, corporations are a significant source of funding for dam removal, paying for 37 percent of all dam removal costs in the 25 cases studied (Figure 1). The corporate share of dam removal costs varies relatively little between large projects greater than $1 million and smaller projects less than $1 million, accounting for 40 percent and 35 percent of these projects' costs, respectively (Figures 2 and 3).

C. Examples of Funded Projects

Three examples drawn from the *Dam Removal Success* report illustrate some typical dam removal financing approaches that bear out these figures and trends.

1. Single Funding Source: Sandstone Dam, Kettle River, Minnesota

The Sandstone dam removal offers a typical example of a single government agency financing approach. In this case, the dam was owned by the state. In other instances (*e.g.*, Woolen Mills dam on the Milwaukee River in Wisconsin) state government agencies have also paid most or all of the costs to remove dams owned by local governments.

The Sandstone Dam, located on the Kettle River in eastern Minnesota, was an inactive hydropower dam. Obsolete for over 30 years, it was a public safety hazard due to its deteriorated

condition. The dam was located within Banning State Park, and the Minnesota Department of Natural Resources (DNR) decided to remove the structure. The removal not only provided significant recreational and aesthetic benefits by uncovering a stretch of whitewater rapids and a waterfall, but it also restored fish habitat for numerous species, including the rare lake sturgeon. Minnesota Power and Light gifted the structure and 200 acres of surrounding land to the DNR when the cost of producing power became uneconomical in the 1960s. When the dam was removed in 1995, the cost of refurbishing the dam for hydropower was estimated at over $1 million compared to an estimated removal cost of $300,000. The actual cost of removal was only $208,000. Funding for the project, as well as engineering support, were accomplished with the agency staff and budget of the Dam Safety Program at the Minnesota DNR, Division of Waters. A private company was employed to conduct the actual demolition of the 20-foot tall and 150-foot wide structure. Due to limited funding, little stream restoration was done in conjunction with the project other than some initial bank stabilization.

2. Cooperating Agencies: Seven dams on the Conestoga River, Pennsylvania

Removal of the seven dams from the Conestoga River and its tributaries in southeastern Pennsylvania provides a good example of a federal and state government agency cooperating to share costs and achieve complementary objectives—improvement of an migratory fishery and enhancement of river health. All were obsolete run-of-the-river dams that were originally built to power mills or provide navigation canals with water. The dams on the Conestoga, a large tributary of the Susquehanna River, blocked migratory fish, including American shad, from reaching their historic spawning grounds.

The Pennsylvania Fish and Boat Commission managed the removal of the dams, which ranged from $1,500 to $110,000 in cost, and from three to 13 feet in height and 10 to 300 feet in length. Half of the $218,500 removal costs were funded through the U.S. EPA's Chesapeake Bay Program for migratory fish passage. This program requires a 50 percent match from a non-federal source, which was chiefly provided by the Pennsylvania Fish and Boat Commission. Other local government agencies and non-governmental groups provided in-kind services to assist with the removals and contribute to the 50 percent cost-share.

3. Multiple Sources: Seven dams on the Naugatuck River, Connecticut

The dam removals on the Naugatuck River provide an excellent example of bringing together multiple sources of funding to make a project possible.

The Connecticut Department of Environmental Protection (DEP) has been working to restore the degraded Naugatuck River under a far-reaching program that includes full removal of four dams—the Anaconda and Freight St. Dams in Waterbury and the Plats Mill and Union City Dams in Naugatuck—as well as construction of fish and/or boat passage at three others, and major upgrades to six wastewater treatment plants. DEP has worked in partnership with local communities, Trout Unlimited, and other private partners to accomplish the river-wide restoration and to arrange an estimated $8 million in total funding to complete the work on all seven dams.

An elaborate funding package was put together to make the project work, including the following components:

- To pay for the overall dam removal planning and design, Connecticut DEP used approximately $300,000 in supplemental environmental penalties—in this case, payments in

lieu of environmental enforcement penalties from Clean Water Act and State Clean Water Act violations.

- The City of Waterbury accessed approximately $300,000 in Clean Water Act funds for upgrading its wastewater treatment plants. As mitigation for water quality violations during construction to expand its facility, the City eventually provided $1 million for the removal of Platts Mill and Freight St. Dams as well as fish passage improvements to other dams.
- Connecticut DEP removed Union City Dam for $250,000 using state River Restoration Fund monies, which are financed through state bonds.
- An additional $50,000 for the Union City Dam came from the Iroquois Pipeline Fund (on a 5:1 matching basis) through the National Fish and Wildlife Foundation, a quasi-federal government funding source for resource conservation and restoration. (An additional $50,000 in Iroquois Pipeline monies will go toward the fish and boat bypass planned for the Tingue Dam on the Naugatuck.)
- Finally, Anaconda Dam was removed by the city of Waterbury with $100,000 of its own funds, although the city is suing the dam owner to recoup these costs.

Part IV. Cost Considerations

A. Introduction

Determining how much it will cost to remove a dam is a new art. Although demolishing structures on land is a common practice, removing structures from the middle of a river or stream is still relatively new. This section provides information and recommendations regarding development of an accurate dam removal cost estimate.

Dam Removal Costs Often Over-Estimated
One of the vexing problems in funding dam removal has been the lack of accurate cost estimates. Estimates have often been significantly off the mark—usually to the high side. In many cases dams targeted for removal are a century or more old and there is little information available about the materials and methods used in the dam's construction. In other cases, engineers have over estimated the cost of site restoration due to a desire to over-engineer an inherently natural stream restoration process. Simply the new nature of dam removal creates uncertainty. All of this leads engineers and planners inexperienced with dam removal to account for unforeseen problems by being extremely conservative when creating dam removal plans and when estimating costs.

When the dam removal option is added to the options being considered for a project, even the very conservative cost estimates for dam removal tend to be lower than those for repair. Among 10 cases examined, actual dam removal costs were only 37 percent on average of the estimated repair cost.[12] Often, this cost disparity is enough by itself to convince a community to remove rather than repair or replace an unsafe dam, without even considering the ecological and safety benefits of doing so. However, if cost estimates for a dam removal are too high—as happened in several of the case studies where the cost of removal was from 45 to 350 percent over the actual cost of removal—communities cannot make fully informed choices. Engineers understandably want a safety margin to cover the "unknown," but by creating significantly inflated estimates they may inadvertently make repairing or replacing a dam appear the more economically rational choice when in fact it is not.

All Associated Costs of Dam Removal Need to be Identified
While dam removal cost estimates may be inflated because of general uncertainty, it *is* important to identify carefully the real costs of removing a dam. Many of these costs may not be directly related to the demolition, but to ancillary and essential expenses, such as planning the project and obtaining permits, altering infrastructure such as water intake or discharge pipes affected by the removal, restoring the removal site, and studying the ecological impacts of the removal. Although all of these costs may not necessarily be included in a general cost description of a dam removal, they are expenses directly related to dam removal and thus should be identified.[13]

Ancillary dam removal costs will vary widely and can add up to a significant percentage of the total costs of the project. Among the seven *Dam Removal Success Stories* cases for which these extra costs were available, for example, expenses not directly related to dam removal ranged from a low of 26 percent to a high of 81 percent of total project costs. Dam removal efforts typically

[12] This figure is based on dam repair estimates and actual total removal costs for 10 of 25 case studies for which this information was available – the Baraboo, Clyde, Kennebec, Milwaukee, Pleasant, Santa Fe, and Willow Rivers, Souadabscook Stream, and Cold and Whitestone Creeks.
[13] What is included in typical cost descriptions of a dam removal varies. Some include only the demolition itself. Others include the demolition and associated site restoration and infrastructure repair. Fewer include the project planning and analysis costs. And rarely are the project follow-up costs included. To avoid confusion, when total cost descriptions of a dam removal are cited, they should include a description of what is included in the cost figure.

occur in three stages: (1) Project planning and analysis; (2) Field work; and (3) Project follow-up. In each stage there are costs that should be considered as a dam removal is being contemplated. Some of these costs are described below.

B. Project Planning and Analysis

During the initial project planning and analysis phase of a dam removal project, a wide range of issues must be assessed. The cost of conducting the planning and analysis needs to be included in any assessment of dam removal costs. These costs can vary, depending on the complexity of the dam removal, the depth of analysis needed, and the types of permits required at the state and local levels. For example, if sediments behind the dam need to be tested for toxic content, or if the state requires preparation of a full environmental impact statement, the cost of project planning and analysis can become a significant percentage of the total dam removal cost, especially for small projects.

In addition, proper planning and analysis of the dam removal project can make a significant difference in the ability to make an accurate assessment of the total dam removal cost. For example, a visual survey may indicate the need to extend an upstream water intake pipe into the restored river, which will impact the total cost of the removal. In addition, thorough review and design of the removal can allow the cost estimates to be as accurate as possible and eliminate the need for large contingency factors.[14]

The key steps in project planning and analysis are:

- Visual survey and documentation review;
- Ecological impact evaluation;
- Sediment analysis;
- Design and engineering; and
- Permits required for dam removal.

1. Visual Survey and Documentation Review

Impact on cost of project planning and analysis:
A complete visual survey of the dam, its reservoir, and the river upstream and downstream of the impoundment is essential to identify safe and proper engineering approaches to removing the dam, as well as infrastructure that may need to be replaced, modified or at least monitored once the dam is removed (see infrastructure discussion below).

In addition to the visual survey, a full review of all documentation relating to the location and structure of municipal and private infrastructure that could be affected by dam removal needs to be undertaken. This includes water pipes, surface drains, irrigation systems, hydrants, septic and wastewater systems, roads, and bridge piers and abutments. Draining of the reservoir may also affect groundwater levels in surrounding areas. This may cause a need to alter local wells and/or drain the reservoir in a way to minimize bank slumping. In addition, a review of documentation can determine the current and past industrial use of the river upstream of the dam and thus the likelihood that there are contaminants in the sediments in the impoundment.

This project planning and analysis stage will likely not entail significant expense.

[14] Even with an accurate cost estimate, in some dam removals a contingency amount should be included to address unforeseen issues. A budget for a small straightforward dam removal probably needs little if any contingency amount, but the budget for a large complex dam removal may need a significant one.

Impact on total cost of removal:
Although this step will likely not entail much cost, it can significantly affect the cost of the full removal because results from this information gathering stage will help to determine the needed depth of other pre-removal studies (such as sediment testing) as well as determine how much associated mitigation is needed (such as alteration of a water supply pipe).

2. Ecological Impact Evaluation

Impact on cost of project planning and analysis:
As part of obtaining state and federal permits for the removal, the likely ecological impacts of the removal will need to be assessed. This will include the short-term impacts on fish and wildlife of the removal process itself and the long-term impacts of converting the impoundment to a free-flowing river. It will also include the likely addition or loss of wetlands, and assessing the risk of introducing non-native species. The ecological impacts of releasing the sediment collected in the impoundment will also need to be assessed (discussed separately below). The level of analysis needed varies significantly, depending on the state where the removal is occurring, and on the size and complexity of the removal. The cost of this ecological impact evaluation will vary as well based on the level of analysis required.

Impact on total cost of removal:
The results of this ecological impact analysis can impact the final dam removal cost. For example, a method of dam removal may be selected that is significantly more expensive but minimizes its impacts on fish species.

3. Sediment Analysis

Impact on cost of project planning and analysis:
The amount and characteristics of the sediment collected in the impoundment should be determined prior to designing a dam removal. This information can be used in deciding how best to remove collected sediment from the former impoundment. The method of determining this information can range from an estimate based on a visual survey and review of historic records to careful sediment testing for amount, characteristics and toxic content. Thorough sediment testing can be very expensive and may not be necessary for smaller removals.

Impact on total cost of removal:
How sediments are treated can significantly affect the total cost of removal. Options range from allowing the sediment to disperse naturally downstream to dredging and removing all of the sediment off-site. Some of the highest cost estimates for removal have been for full dredging and removal of all sediments. Most of these high cost estimates were substantially reduced by identifying alternative approaches to dispersing the sediment.

4. Design and Engineering

Impact on cost of project planning and analysis:
Dam removal design and engineering plans in detail how a dam will be removed, and how necessary modifications to other infrastructure will be made. For most removals, a professional engineering firm is needed to design the removal. This cost should be accounted for in any dam removal cost estimate.

Impact on total cost of removal:
Because dam removal is relatively new, many engineers are unfamiliar with dam removal and thus tend to design and price projects very conservatively. Some engineers respond to the uncertainty of both the removal itself and of a natural river system by over-engineering the removal and site restoration. Care should be taken to ensure that the project is not over-engineered, both to ensure that removal costs remain low and to ensure that the river can naturally restore itself.

In order to obtain an accurate cost estimate for removal, an engineer unfamiliar with dam removal should consult with others that have experience in removal. Careful planning and early partnering between the design team (sometimes the project engineers) and contractors can also help to reduce costs associated with dam removal—contractor bids for some dam removal projects have come in substantially lower than engineers' estimates. In addition, some states that are knowledgeable about dam removal, such as Pennsylvania, have helped local communities minimize these costs by offering free or low-cost engineering assistance.

5. Permits Required for Dam Removal

Impact on cost of project planning and analysis:
In general, dam removals require a variety of federal, state and local permits for activities that may cause impacts to navigable waterways, bridges, wetlands and fish and wildlife habitat. Although removing a dam generally provides significant ecological benefits, removal projects usually need to abide by the same environmental regulations as other construction projects. Obtaining permits for dam removal can be a large expense because regulatory agencies may be unfamiliar with dam removal and thus may require additional studies and analysis. Delays and added expense caused by permitting a dam removal can sometimes have the effect of encouraging dam owners to repair a dam rather than undergo a long and complicated permitting process. In states where dam removal has become more common, such as Pennsylvania, special streamlined permitting procedures for dam removal have been established, and other states are considering similar programs as they develop more experience with dam removal.

Impact on total cost of removal:
State permitting requirements can impact the total cost of removal if specific mitigation steps are required. Some states require, for example, that all sediment in the impoundment be physically removed off-site as part of the removal. Prior to estimating dam removal costs, a review of state requirements should be made.

C. Field Work

The second phase in dam removal projects involves the physical work and expense required to remove the dam structure and restore the area it once occupied. In this phase, the primary cost categories are:

- Dam deconstruction;
- Sediment management;
- Infrastructure repair and replacement;
- Site restoration; and
- Historic and archaeological monitoring and documentation.

1. Dam Deconstruction

Dam deconstruction costs include the construction of temporary water diversion structures (such as cofferdams), the physical removal of the dam structure, and the disposal of materials. Contractors typically use heavy equipment such as cranes, backhoes equipped with hoe rams and concrete crushing equipment, although some dams have been removed using explosives.

Some dams may contain a significant amount of traditionally salvageable material, such as granite blocks. Other dam removals have been able to reduce disposal costs by salvaging almost the entire structure, from the waterlogged timbers to the rock and gravel behind the dam. Dam removal costs can also be lowered if dam removal contractors are consulted when the dam removal is being engineered. For example, contractors may be able to suggest construction techniques that are simpler and cheaper, or they may be able to bring costs savings to a project through their individual capacities. This was the case with the Edwards Dam in Maine, where a local contractor was able to supply gravel from his own mines for a cofferdam, reducing the unit cost far below the market price estimated by the design engineer.

Several branches of the Armed Services, including the Marines and National Guard, have used dam removal projects for demolition training exercises. These projects have much lower costs, because equipment and labor are both donated by the military unit involved.[15]

2. Sediment Management

One of the most important issues to consider in designing a dam removal is the treatment of the sediments collected behind the dam that will be released when the dam is removed. For the most part, sediments are flushed rapidly downstream after dam removal, and often cause the equivalent impact of a major storm event. Downstream sediment replenishment of riverbanks, estuaries and beaches can be a significant ecological benefit of dam removal. In some cases, however, the volume of sediment is too great for the river to handle in one release or the sediments contain toxics, such as PCBs, and should not be released. In these cases, some or all of the sediment must be physically removed from the impoundment. Methods of sediment removal include dredging or a suction/slurry pipe combination. Sediment removal can be very expensive, often dwarfing the cost of the physical demolition. To keep dam removal costs low, alternatives to full sediment removal should be seriously considered.

3. Infrastructure Repair and Replacement

Repairing or replacing infrastructure, such as bridge abutments and sewer pipes, can be required in conjunction with a dam removal. This need occurs when infrastructure is designed for and built after the construction of a dam on the part of the river that has been impounded. When water levels are lowered with a dam's removal, the assumptions for the design engineering are changed significantly. Examples of this include all water withdrawal and discharge facilities (which end up with exposed intakes and outfalls following dam removal), infrastructure that relies on the insulating value of the water from the impoundment where winter temperatures descend below freezing (such as aqueducts buried beneath the river that would freeze when exposed), bridge piers and abutments (which can suffer erosion and unstable base structures), and

[15] For more information on use of the Armed Services for dam removal, see the Coastal America program description in Appendix I.

boat launches and docks (which can leave recreation high and dry). Even downstream areas need to be examined with care to see if projected new flows affect infrastructure.

Depending on the type of infrastructure involved, these repair costs can be greater than the physical dam deconstruction costs. This underscores the need for a thorough survey of the dam removal area at the outset of the project.

4. Site Restoration

Restoring the dam site and former impoundment area can sometimes involve considerable expense in materials and labor. The extent and amount of restoration needed depends on the river and the nature of the dam removed. In many cases, the river can restore itself without excessive human intervention. But in some situations, riverbanks may need to be regraded to a more natural gradient and stabilized with structural or bioengineering techniques. Although past dam removals show that usually the exposed mud flats quickly and naturally regenerate with vegetation and are not the barren, smelly eyesores that some fear, in certain situations some replanting must be conducted. Many dam removal plans, however, over-engineer the site restoration components of the removal, recommending excessive rip-rap and revegetation. Not only does this add unnecessary expense to the dam removal, it also prevents the river from becoming fully restored.

Restoring a fully functioning river and riparian ecosystem is not normally achieved in a single restoration effort. A multi-year effort may be required to monitor the natural restoration of a river and identify where intervention is required. In some dam removals, grassroots organizations, schools, and other community groups have stepped forward with free labor to work on the long-term stewardship needs.

5. Historic and Archaeological Monitoring and Documentation.

When an impoundment is drained, archaeological sites along the previously submerged river banks may be exposed. Most dam removals contain an archaeological assessment post removal to identify and secure archaeological sites. Depending on the location and archaeological resources present, this survey and mitigation can be a significant expense.

In addition, many dams being removed are old and may have some historic significance. Documentation of the historic aspects of the dam may be required. This documentation can range from a sign posted at the former dam site to building a detailed kiosk to preserving in place part of the dam.

In order to obtain an accurate assessment of the total cost of a dam removal, consultation with the state historic preservation office must be scheduled early in the removal planning process to assess archaeological and historic needs.

D. Scientific Monitoring

The third phase in dam removal projects involves follow-up study. Many rivers and riparian areas have rebounded significantly after a dam is removed. Monitoring how the river recovers after a dam is removed can provide extremely valuable information about rivers and river restoration. Data about sediment transport, plant recruitment and regeneration, riparian wetland response, aquatic and aquatic-dependent species diversity and strength, and water chemistry are all essential to assess the effects of dam removals.

Unfortunately, this scientific monitoring phase is often overlooked. Funds have not been regularly set aside for such monitoring, and thus there have been relatively few scientific studies of the impacts of dam removal. If possible, funds should be reserved for this scientific study.

APPENDIX A:
A Summary of Selected Federal Dam Removal Funding Sources[16]

The following programs represent federal funding sources that might be used for all or parts of a dam removal or associated river restoration effort. They include a wide array of funding programs. Where a program has already been used for dam removal, it is indicated. Many of the programs summarized here have not been used for dam removal projects, but could be used for that purpose if a strong enough case is made in the funding application process, and if program administrators are made aware of the benefits of specific dam removals.

Many other federal programs will not pay for removing the dam itself, but may be useful for other costs associated with dam removal, such as riverfront revitalization, preservation of historic structures, trail development, and streambank restoration. Quite a few dam removal efforts have been successful because they creatively pieced together disparate (and seemingly farfetched) funding sources to support an overall project effort. It should also be noted that these programs are valuable funding sources for river protection and restoration efforts in general and should be pursued for that purpose as well.

A. General Overview[17]

Federal funding for dam removal can come from: (1) existing federal funding programs; (2) general budgets of federal agencies; (3) federal Congressional appropriations specific to a particular dam; (4) natural resource damage assessments and other mitigation funds; (5) decommissioning funds and other mitigation under the Federal Energy Regulatory Commission licensing process; and (6) in-kind federal assistance in the form of studies, technical assistance, and direct assistance by branches of the Armed Services.

1. Existing Federal Funding Programs

There is no dedicated funding source at the federal level for removal of dams for ecological or recreation reasons, nor is there a dedicated source for repair or removal of unsafe dams at the federal level. Nevertheless, there is a remarkable array of federal programs and dollars that can be tapped for both removal and associated costs. Although some dam removals have been funded directly through one federal source, many dam removals have creatively combined monies from many sources.

Many of the federal funding programs provide grants to individuals and nonprofit organizations as well as state and local governments. Matching requirements are included with many federal funding sources—that is, most federal funding programs require a certain percentage of project costs to be borne by non-federal funding sources. These match requirements can sometimes be difficult for local communities to meet, particularly since most federal programs do not allow matching with other federal funds. In some programs, more flexible matching fund rules are beginning to take hold. For example, the U.S. Department of Transportation's TEA-21 Recreational Trails program (potential funding for riverfront restoration work related to a dam

[16] An excellent resource to learn more about any of these federal programs is The Catalog of Federal Domestic Assistance. It is updated annually and contains detailed information in a searchable database of all federal domestic funding programs. It can be accessed at: *www.cfda.gov* (Hint: click on "Search the Catalogue FAPRS" and then click on the "agency" or the "subagency" buttons, or use a keyword to focus your search for detailed program information.)

[17] This general overview section can also be found in Part II of this report.

removal), allows other federal funds to be used to match up to 95 percent of program grants. The Army Corps of Engineers also has liberal rules that allow up to 80 percent of the match required under its Aquatic Ecosystem Restoration and Modifications for Environmental Improvements programs to come from in-kind contributions.

To date, natural resource agencies, such as the U.S. Fish and Wildlife Service (Interior Department), the U.S. Environmental Protection Agency, National Marine Fisheries Service (Commerce Department) and the Natural Resources Conservation Service (Agriculture Department) have provided the most grant funding for the direct physical demolition costs of dam removal. The most frequently tapped federal grant programs for dam removal include: Partners for Fish and Wildlife (U.S. Fish and Wildlife Service), Challenge Grants (National Fish and Wildlife Foundation), Community-Based Restoration (National Marine Fisheries Service), Chesapeake Bay Program's Fish Passage Workgroup (U.S. EPA), and Wildlife Habitat Improvement Program (Natural Resources Conservation Service).

Many of these programs make grants on a competitive basis, and the demand for funds is much greater than the supply. For example, the Natural Resources Conservation Service's Wildlife Habitat Incentives Program (WHIP) program provides funding for up to 75 percent of habitat improvements on private lands and has been used to remove some dams. Demand for WHIP funds has been so great that the program exhausted the available $50 million in funding appropriated for 1997-2000 in two years.

2. General Budgets of Federal Agencies

Some federal agencies have general budget funds that can be used to help finance dam removals, studies associated with dam removals, related restoration work, and the like. For example, the Bureau of Reclamation (Department of Interior) has provided funding from its general budget to study removal of the Matilija Dam on the Ventura River in southern California. These funds are likely to be limited, but they can help to initiate a dam removal study, provide part of the funding needed for dam removal in combination with other funds, or fully fund a small dam removal project.

Some agencies may also have general budget funds to repair or remove dams that they own. For example, both the National Park Service and U.S. Forest Service have a policy to "maintain them or drain them," directing that dams on their lands either be properly maintained and serving a useful purpose, or be removed.

3. Specific Federal Congressional Appropriations

A number of federal agencies can be authorized by Congress to remove specific dams, including the Army Corps of Engineers, Bureau of Reclamation, and National Park Service. Usually, this funding is for dams owned by the agency and/or located on agency lands. However, funds have also been appropriated for removals that are not on agency property. Each project must be specifically authorized and Congress generally must appropriate specific funds to the authorized project before the dam can be removed. For example, in 1992 the National Park Service was authorized by Congress to purchase two dams from private dam owners on the Elwha River in Olympic National Park in Washington. The dams block migratory salmon and steelhead runs and cause other impacts to the river system. Appropriations to purchase and remove the dams are actively being pursued. In another example, in 1999 Congress authorized $10 million for the Army Corps of Engineers to remove the Embrey Dam on the Rappahannock River in Virginia.

The Army Corps is currently conducting a feasibility study for the dam removal and has committed to removing the dam by 2002.

4. Natural Resource Damage Assessments and Other Mitigation Funds

The federal government collects fines for damages to natural resources through violations of the Clean Water Act, the Superfund Act (CERCLA), the Oil Pollution Act, the National Marine Sanctuaries Act, and the Endangered Species Act. The Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration assess damages, levy fines, and conduct restoration efforts related to oil spills and hazardous chemical releases. These agencies and the National Fish and Wildlife Foundation, a quasi-governmental non-profit organization, act as trustees for the violation fines, which are used to fund restoration efforts. Damage assessments and other mitigation funds have been an important source of funding for dam removals in watersheds where environmental violations have occurred. For example, funds from environmental violations associated with the Iroquois Pipeline were made available for removal of dams and river restoration activities on the Naugatuck River in Connecticut.

Sometimes, funds are established in advance of the actual environmental impact as mitigation for a proposed project under agreements negotiated between federal or state regulators and the private or public facilities or landowners they regulate. In a number of cases, these funds have been used for dam removal and related restoration efforts. For example, $2.5 million for the removal of the Edwards Dam on the Kennebec River in Maine was funded by the Bath Iron Works Corporation as mitigation for a planned 17-acre expansion of its shipbuilding facility into the Kennebec River.

5. Decommissioning Funds and Other Mitigation Under the Federal Energy Regulatory Commission Licensing Process

The Federal Energy Regulatory Commission (FERC) has the authority to license the operation of most non-federal hydropower dams. FERC is charged with balancing economic interests and the environment when granting a license. Many licenses across the country, which can be issued for 30 to 50 years, are coming up for renewal in the next few years. There are at least five potential avenues for funding dam removal through the FERC relicensing process[18]:

(a) required modifications to existing facilities;
(b) required removal of a dam;
(c) removal or restoration of *other* dams as mitigation for continued operation;
(d) specific dam decommissioning funds; and
(e) general dam decommissioning funds.

(a) *Required modifications to existing facilities*. Through the FERC relicensing process, applicants can be required to make necessary modifications to dam structures or operations to improve environmental conditions impacted by the dam. This can take the form of modifications to dam structures, such as fish passage, or operations requirements, such as flow release levels and timing that more closely approximate natural river flows. Depending on the cost of the required modifications and the value of the hydropower produced, the applicant may choose to voluntarily remove the dam as the more economically rational

[18] For more information about decommissioning of FERC-regulated hydropower dams, see *runningrivers.americanrivers.org*.

choice. This occurred recently with the Condit Dam on the White Salmon River in Washington, which was required by FERC under a new license to provide passage for salmon whose migration had been blocked by the dam. In September of 1999, a voluntary agreement among the Yakama Nation, PacifiCorp, environmental groups, and state and federal fishery agencies was reached to remove Condit Dam as a less expensive alternative to fish passage.

(b) *Required removal of the dam.* FERC can deny a dam owner's application to relicense a dam and require that the dam be removed. This occurred for the first time when FERC denied a relicense application for the Edwards Dam in Maine and ordered the dam removed at the owner's expense because the environmental benefits of removal overwhelmingly outweighed the economic benefits of the hydropower produced at the dam.[19]

(c) *Removal or restoration of other dams as mitigation for continued operation*. Approving an application to relicense a dam can be conditioned on the applicant paying to remove other dams on the same or connected rivers as mitigation for being allowed to continue operating the present hydropower dam. The dams to be removed may or may not be owned by the licensee. For example, on the Menomonee River in Wisconsin and Michigan, a public utility agreed to remove one dam it owned that was no longer economically viable, as well as a smaller dam on a tributary to the river that it did not own, as part of the environmental mitigation for relicensing eight other hydropower dams.

(d) *Specific dam decommissioning funds*. FERC has the authority to require a dam owner to establish an individual decommissioning fund to finance future removal of a dam. However, to date, FERC has never ordered a dam owner to establish such a fund.

(e) *General dam decommissioning fund*. FERC or Congress also could establish a general dam decommissioning trust fund financed by all dam owners to be used to remove dams whose owners are unable to maintain their license and cannot undertake dam removal without financial assistance. Under the trust fund approach, all FERC licensees would be required to provide funding either in a one-time payment, or over time to a general decommissioning funding pool as a condition of license renewal.

6. In-Kind Federal Assistance

There are many different forms of in-kind (*i.e.*, non-monetary) assistance provided by federal agencies. First, some federal natural resource agencies manage grant programs that have already been used for dam removal and related restoration projects (*e.g.*, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Natural Resources Conservation Service). Many of these staff offer specific expertise in fisheries, aquatic ecosystem restoration and dam deconstruction and replacement of infrastructure that can be useful even if they do not provide funding for dam removal.

Second, the U.S. Armed Services are another potential source of donated labor and equipment for dam removal. For example, a group of U.S. Marines recently demolished a dam on the Little River in North Carolina as a training exercise. During the summer of 2000, an Air Force team from Texas removed the East Machias Dam, in East Machias, Maine under the auspices of Coastal America.

[19]The Edwards Dam was subsequently removed through voluntary settlement agreement.

B. Updating this Summary

There may be important funding sources that we have unintentionally omitted in this appendix. Please contact Elizabeth Maclin at American Rivers (202-347-7550, *emaclin@amrivers.org*) if you have information about other federal programs that should be included. This appendix will be updated periodically.

C. List of Selected Federal Funding Programs

The funding programs are listed by name under the category of the federal department and agency responsible for administering each program. Department, agency, and program names are listed alphabetically.

Agriculture Department
Farm Service Agency
- Conservation Reserve Enhancement Program
- Conservation Reserve Program

Forest Service
- Forest Legacy
- Stewardship Incentive Program

Natural Resources Conservation Service
- Environmental Quality Improvement Program (EQIP)
- Forest Incentives Program
- Wetlands Reserve Program (WRP)
- Wildlife Habitat Incentives Program (WHIP)

Coastal America
- Coastal America Program
- National Corporate Wetlands Restoration Partnership

Commerce Department
Economic Development Administration
- Grants for Public Works and Economic Development

National Marine Fisheries Service (NOAA)
- Anadromous Fish Conservation Act Program
- Atlantic Coastal Fisheries Cooperative Management Act
- Community-Based Restoration
- Habitat Conservation
- National Fisheries Habitat Program (Sea Grant)

Defense Department
United States Army Corps of Engineers
- Aquatic Ecosystem Restoration (Sec. 206)
- Beach Erosion Control Projects (Sec. 103)
- Beneficial Use of Dredged Material for Ecosystem Restoration (Sec. 204)
- Challenge 21 (Flood Hazard and Riverine Ecosystem Restoration)

- Emergency Advance Measures for Flood Prevention
- Planning Assistance to the States (Sec. 22)
- Project Modifications for Environmental Improvements (Sec. 1135)

Energy Department
Federal Energy Regulatory Commission
- Great Lakes Fishery Trust

Environmental Protection Agency
- Capitalization Grants for State Revolving Loans-Clean Water Act
- Capitalization Grants for State Revolving Loans-Safe Drinking Water Act
- Chesapeake Bay Program
- Nonpoint Pollution Implementation Grants (Sec. 319)
- Sustainable Development Challenge Grants
- Wetlands Protection Development Grants

Interior Department
Bureau of Indian Affairs
- Safety of Dams on Indian Lands

Fish & Wildlife Service
- Challenge Grant Cost share
- The Coastal Program
- National Coastal Wetlands Conservation
- North American Wetlands Conservation Act (NAWCA)
- Partners for Fish and Wildlife
- Sport Fish Restoration (Dingell-Johnson Act and Wallop-Breaux Amendment)
- Wildlife Restoration (Pittman-Robertson)

Land and Water Conservation Fund

National Park Service
- Historic Preservation Fund
- Rivers and Trails Conservation Assistance Program
- Urban Park and Recreation Recovery (UPARR)

National Fish and Wildlife Foundation (NFWF)

National Service Corps
- Americorps

Transportation Department
- TEA-21

Coast Guard
- Bridge Alteration

D. Index to Selected Federal Funding Programs[20]

The following table indexes selected federal funding programs, each of which is summarized in more detail above. The purpose of this index is to create a quick reference to locate funding sources according to the funding program's primary purpose, type of assistance provided, and eligibility.

KEY:
*Types of Assistance
Tech = Technical Assistance

**Eligibility
I =Individuals *L* =Local Government *O* =Organizations
S =State Government *T* =Tribal Government

Program	**Agency**	**Type of Assistance***	**Eligibility****	**Cultural/Historic Preservation**	**Dam Safety/Removal**	**Drinking Water**	**Environmental Damage Mitigation**	**Fish Passage**	**Flood Hazard**	**Habitat Enhancement**	**Parks and Open Space**	**Recreation/Sportfishing**	**Riparian/Wetland Restoration**	**Transportation Infrastructure**	**Community Revitalization**	**Water Quality**
Conservation Reserve Program	*USDA*	Tech Grant	*I*							✓			✓			✓
Conservation Reserve Enhancement Program	*USDA*	Tech Grant	*I*							✓			✓			✓
Forest Legacy	*USDA*	Grant	*T O S I L*	✓						✓	✓	✓	✓			✓
Stewardship Incentive Program	*USDA*	Tech Grant	*T I*							✓						
Environmental Quality Improvement Program	*USDA*	Tech Grant Loan	*T I*							✓			✓			✓
Forest Incentives Program	*USDA*	Tech Grant	*T O I*							✓						

[20] An excellent resource to learn more about any of the funding programs summarized above is the Catalog of Federal Domestic Assistance. It is updated annually and contains detailed information in a searchable database of all federal domestic funding programs. It can be accessed on the Internet at: *www.cfda.gov* (Hint: click on "Search the Catalogue FAPRS" and then click on the "agency" or the "subagency" buttons, or use a keyword to complete your search for detailed program information.)

Program	**Agency**	**Type of Assistance***	**Eligibility****	**Cultural/Historic Preservation**	**Dam Safety/Removal**	**Drinking Water**	**Environmental Damage Mitigation**	**Fish Passage**	**Flood Hazard**	**Habitat Enhancement**	**Parks and Open Space**	**Recreation/Sportfishing**	**Riparian/Wetland Restoration**	**Transportation Infrastructure**	**Community Revitalization**	**Water Quality**
Wetlands Reserve Program	*USDA*	Tech Grant	*T O S I L*							✓			✓			
Wildlife Habitat Incentives Program	*USDA*	Tech Grant	*T O S I L*					✓		✓			✓			
Coastal America Programs	*Coastal America*	Tech Grant	*T O S L*		✓			✓		✓		✓	✓			
National Corporate Wetlands Restoration Partnership	*Coastal America*	Tech Grant	*T O S L*		✓			✓		✓			✓			
Grants For Public Works and Economic Development	*Commerce*	Grant	*T O S L*												✓	
Anadromous Fish Conservation Act	*Commerce*	Grant	*T O S I L*					✓		✓		✓				
Atlantic Coastal Fisheries Cooperative Management Act	*Commerce*	Grant	*S*					✓		✓						
Community -Based Restoration	*Commerce*	Grant	*T O S L*		✓			✓		✓		✓				
Habitat Conservation	*Commerce*	Grant	*T O S I L*				✓			✓			✓			
National Fisheries Habitat Program	*Commerce*	Grant	*T O S I L*					✓		✓			✓			
Aquatic Ecosystem Restoration	*Defense*	Tech Grant	*T O S L*							✓			✓			
Beach Erosion Control Projects	*Defense*	Tech Grant	*T O S L*							✓		✓				
Beneficial Use of Dredged Material for Ecosystem Restoration	*Defense*	Tech Grant	*T O S L*							✓			✓			
Challenge 21 Initiative	*Defense*	Grant	*T O S L*						✓				✓			

Program	**Agency**	**Type of Assistance***	**Eligibility****	**Cultural/Historic Preservation**	**Dam Safety/Removal**	**Drinking Water**	**Environmental Damage Mitigation**	**Fish Passage**	**Flood Hazard**	**Habitat Enhancement**	**Parks and Open Space**	**Recreation/Sportfishing**	**Riparian/Wetland Restoration**	**Transportation Infrastructure**	**Community Revitalization**	**Water Quality**
Emergency Advance Measures for Flood Prevention	*Defense*	Tech Grant	*T O S I L*		✓				✓							
Planning Assistance to the States	*Defense*	Tech Grant	*T S*	✓	✓	✓	✓		✓	✓			✓	✓		✓
Project Modifications for Environmental Improvements	*Defense*	Tech Grant	*T O S L*				✓			✓		✓	✓			✓
Great Lakes Fishery Trust	*Energy Dept.-FERC*	Grant	*T O S L*					✓		✓		✓				
Capitalization Grants for State Revolving Loans-Clean Water Act	*EPA*	Loan	*S L O*										✓			✓
Capitalization grants for State Revolving Loans-Safe Drinking Water Act	*EPA*	Loan	*S*			✓										✓
Chesapeake Bay Program	*EPA*	Grant	*T O S L*					✓					✓			✓
Nonpoint Pollution Implementation Grants	*EPA*	Grant	*T O S L*													
Sustainable Development Challenge Grants	*EPA*	Grant	*T O S L*												✓	
Wetlands Protection - Development Grants	*EPA*	Grant	*T O S L*						✓	✓			✓			✓
Safety of Dams on Indian Lands	*Interior*	Tech Grant	*T*		✓											
Challenge Grant Cost Share	*Interior*	Tech Grant Loan	*T O S I L*					✓		✓		✓	✓			

Program	**Agency**	**Type of Assistance***	**Eligibility****	**Cultural/Historic Preservation**	**Dam Safety/Removal**	**Drinking Water**	**Environmental Damage Mitigation**	**Fish Passage**	**Flood Hazard**	**Habitat Enhancement**	**Parks and Open Space**	**Recreation/Sportfishing**	**Riparian/Wetland Restoration**	**Transportation Infrastructure**	**Community Revitalization**	**Water Quality**
The Coastal Program	*Interior*	Tech Grant	*T O S I L*							✓		✓	✓			
National Coastal Wetlands Conservation	*Interior*	Grant	*S*										✓			
North American Wetlands Conservation Act	*Interior*	Grant	*T O S L*													
Partners for Fish and Wildlife	*Interior*	Tech Grant	*T O S I L*					✓		✓			✓			
Sport Fish Restoration Act	*Interior*	Grant	*S*									✓				
Wildlife Restoration Act	*Interior*	Grant	*S*		✓					✓						
Land and Water Conservation Fund	*Interior*	Grant	*T S L*	✓							✓	✓				
Historic Preservation Fund	*Interior*	Tech Grant	*T S*	✓											✓	
Rivers, Trails, and Conservation Assistance Program	*Interior*	Tech	*T O S L*	✓						✓	✓	✓			✓	
Urban Park and Recreation Recovery	*Interior*	Grant	*T L*												✓	
Numerous Programs	*National Fish and Wildlife Foundation*	Grant	*T O S L*				✓	✓		✓			✓			
Americorps	*National Service Corps*	Tech Grant	*T O S L*	✓	✓					✓	✓	✓	✓		✓	
TEA-21	*Transportation*	Grant	*T O S L*	✓										✓	✓	
Bridge Alteration	*Transportation*	Grant	*T O S I L*											✓		

Agriculture Department (Farm Service Agency)

Conservation Reserve Enhancement Program (CREP)

DESCRIPTION:

Similar to the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP) is a state-federal partnership to address areas of state or nationally significant water quality (*e.g.*, Chesapeake Bay, Illinois River), soil erosion, and wildlife habitat issues related to agricultural land use. States must apply to USDA-FSA to enroll in the program and must participate financially. Initially, state proposals are limited to 100,000 acres. Washington and Oregon established programs that will devote $250 million to restore 7,000 miles of habitat along salmon and trout streams in the Northwest

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Lease payments to farmers that undertake conservation practices on enrolled acres.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

In conjunction with dam removal, this program could be used to ensure that newly dewatered areas are not farmed and/or riparian areas protected from sedimentation and agricultural runoff.

ELIGIBILITY:

☐ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☐ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $1.2 billion (for program in 6 states: IL, MD, MN, NY, OR, WA)
FY 2000: Determined at year end based on state use of funds

CONTACT INFORMATION:

Contact the local county USDA-FSA office
Headquarters Office, USDA, Farm Service Agency, 202-720-3467
Web site: *www.fsa.usda.gov/dafp/cepd/crep/crephome.htm*

Agriculture Department (Farm Service Agency)

Conservation Reserve Program (CRP)

DESCRIPTION:

This program has protected millions of acres of areas along rivers, lakes, and wetlands. It provides incentives to farmers to take highly erodible or other environmentally sensitive lands out of production for 10-15 years. The participating farmer, in exchange for annual payments, agrees to a conservation plan for converting cropland to long-term resource conserving cover, such as perennial grasses, legumes, forbs, shrubs, or trees. There are two methods for enrolling acreage under the CRP program: "continuous signup" in which acreage suitable for certain conservation practices, such as riparian buffers (which can remove up to 75% of sediment and 50% of nutrients and pesticides) may be enrolled at any time on a noncompetitive basis; and "general signup" in which acreage is submitted by farmers at designated times and ranked competitively based on its environmental benefit versus other farmers. See also Conservation Reserve Enhancement Program and Wetlands Reserve Program (Natural Resources Conservation Service).

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Lease payments made directly to farmer in exchange for not planting crops and installing conservation practices and non-crop vegetation for the period of enrollment, usually 10-15 years. The Administration proposes an additional $100 million in bonuses to farmers who enroll through continuous sign-up to offset their costs of installing conservation practices.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

In conjunction with dam removal, this program could be used to ensure that newly dewatered areas are not farmed and/or riparian areas protected from sedimentation and agricultural runoff.

ELIGIBILITY:

☐ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☐ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $1,513,849,000
FY 2000: $1,630,089,000
FY 2001: $1,689,893,000

CONTACT INFORMATION:

Contact the local county USDA-FSA office
Headquarters Office, USDA, Farm Service Agency, 202-720-3467
Web site: *www.fsa.usda.gov/dafp/cepd/crpinfo.htm*

Agriculture Department (Forest Service)

Forest Legacy

DESCRIPTION:

The Forest Legacy Program is designed to protect environmentally important forest areas threatened by conversion to non-forest use. The program provides funds to protect important lands through direct acquisition and through conservation easements, purchased from willing sellers of private forest lands at fair market value. Priority is given to lands that can be effectively protected and managed, and which have important scenic, cultural, and recreational resources; fish and wildlife habitat; riparian areas; and other ecological values. States must apply to the Forest Service to participate in the program (CA, CT, DE, HI, IL have current programs; TN, NC, SC, MN, WI, MT, PA may be eligible for FY '00 funding; OH, IA, GA, NM, VA are considering programs for FY '01). States prioritize and rank project requests and submit them to the Forest Service for funding. In Washington state for example, 2,000 acres were protected with $6.2 million in Forest Legacy funds, linking critical habitat, preserving scenic views, and providing public recreation access along a corridor from Seattle eastward to the Cascade Mountains.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Funding provided for up to 75% of program costs, with at least 25% match from private, state, or local government required.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☑ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to protect important riparian and upland forest areas in conjunction with a dam removal and river restoration project.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL: (FY '01: 59.8 million – proposed)

FY 1999: $7 million
FY 2000: $30 million

CONTACT INFORMATION:

Contact State Forester office for more information; see *www.stateforesters.org*
Headquarters Office, U.S. Forest Service, Cooperative Forestry, 202-205-1389
Web site: *www.fs.fed.us/spf/coop/flp.htm*

Agriculture Department (Forest Service)
Stewardship Incentive Program

DESCRIPTION:
The purpose of this program is to encourage long-term stewardship of non-industrial private forest land. The program works with private landowners, either individually or collectively with their neighbors, to more actively manage their forests, watersheds, and related resources for multiple resource benefits and values. The program is delivered through the State Forester or equivalent state natural resource management agency. It provides comprehensive technical assistance and cost-shared payments to landowners to help them develop and implement a variety of forest and other resource enhancement and protection activities. In exchange for technical and cost-share assistance, the landowner must agree to install and maintain practices outlined in plan for a minimum of 10 years.
Note: This program can also support grassland and other native vegetation restoration plans. Also see Forest Incentives Program, USDA-NRCS.

ASSISTANCE PROVIDED:
☑ technical assistance ☑ grant ☐ loan

Technical assistance is provided free. Program reimburses up to 75% of the landowner's approved expenses to a maximum of $10,000 per year per landowner. Note: no federal funding for cost-share grants was appropriated in FY '99 or FY '00; however, some states have similar state-funded assistance programs.

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
Could be used to restore floodplain forest or other native vegetation as part of restoration effort following dam removal.

ELIGIBILITY:
☑ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☐ Organizations ☑ Individuals

Eligible landowner must own less than 1,000 acres, although waivers for up to 5,000 acres are available.

FUNDING LEVEL: See note under "Description" above.

CONTACT INFORMATION:
Contact State Forester office for more information; see *www.stateforesters.org*
Headquarters Office, U.S. Forest Service, Cooperative Forestry, 202-205-1389
Web site: *www.fs.fed.us/spf/coop/sif.htm*

Agriculture Department (Natural Resources Conservation Service)

Environmental Quality Improvement Program (EQIP)

DESCRIPTION:

A voluntary program designed to provide technical, educational, and financial assistance to farmers and ranchers to address soil, water, and related natural resource concerns. NRCS staff help farmers implement nutrient management, manure management, integrated pest management, irrigation and water management, and wildlife habitat management practices. Cost-share grants are offered to farmers and ranchers who install land management practices included in the conservation plan under five- to ten-year contracts.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☑ loan

Technical assistance in developing a conservation plan is provided free. Grants for installation of structural and vegetative practices can be funded at up to 75% of the total cost. In addition, NRCS can provide additional incentive payments to encourage conservation practices. Cost-share and incentive payments are limited to $10,000 per person per year, and $50,000 over the length of the contract.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

This program could be used to remove small dams and other obstructions on streams and to install associated stream protection and restoration practices.

ELIGIBILITY:

☑ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☐ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $137 million (estimated)
FY 2000: $158 million (estimated)

CONTACT INFORMATION:

Contact regional or local NRCS office
Headquarters Office, Deputy Chief for Natural Resource Conservation, NRCS, 202-720-1845
Web site: *www.nrcs.usda.gov*

Agriculture Department (Natural Resources Conservation Service)

Forest Incentives Program

DESCRIPTION:

The purpose of the program is to encourage non-industrial private forest land owners to increase timber production and to enhance other forest resources. An approved forest management plan must be developed in consultation with the State Forester's office in order to qualify for technical and cost-share assistance. In order for an individual within a county to receive funds through this program, the county or a portion of the county must be designated as eligible by the State Conservationist and State Forester. Special forestry practices may be approved if needed for significant and unique local conditions. Also see Stewardship Incentive Program, USDA-Forest Service.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Technical assistance for development of forest management plan is free. Cost-sharing of up to 65% of the total cost is available for tree planting, timber stand improvement, and site preparation for natural regeneration. Range of financial assistance: $50 to $10,000 per year; $1,600 average.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to restore floodplain or upland forest associated with dam removal project.

ELIGIBILITY:

☑ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☑ Organizations ☑ Individuals

Cost-share agreements are limited to landowners of less than 1,000 acres of non-industrial private forest land, capable of producing at least 50 cubic feet of wood per acre per year, except by special approval.

FUNDING LEVEL:

FY 1999: $16.3 million
FY 2000: $20,535,598
FY 2001: $0

CONTACT INFORMATION:

Contact local NRCS office.
Headquarters Office, Deputy Chief for Natural Resource Conservation, NRCS, 202-720-1845
Web site: *www.nrcs.usda.gov*

Agriculture Department (Natural Resources Conservation Service)
Wetlands Reserve Program (WRP)

DESCRIPTION:
The program's purpose is to restore and protect farmed wetlands, prior converted wetlands, and wetlands farmed under natural condition, riparian areas, and eligible buffer areas by protecting those acres with conservation easements. WRP has a goal of 975,000 acres enrolled by the year 2002 with one-third as permanent easements, one-third as 30-year easements and one-third under restoration agreements. The landowner must ensure that the easement granted to NRCS is superior to the rights of all others and shall agree to implement a wetland restoration plan designed to restore and maintain the easement area. The plan must include a designated access route to be used as necessary for easement management and monitoring.

ASSISTANCE PROVIDED:
☑ technical assistance ☑ grant ☐ loan

Direct payment in exchange for conservation easement. The landowner receives in cash an amount equal to the fair agricultural market value of the land's "as is' condition less the fair market value of such land encumbered by the permanent easement or 75% for a 30-year easement. Up to 100% of the wetland restoration costs also can be covered.

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
Could be used to protect riparian and wetland lands in conjunction with a dam removal and river restoration project.

ELIGIBILITY: Any qualified landowner is eligible.
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL:
FY 1999: $132 million (estimated)
FY 2000: $209 million (estimated)

CONTACT INFORMATION:
Contact regional or local NRCS office
Headquarters Office, Deputy Chief for Natural Resource Conservation, NRCS, 202-720-1845
Web site: *www.nrcs.usda.gov/NRCSProg.html*
www.wl.fb-net.org

Agriculture Department (Natural Resources Conservation Service)

Wildlife Habitat Incentives Program (WHIP)

DESCRIPTION:

The Wildlife Habitat Incentives Program (WHIP) provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan in exchange for cost-share funding to install the habitat modifications. Applications are approved based on the magnitude of wildlife habitat benefits realized by the proposed activities, and according to each state's priority wildlife objectives, and depending on the availability of funds. The program requires a contract cost-share agreement of a minimum of 10 years. NRCS offers free technical assistance to landowners in the preparation of a wildlife habitat development plan, including the steps necessary to maintain the habitat for the life of the agreement. The plan may or may not be part of a larger conservation plan that addresses other resource needs such as water quality and soil erosion. Lands currently enrolled in the Conservation Reserve Program or Wetlands Reserve Program are not eligible.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Technical assistance is free. NRCS pays up to 75% of the cost of installing the wildlife habitat practices.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

This program has been used to fund portions of the costs to remove dams in a number of cases, including Souadabscook Stream in Maine (for more information please see *damremovaltoolkit.americanrivers.org*, click on "Case Studies of Completed Dam Removals" and then click on "Souadabscook Stream, Maine.")

ELIGIBILITY: Landowners who either own or control land.

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $20 million
FY 2000: no funds available

CONTACT INFORMATION:

Contact regional or local office.
Headquarters Office, Deputy Chief for Natural Resource Conservation, 202-720-1845
Web site: *www.nrcs.usda.gov/NRCSProg.html*
www.wl.fb-net.org/whip

Coastal America

Coastal America Program

DESCRIPTION:

Coastal America was established in 1992 as a partnership of Federal agencies with statutory responsibility for coastal resources or whose operational activities affect the coastal environment. Coastal America's objective is to protect, preserve, and restore the Nation's coastal ecosystems through existing Federal programs, and by integrating Federal actions with state, local, tribal governmental and non-governmental efforts. Each year, regional Coastal America teams (comprised of senior staff from participating federal agency regional offices) develop project selection criteria and identify priority projects. These projects are then given funding priority by each partner under its existing programs. Generally, one agency assumes a lead funding and management role in each project with other agencies providing technical and other support. In-kind assistance has been provided by members of the U.S. Armed Services on a number of Coastal America dam removal projects. For example, a group of eight Air Force Reserve teams are deconstructing East Machias Dam on the East Machias River in Maine, as part of their summer training exercises. Dam removal is expected to begin in July or August, 2000. In North Carolina, a group of Marines dismantled the Rains Mill Dam on the Little River, opening up previously blocked spawning grounds for several species of native fish.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Funds coordinated through the Coastal America program have been used to remove 15 dams in Maine and North Carolina, including three on Souadabscook Stream (Maine), and the Quaker Neck Dam on the Neuse River (North Carolina).

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally):

FY 1999: depends on Federal agency funding
FY 2000: depends on Federal agency funding

CONTACT INFORMATION:

Contact regional Coastal America team members through local or regional Federal agency offices. Coastal America, Washington, DC, 202-401-9928
Web site: *www.coastalamerica.gov* (see Web site for contact information for Coastal America regional teams)

Coastal America
National Corporate Wetlands Restoration Partnership

DESCRIPTION:
A new Coastal America program, the National Corporate Wetlands Restoration Partnership (CWRP) is a voluntary public-private partnership in which corporations join forces with federal and state agencies, as well as local communities and non-profit organizations to restore wetlands and other aquatic habitats. Corporations contribute funds to a participating private foundation or state trust fund, which are generally matched by federal dollars. The federal dollar match varies from project to project, but the goal is for every CWRP dollar invested to result in up to four dollars of habitat improvement.

ASSISTANCE PROVIDED:
☑ technical assistance ☑ grant ☐ loan

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
Funds can be used for dam removal.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally**):**
FY 1999: depends on Federal agency funding
FY 2000: depends on Federal agency funding

CONTACT INFORMATION:
Coastal America, Washington, DC, 202-401-9928 (Contact regional Coastal America team members through local or regional Federal agency offices)
Web site: *www.coastalamerica.gov* (see web site for contact information for Coastal America regional teams)

Commerce Department (Economic Development Administration)
Grants for Public Works and Economic Development

DESCRIPTION:
Program promotes long-term economic development and assists in the construction of public works facilities needed to initiate and support the creation and retention of permanent jobs in the private sector in areas experiencing substantial economic distress. Grants made for such public facilities as water and sewer systems, industrial access roads, tourism facilities, and infrastructure needed for business expansion. Qualified projects must fulfill a pressing need of the area and assist in creating long-term jobs or benefit long-term unemployed and low-income families. Examples of funded projects: renovation and recycling of old industrial buildings, port development and expansion. Grants have averaged $855,000.

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

Local match of 50% of project costs required. Severely depressed areas and areas located within Economic Development Districts may receive supplementary grants to bring the Federal contribution up to 80%. Indian Tribes may be eligible for up to 100% of project costs.

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
Qualified areas could access these funds for public works improvements related to dam removal and riverfront revitalization projects.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:
FY 1999: $208,850,000
FY 2000: $191,178,000 (estimated)

CONTACT INFORMATION:
Contact regional EDA office (see Web site for contact information)
Headquarters Office, 202-482-5265
Web site: *www.doc.gov/eda*

Commerce Department (National Marine Fisheries Service)
Anadromous Fish Conservation Act Program

DESCRIPTION:
The purpose of this program is to provide a means for the federal government to cooperate with states and other interests in the conservation, development, and enhancement of the nation's anadromous fish stocks and the fish in the Great Lakes and Lake Champlain that ascend streams to spawn. The program, jointly administered with NOAA-NMFS and the U.S. Fish and Wildlife Service, provides funds for spawning area improvement, installation of fishways, data collection, construction of fish protection devices and hatcheries, and research. Funds cannot be used in the Columbia River basin, with the exception of Idaho. Applications must be coordinated with the state fishery agency with responsibility for the resource affected by the proposal.

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

Requires 50% federal/50% non-federal cost-share (90/10 cost-share for projects supporting an interstate Fishery Management Plan), and real and personal property may be used in lieu of matching funds.

Range of past grants: $2,000-$400,000; $40,000 average

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
Can be used for dam removal.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

All applicants must submit projects through the State fishery agency.

FUNDING LEVEL (total available nationally**):**
FY 1999: $2,000,000
FY 2000: $2,000,000 (estimated)

CONTACT INFORMATION:
Applicants should make an initial contact at the NMFS Regional Office (see Web site for locations and contact information)
Headquarters Office, Silver Spring, MD, 301-427-2014
Web site: *www.nmfs.gov*

Commerce Department (National Marine Fisheries Service)

Atlantic Coastal Fisheries Cooperative Management Act

DESCRIPTION:

The program's purpose is to provide assistance to eligible Atlantic Coast states (CT, DE, DC, FL, GA, MA, MD, ME, NC, NH, NJ, NY, PA, RI, SC, VA), the Atlantic States Marine Fisheries Commission, and the Potomac River Fisheries Commission to support effective interstate conservation and management of Atlantic Coastal resources. Funds can be used for development, implementation, and enforcement of fishery management plans, research, and habitat conservation. Applications must be received by May 31 of each fiscal year.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Funding up to 100% of the total project cost, but recipient matching funds are encouraged.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Can be used for habitat conservation, and is some instances dam removal in Atlantic States, Maine through Florida.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. (Atlantic states only) ☐ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally**):**

FY 1999: $4,800,000
FY 2000: $5,300,000 (estimated)

CONTACT INFORMATION:

Regional office contacts:
Northeast – Harold Mears, NMFS Gloucester, MA, 978-281-9243, email: *Grants-Information@noaa.gov*
Southeast – Cynthia Pierce, NMFS St. Petersburg, FL, 727-570-5324, email: *cynthia.pierce@noaa.gov*

Headquarters Office, Silver Spring, MD, 301-427-2014
Web site: *www.nmfs.gov*

Commerce Department (National Marine Fisheries Service)
Community-Based Restoration

DESCRIPTION:
The National Marine Fisheries Service (NMFS) launched this program in 1996 to involve local marine and estuarine habitat restoration. Projects are often identified by individuals and civic organizations, and depend on their hands-on involvement to implement the restoration. The program represents a financial partnership between a government agency and a private nonprofit, the American Sportfishing Association (ASA). In the initial year, ASA matched NMFS' contribution of $50,000, which it generated through its membership and three sportfishing businesses that helped to fund several California projects where the businesses are located.

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

There is no formal matching requirement, but matching funds increase an application's merit. Matching funds can consist of a combination of cash, in-kind services, and volunteer labor.

PROGRAM'S PRIMARY PURPOSE(S):
☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
The program has made multiple grants for dam removal, modification, and associated restoration. Ten community projects were funded in 1999 for a total of $150,000. Projects in California include the removal of the Fiock Dam on the Shasta River, partial removal of Roy's Dam Fishway. Two dams were removed in Oregon, the Drobkiewics on Yale Creek, and the Hartman Irrigation Dam on Clackamas River. The first dam removal project in Massachusetts was recently completed with the removal of the Billington Street Dam in Plymouth. Funding proposals typically range from $5,000 to $25,000. Projects must result in on-the-ground habitat restoration, and must involve community participation through an educational or volunteer component. Where possible, participation of NOAA staff is encouraged.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:
FY 1999: $150,000
FY 2000: under consideration

CONTACT INFORMATION:
NMFS Office of Habitat Conservation, Silver Spring, MD, 301-713-0174
Web site: *www.nmfs.gov/habitat/restoration/msiepage.html*

Commerce Department (National Marine Fisheries Service)
Habitat Conservation

DESCRIPTION:
This program provides grants for research, management, public education, and conservation of wetlands and other coastal habitats. Research and management activities include determining the effects of habitat modifications and contaminants on populations of living marine resources, restoring depleted stocks that have been adversely impacted by habitat modifications to estuarine and marine habitats, especially for species currently under, or proposed for, future federal or inter-jurisdictional management. Proposals should be submitted to the appropriate regional NMFS office.

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

Project costs are funded up to 100%, but grantee matching contributions are encouraged.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation	☐ parks and open space
☐ dam safety/removal	☐ recreation/sportfishing
☐ drinking water	☑ riparian/wetland restoration
☑ environmental damage mitigation	☐ transportation infrastructure
☐ fish passage	☐ community revitalization
☐ flood hazard	☐ water quality
☑ habitat enhancement	

APPLICABILITY FOR DAM REMOVAL:
Although there are no examples to date, funds can be used for dam removal. Funds could also be used for research on the effects of dam removal, and for restoration of aquatic and wetland and coastal estuary habitats associated with dam removal.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL (total available nationally**):**
FY 1999: $4,500,000
FY 2000: $5,000,000 (estimated)

CONTACT INFORMATION:
Regional office contacts:
Northeast – Harold Mears, NMFS Gloucester, MA, 978-281-9243
Southeast – Ellie Roche, NMFS St. Petersburg, FL, 727-570-5324.
Southwest – Long Beach, CA, 310-980-4001
Northwest – Seattle, WA, 206-526-6187

Headquarters Office, Silver Spring, MD, 301-713-2325
Web site: *www.nmfs.gov/habitat*

Commerce Department (National Marine Fisheries Service)
National Fisheries Habitat Program

DESCRIPTION:
This new program provides funding to restore habitat for coastal marine resources and anadromous fish. A broad range of fisheries habitat restoration projects are potentially fundable, including artificial reefs, estuarine dredging, wetland rehabilitation, streambank stabilization, and spawning habitat for anadromous fish species. The program is a partnership between NMFS' Community-Based Restoration program and Sea Grant. The program seeks to promote local, hands-on involvement in habitat restoration projects. Preference is given to proposals that involve collaboration with multiple investigators and federal agencies, and that focus on regional and national issues with broad application. Proposals should be submitted to the nearest state Sea Grant Program or National Sea Grant Office.

(Note: Pre-proposals for FY 2000 were due Dec. 1, 1999; if invited, full proposals were due Feb. 15, 2000. It is anticipated that an additional $1.5 million in funding will be available for projects in 2001.)

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

Matching funds of at least 50% are required for the federal funds requested. Proposals may request up to $300,000 per year for a maximum of two years.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation	☐ parks and open space
☐ dam safety/removal	☐ recreation/sportfishing
☐ drinking water	☑ riparian/wetland restoration
☐ environmental damage mitigation	☐ transportation infrastructure
☑ fish passage	☐ community revitalization
☐ flood hazard	☐ water quality
☑ habitat enhancement	

APPLICABILITY FOR DAM REMOVAL:
Can be used for dam removal.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL (total available nationally**):**
FY 1999: $0
FY 2000: $1,500,000
FY 20001: $1,500,000 (anticipated)

CONTACT INFORMATION:
National Sea Grant College Program, Silver Spring, MD, 301-713-2435
www.nsgo.seagrant.org
NMFS Headquarters Office, Silver Spring, MD, 301-713-0174
Web site: *www.nmfs.gov*

Defense Department (Army Corps of Engineers)

Aquatic Ecosystem Restoration (Sec. 206)

DESCRIPTION:

Created under the Water Resources Development Act of 1996 (WRDA), the program provides design and engineering assistance to restore degraded aquatic ecosystems to a more natural condition. Requested assistance does not need to be related to an existing Army Corps project (unlike S. 1135). A local sponsor (usually a state or local government) first requests assistance from the appropriate Corps district office. The Corps district office then prepares a preliminary restoration plan, requests funding for the project based on the preliminary plan, and if approved, conducts a feasibility study (*e.g.*, plan and engineering design for dam removal and disposal, incl. social/economic considerations), and negotiates a project cooperative agreement with the local sponsor to conduct the actual work.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

There are four steps in each Army Corps Project:

1. *Reconnaissance* – Identify potential opportunities and solutions; determine level of federal interest; estimate the costs of the feasibility phase; and assess the support from local interests. Typically complete in less than 12 months.
2. *Feasibility Study* – Assess the feasibility of the project and alternatives. Up to three years needed to complete this phase.
3. *Pre-construction Engineering and Design* – Develop the engineering and design plans for the final project. Generally takes at least a year.
4. *Construction* – Implementation of the project.

The total project costs for each project cannot exceed $5 million. Approximately $20 million is appropriated annually for the full program. Funding is appropriated to a discretionary fund managed by the Corps.

Cost share requirements:

Reconnaissance Study – ACOE pays 100%
Feasibility Study – 65% ACOE, 35% local match (with up to 80% in kind)
Pre-construction Engineering and Design – 65% ACOE, 35% local match (with up to 80% in kind)
Construction – 65% ACOE, 35% local match (with up to 80% in kind)

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:
This program is being used for feasibility and engineering studies and may be used to modify and remove dams on the Baraboo River in Wisconsin, the Presumscot River in Maine, and Goldsboro Creek in Washington. Other projects are under consideration on the Cuyahoga River in Ohio.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally):
FY 1999: $11,000,000
FY 2000: $11,000,000

CONTACT INFORMATION:
Contact regional or local district office
Headquarters Office, U.S. Army Corps of Engineers, 202-761-0169
Web site: *www.usace.army.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Beach Erosion Control Projects

DESCRIPTION:

Program designed to control beach and shore erosion to public shores through projects not specifically authorized by Congress. The Corps of Engineers designs and constructs the project. Local sponsor must agree to share project costs 50/50, provide the necessary lands, easements, rights-of-way, *etc.*, assure continued public ownership or public use of the beach, and provide for project maintenance. Prospective sponsoring agencies should contact the local Army Corps district office requesting assistance and indicating that the necessary required components are in place.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Project planning studies are undertaken in a single feasibility phase: the first $100,000 is federally funded, additional study costs are shared 50/50 with local sponsor, although a portion may be in-kind. Cost-sharing, with at least some cash contribution is required for project costs, based on public ownership and use of the beach protected. Federal project costs cannot exceed $2,000,000.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could potentially be applied in areas where dams obstruct the natural movement of sand and other sediment downstream to beach areas.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally):

FY 1999: $3,000,000
FY 2000: $3,000,000 (estimated)

CONTACT INFORMATION:

Contact regional or local district office
Headquarters Office, U.S. Army Corps of Engineers, 202-761-1975
Web site: *www.usace.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Beneficial Use of Dredged Material for Ecosystem Restoration (Sec. 204)

DESCRIPTION:

Program designed to provide protection, restoration, and creation of aquatic and ecologically-related habitats, including wetlands, in connection with dredging for construction, operation, or maintenance of an authorized Army Corps navigation project. This program funds projects over and above the normal construction and maintenance costs associated with a harbor or inland waterway project.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

25% non-federal match required.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for streambank re-grading or wetland restoration associated with a navigation project related to a dam removal project. To date, the program has primarily funded placement of dredged material in areas where it will create or restore wetlands and related habitat such as nesting islands. For example, dredged material was placed on Grand Terre Island, LA to restore approximately 125 acres of wetlands and nesting islands. Studies and/or projects (all non-dam removal) are underway in New Jersey, Louisiana, North Carolina, South Carolina, Wisconsin, and Minnesota.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $350,000
FY 2000: $1,000,000

CONTACT INFORMATION:

Contact regional or local district office
Headquarters Office, U.S. Army Corps of Engineers, 202-761-1975
Web site: *www.usace.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Challenge 21 Initiative (Flood Hazard and Riverine Ecosystem *Restoration)*

DESCRIPTION:

New pilot program created in 1999 authorizing the Army Corps to undertake nonstructural flood control and riverine ecosystem restoration projects. The authorizing act encourages projects "that conserve, restore, and manage hydrologic and hydraulic regimes and restore the natural functions and values of floodplains." Where appropriate, program funds can be used to move homes and businesses out of flood-prone areas and restore the natural floodplain. In many instances, the Army Corps will work in tandem with other federal partners, including the Federal Emergency Management Agency (FEMA), the Department of Agriculture and the Department of Interior on projects, as well as with local sponsors.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Federal and local governments share project costs: 50/50 of the cost for studies, and 63% federal / 35% local for project implementation

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☑ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for floodplain, wetland and riparian restoration and/or prevention of flood damages on floodplains associated with dam removals, or removal of dams themselves where dam removal improves flood control.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

Many states and local communities have applied to be considered for projects when the program's initial funding will become available in 2001.

FUNDING LEVEL:

FY 1999: no funding available
FY 2000: no funding available
FY 2001: $20 million authorized

CONTACT INFORMATION:

Contact regional or local district office
Headquarters Office, U.S. Army Corps of Engineers, 202-761-1975
Web site: *www.usace.army.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Emergency Advance Measures for Flood Prevention

DESCRIPTION:

This program authorizes the Army Corps to perform activities prior to flooding that would assist in protecting against loss of life and damages to property due to flooding. Authorized assistance includes work such as removal of waterway obstructions, work necessary to prevent dam failure, and work necessary to prepare for abnormal snowmelt. There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program is short-term. The state Governor must request assistance, and the Corps can respond within hours or days, depending on the situation.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

There are no matching requirements.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☑ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for selective dam removal where failure of the dam would threaten a catastrophic flood event.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

The Governor of the affected state must request assistance.

FUNDING LEVEL (total available nationally):

FY 1999: $1,000,000
FY 2000: based on need

CONTACT INFORMATION:

Contact regional or local district office
Headquarters Office, U.S. Army Corps of Engineers, 202-272-0251
Web site: *www.usace.army.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Planning Assistance to States (Sec. 22)

DESCRIPTION:

This program provides technical assistance to support states and Tribes with water and related land resource management. Typical studies involve watershed studies, inventories of flood-prone structures, hydrologic or hydraulic modeling, water supply investigations, wetland evaluations, cultural resource studies, river spill response, dam failure analysis, and public use planning and analysis. Projects can begin once the Army Corps and State or Tribe agree on goals for a study, scope of work and cost estimate, and once federal funds are available and State cost share dollars are received.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Required State and Tribe cost share is 50% of program costs. There is a $500,000 federal assistance maximum.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☑ dam safety/removal
☑ drinking water
☑ environmental damage mitigation
☐ fish passage
☑ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☑ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Program funds could be used to cover a variety of planning, feasibility and engineering costs associated with a dam removal.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $6.3 million
FY 2000: $5.8 million
FY 2001: $6.5 million

CONTACT INFORMATION:

Contact regional or local office.
Headquarters Office, U.S. Army Corps of Engineers, 202-272-0251
Web site: *www.usace.army.mil* (provides contact information for regional and local district offices)

Defense Department (Army Corps of Engineers)

Project Modifications for Environmental Improvements (Sec. 1135)

DESCRIPTION:

Created under the Water Resources Development Act of 1986, this program provides for the restoration of rivers, wetlands, and floodplains degraded by an existing Army Corps water project, including dams, flood control, and navigation structures. The objective of these projects should be " restoring degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition, which will involve consideration of the ecosystem's natural integrity, productivity, stability, and biological diversity. The program also allows for restoration of areas impacted by a project that are not at the project location (*e.g.*, downstream erosion from upstream channel-hardening). The restoration project must provide public benefits and may not be for limited interests (*e.g.*, hunting clubs).

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

There are four steps in each Army Corps Project:

1. *Reconnaissance* – Identify potential opportunities and solutions; determine level of federal interest; estimate the costs of the feasibility phase; and assess the support from local interests. Typically complete in less than 12 months.
2. *Feasibility Study* – Assess the feasibility of the project and alternatives. Up to three years needed to complete this phase.
3. *Pre-construction Engineering and Design* – Develop the engineering and design plans for the final project. Generally takes at least a year.
4. *Construction* – Implementation of the project.

ACOE will fund 100% of the Reconnaissance phase. For all other phases, the program requires a 75% federal / 25% non-federal cost-share, but up to 80% of the match may be in-kind contributions. The maximum federal project assistance is $5 million, including planning studies.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☑ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for dam removal if related to an existing Army Corps water project. Sec. 1135 funds were used for engineering design on a dam removal project on the Walla Walla River in Washington State. In addition, an estimated $3 million was used to build fish passage on another dam, further downstream on the Walla Walla.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL (total available nationally**):**
FY 1999: $11,000,000
FY 2000: $10,000,000

CONTACT INFORMATION:
Contact regional or local office
Headquarters Office, U.S. Army Corps of Engineers, 202-272-0251
Web site: *www.usace.army.mil* (provides contact information for regional and local district offices)

Energy Department (Federal Energy Regulatory Commission)

Great Lakes Fishery Trust

DESCRIPTION:

This program was created in 1996 as part of a court settlement for fish losses at a hydroelectric facility located on Great Lakes bottom lands leased from the Michigan Department of Natural Resources (MDNR). The settlement required the utility to install barriers to prevent future entrainment and fish losses and provided for a trust to be established to manage the assets from the settlement. As part of the settlement, the trust began accepting lands in 1997 located in 17 Michigan counties from Consumers Energy. The land will either be sold to public resources agencies, tribes, or private parties, or protected, where appropriate, with conservation easements. Proceeds from the sale of the lands are being used to endow the trust. The Great Lakes Fishery Trust provides grants for research that benefits Great Lakes fisheries, rehabilitation of lake trout, lake sturgeon, and other Great Lakes fish species, protection and enhancement of Great Lakes fish habitat, public education about the Great Lakes fishery, and property acquisition for the above purposes (must be approved by MDNR, U.S. Dept. of Interior or tribal authorities), or to provide public access to the Great Lakes. Priority is given to projects that benefit Lake Michigan. The trust is administered by a six-member board of trustees representing the MDNR, Michigan Attorney General's office, National Wildlife Federation, Michigan United Conservation Clubs, U.S. Department of Interior, and two tribal councils.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

100% grants for eligible projects.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

The program has been used to help fund a dam removal on the Muskegon River in Michigan.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

Seven initial pilot grants were made in 1998 for a total of $2.5 million.
FY 1999: $4 million (estimated)
FY 2000: $4 million (estimated)

CONTACT INFORMATION:

Great Lakes Fishery Trust office, 517-371-7468, *glft@pscinc.com*
Web site: *www.glft.org*

Environmental Protection Agency

Capitalization Grants for State Revolving Loans - Clean Water Act

DESCRIPTION:

Capitalization grants are available to each state for to fund a clean water State revolving loan program for (1) construction of publicly owned wastewater treatment works, (2) implementing nonpoint source pollution management activities, and (3) developing and implementing an estuary conservation and management plan. Up to 20% of the funds for revolving loans can be authorized for use as grants for nonpoint source and estuary projects as authorized under the Clean Water Act and National Estuary Program. The 27 designated estuary programs around the country could use these grants to remove obstructions such as dams, culverts and stream channelization from migration routes of anadromous fish. States also have used revolving loans for water treatment capital investment programs for municipalities and multi-community agencies.

ASSISTANCE PROVIDED:

☐ technical assistance ☐ grant ☑ loan

Low- interest loans provided by states for approved activities.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to protect riparian and other environmentally sensitive areas from nonpoint runoff and other contamination.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

Local governments and qualified nonprofit organizations in many states can access state revolving loans capitalized through EPA funding.

FUNDING LEVEL:

FY 1999: $1 billion
FY 2000: $1.35 billion

CONTACT INFORMATION:

Contact regional EPA office, see Web site for contact information:
www.epa.gov/epahome/locate2.htm
U.S. EPA, State Revolving Loan Branch, 202-260-7366
Web site: *www.epa.gov/reg5oh2o/sdw/dwsrf.htm*

Environmental Protection Agency

Capitalization Grants for State Revolving Loans - Safe Drinking Water Act

DESCRIPTION:

Capitalization grants are available to each state to establish a safe drinking water revolving loan program for (1) construction of publicly owned water treatment facilities, and (2) protection of drinking water surface sources and well head areas. EPA has encouraged states to set-aside a portion of funds that can be used for source water protection to address nonpoint pollution. Revolving loans under this program can be used for conservation easements to protect source water areas from development or other activities that would pollute the drinking water source

ASSISTANCE PROVIDED:

☐ technical assistance ☐ grant ☑ loan

Low- interest loans provided by states for approved activities.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☑ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to protect riparian and other environmentally sensitive areas from nonpoint runoff and other contamination.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

Local governments and qualified nonprofit organizations in many states can access state revolving loans capitalized through EPA funding.

FUNDING LEVEL:

FY 1999: $775 million
FY 2000: $800 million

CONTACT INFORMATION:

Contact regional EPA office, see Web site for contact information:
www.epa.gov/epahome/locate2.htm
U.S. EPA, State Revolving Loan Branch, 202-260-7366
Web site: *www.epa.gov/reg5oh2o/sdw/dwsrf.htm*

Environmental Protection Agency

Chesapeake Bay Program

DESCRIPTION:

This program is designed to assist states and other public and nonprofit entities or individuals in reducing pollution and improving the quality of living resources in the Chesapeake Bay. In cooperation with the Chesapeake Bay Executive Council, a Fish Passage Workgroup was established to find ways to improve fish passage and provide better access to spawning habitat. The workgroup's goal is to open over 1,300 miles of spawning habitat for shad, alewives, and blueback herring by 2003. Funds from EPA's Chesapeake Bay program have been dedicated to a matching grants program for local projects that improve fish passage, including dam breaching.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

A minimum of 50% non-federal match is required.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Program grants have been used to remove, notch, and breach dams in Pennsylvania and elsewhere in the Chesapeake basin.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $450,000
FY 2000: $450,000

CONTACT INFORMATION:

Regional office, Annapolis, MD, 410-267-5700
U.S. EPA, Office of Water, 202-260-5700
U.S Fish and Wildlife Service (Fish Passage Workgroup), 717-238-6425
Web site: *www.epa.gov/r3chespk/*

Environmental Protection Agency

Nonpoint Pollution Implementation Grants (Sec. 319)

DESCRIPTION:

This program is designed to provide funds to states for on-the-ground projects to reduce nonpoint source pollution runoff, addressed in Section 319 of the Clean Water Act. States and tribes are the only entities that may receive these federal funds, but they may re-grant to local municipalities and nonprofit organizations. Grants are made by states to applicants on a competitive basis.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Nonfederal matching funds of at least 40% of project costs are required (except for tribal grants where financial hardship is demonstrated).

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to restore lands creating excessive sedimentation or other non-point pollution problems such as streambank stabilization and protection of buffer areas along water courses, in conjunction with dam removal project.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $2.4 billion
FY 2000: $2.4 billion

CONTACT INFORMATION:

Contact state water quality agency or regional EPA office (see Web site for contact information):
www.epa.gov/epahome/locate2.htm
U.S. EPA, Nonpoint Source Control Branch, 202-260-7112
Web site: *www.epa.gov/owow/nps/cwact.html*

Environmental Protection Agency

Sustainable Development Challenge Grants

DESCRIPTION:

The purpose of this program is to "challenge communities to invest in a sustainable future that links environmental protection, economic prosperity and community well-being." The program strongly encourages community members, business and government to work cooperatively to develop community-based projects that promote environmentally and economically sustainable development. Project proposals must include three components: sustainability, community commitment and contribution, and measurable results and evaluation. Examples of past grants include a project to establish a network of 26 organic farms to grow pesticide-free food for local urban residents and reduce agricultural runoff into the Chesapeake Bay.

There are two ranges of competitive grants funding for which applicants may apply:

(1) $30,000-$100,000 request with a total project budget of $125,000 or less; and
(2) $100,001-$250,000 request with no limit on the total project budget.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

All applicants are required to provide a minimum 20% match from non-federal sources.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be considered as a funding source for dam removal related project, or associated activities where the project is expected to result in community revitalization such as redevelopment of a riverfront after the dam is taken out.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $4.7 million
FY 2000: $4.7 million

CONTACT INFORMATION:

Contact state water quality agency or regional EPA office (see Web site for contact information):
www.epa.gov/epahome/locate2.htm
U.S. EPA, Office of Administration, 202-260-6812
Web site: *www.epa.gov/reg5oopa/cbep/grants/index.html*

Environmental Protection Agency

Wetlands Protection Development Grants

DESCRIPTION:

Funds from this program will be used to support the initial development of wetland protection, restoration, or management program or enhance existing effective programs. Projects must clearly demonstrate a direct link to increasing a State's, tribe's or local government's ability to protect, manage and/or restore its wetlands resources.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☑ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☑ water quality

APPLICABILITY FOR DAM REMOVAL:

Funds could be use for habitat restoration upon dam removal.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $15 million
FY 2000: $15 million (estimated)
FY 2001: $15 million (estimated)

CONTACT INFORMATION:

Contact the National Office or EPA web site for regional local contact names and numbers
Wetlands Division, Office of Wetlands, Oceans and Watersheds (EPA), 202-260-6218
Web site: *www.epa.gov*

Interior Department (Bureau of Indian Affairs)

Safety of Dams on Indian Lands

DESCRIPTION:

Program to provide funds to federally recognized Indian Tribal governments for the inspection and hazard of 116 dams under the responsibility of the Bureau of Indian Affairs. Funds are available for use in structural modification to correct deficiencies on unsafe dams, and if deemed necessary, dam removal.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Direct grant payments with no financial match required.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to fund dam removal of unsafe dams, upon consultation with tribe members.

ELIGIBILITY:

☑ Tribal gov't. ☐ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $16,000,000 (estimated)
FY 2000: $17,500,000 (estimated)

CONTACT INFORMATION:

Contact local Bureau of Indian Affairs office
Headquarters Office, Office of Trust Responsibilities, Div. of Water and Land Resources, Branch of Agriculture and Range, Bureau of Indian Affairs, 202-208-5480
Office of Public Affairs, 202-208-3711
Web site: *www.doi.gov/bureau-indian-affairs.html*

Interior Department (Fish and Wildlife Service)

Challenge Grant Cost Share

DESCRIPTION:

The purpose of this program is to manage, restore, and enhance natural and cultural resources on Fish and Wildlife Service lands and private lands in partnership with nonfederal public and private organizations and individuals. Since 1998, $600,000 of program funds have been dedicated to developing recreational fishing programs on refuges, with priority given to refuges near population centers. The program particularly focuses on migratory bird and invasive species projects.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☑ loan

Technical assistance provided free. Grants are made on a 50/50 federal-nonfederal matching basis. The entire match can be in-kind, including labor, materials, equipment, land, and other services. Grants are typically $15,000 or less.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for dam removal.

ELIGIBILITY:

☑Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $3.9 million
FY 2000: $3.9 million

CONTACT INFORMATION:

Contact regional or local FWS office, see Web site for information:
www.fws.gov/where/reqfield.html
U.S. Fish and Wildlife Service, Div. of Refuges, 703-358-1744

Interior Department (Fish and Wildlife Service)

The Coastal Program

DESCRIPTION:

The purpose of this program is to develop innovative partnerships with local and statewide land trusts and other conservation partners to identify and protect some of the most valuable fish and wildlife habitat in coastal regions around the country. About 40% of Fish and Wildlife refuges are located in coastal areas. The program has a particular focus on the Gulf of Maine in northern New England. The program provides technical assistance and provides small grants through a partnership with the Gulf of Maine Council on the Marine Environment. The Gulf of Maine mini-grants program provides grants to local organizations to complete projects in their community that benefit marine and coastal environments.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Fish and Wildlife Service biologists can provide data, GIS computer mapping, restoration and management expertise and knowledge of federal grants. No grants are offered through this program. Gulf of Maine mini-grants require a 50% local match, with at least half of the match required in cash.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Funding has been used for dam removal in Maine and North Carolina (including the dismantling of Rains Mill Dam), as well as several dam modification projects in Washington State. Funds can also be used for land acquisition/protection associated with dam removal and river restoration projects.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $7,101,000
FY 2000: $8,771,000

CONTACT INFORMATION:

Contact regional or local FWS office, see Web site for information:
www.fws.gov/where/regfield.html
U.S. Fish and Wildlife Service, Division of Habitat Conservation, 703-358-2201
Web site (grants): *www.fws.gov/cep/coastweb.html*
Lois Winter, Gulf of Maine Project, 207-781-8364

Interior Department (Fish and Wildlife Service)

National Coastal Wetlands Conservation (Coastal Wetlands Planning, Protection and Restoration Act, CWPPRA)

DESCRIPTION:

This program was established in 1990 under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) to provide matching grants for acquisition, restoration, management or enhancement of coastal wetlands. Funding for the program comes from excise taxes on fishing equipment and motorboat and small engine fuels. States that border the Atlantic, the Gulf of Mexico, Pacific and Great Lakes are eligible for grants. Louisiana has its own program under the CWPPRA to protect and restore its unique coastal wetlands.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Grants are capped at $1 million, States must provide 50% of total project costs, which can be reduced to 25% if the State has established, and maintains, a special fund for the purpose of acquiring coastal wetlands or other natural areas or open spaces. Louisiana projects require a 15% State match.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to protect and restore wetlands in coastal riparian areas in conjunction with a dam removal project.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $10 million
FY 2000: $10 million

CONTACT INFORMATION:

Contact regional or local Fish and Wildlife Service office
Fish and Wildlife Service, Division of Habitat Conservation, 703-358-2201
Web site: *www.fws.gov/cep/cwgcover.html*

Interior Department (Fish and Wildlife Service)

North American Wetlands Conservation Act (NAWCA)

DESCRIPTION:

This program was authorized by Congress in 1989 under the North American Wetlands Conservation Act (NAWCA) to conserve wetland ecosystems and waterfowl and the other migratory birds and fish and wildlife that depend on these habitats. The North American Wetlands Conservation Council (NAWCC) consists of representatives of Fish and Wildlife Service, National Fish and Wildlife Foundation, states from each of four migratory bird "flyways" and nonprofit conservation groups. The Council has focused grants on projects designed to protect and restore important breeding grounds along with resting and over-wintering areas for waterfowl, other migratory birds, and wetland wildlife, including projects in upper Midwest prairie pothole region, coastal areas of Louisiana and South Carolina, California's Central Valley, and the Chesapeake Bay. Typical projects include revegetation, acquiring conservation easements, and establishing water management capabilities.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

There are 2 programs:
Standard Grants – Funding cap of $1 million per project, applicants must match grant by at least a 1:1 ratio. Past grants range from $677,000 to $1 million.

Small Grants – Funding cap of $50,000; priority given to applicants who have never received a grant through this program before. Grants must be matched on a 1:1 ratio.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for wetland protection and restoration in relation to a dam removal project.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $30 million
FY 2000: $30 million

CONTACT INFORMATION:

Standard grants contact: *bettina_sparrowe@fws.gov*
Small grants contact: *keith_morehouse@fws.gov*
Web site: *northamerican.fws.gov/nawcahp.html*

Interior Department (Fish and Wildlife Service)

Partners for Fish and Wildlife

DESCRIPTION:

This program provides technical and financial assistance to private landowners to restore degraded wetlands, streams and river corridors, prairie, grasslands, and other important fish and wildlife habitats for migratory birds, anadromous fish, threatened and endangered species, and some marine mammals. Although the program focuses on private landowners, tribes, states, corporations and nonprofit organizations are also eligible for assistance. Landowners may perform the restoration work and be reimbursed, or Fish and Wildlife Service may complete the work itself or hire a contractor. Private landowners do not have to allow public access as a condition of accepting program assistance. Landowners must agree not to return the project to its former use or damage or destroy the project for a minimum of 10 years. Partners grants may not be used to purchase real property interests or to make rental or other incentive payments to landowners.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Technical assistance is provided free. Wherever possible, the program seeks a 50/50 cost-share between federal and non-federal partners, but cost-shares are not a requirement.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☑ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Funds have been used for dam removal, as well as replacing water impoundments by installing solar-powered irrigation pumps and other functional replacements.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

FUNDING LEVEL:

FY 1999: $28 million
FY 2000: $30 million ($10 million earmarked for specific projects, not available for grants)

CONTACT INFORMATION:

Contact regional or local office, see Web site for contact information:
www.fws.gov/where/reqfield.html
Fish and Wildlife, Habitat Restoration, Martha Naley, 703-358-2201
Web site: *partners.fws.gov*

Interior Department (Fish and Wildlife Service)

Sport Fish Restoration Act (Dingell – Johnson and Wallop – Breaux Amendment)

DESCRIPTION:

The Federal Aid in Sport Fish Restoration Act, commonly referred to as the Dingell-Johnson act, passed on August 9, 1950, was modeled after the Pittman-Robertson Act (see Wildlife Restoration program in this section) to create a parallel program for management of fishery resources, conservation, and restoration. The Sport Fish Restoration program is funded by revenues collected from the manufacturers of fishing rods, reels, creels, lures, flies and artificial baits, who pay an excise tax on these items to the U.S. Treasury. An amendment in 1984 (Wallop-Breaux Amendment) added new provisions to the Act by extending the excise tax to previously untaxed items of sporting equipment. Each state's share is based 60% on its licensed anglers and 40 % on its land and water area. No state may receive more than 5% or less than 1% of each year's total apportionment. The program is a cost-reimbursement program, where the state covers the full amount of an approved project then applies for reimbursement through the program. Examples of funded projects include fish habitat improvement, public access for fishing, and lake and stream rehabilitation.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

The program provides for reimbursement of up to 75% of the project expenses. The state must provide at least 25% of the project costs from a non-federal source.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used for dam removal.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

Participation limited to State Fish and Wildlife agencies.

FUNDING LEVEL:

FY 1999: $212.5 million (estimated)
FY 2000: $259.5 million (estimated)

CONTACT INFORMATION:

Contact regional or local office, see web site for information: *www.fws.gov/where/regfield.html*
Program web site: *fa.r9.fws.gov/sfr/fasfr.html*

Interior Department (Fish and Wildlife Service)

Wildlife Restoration Act (Pittman – Robertson)

DESCRIPTION:

The Federal Aid in Wildlife Restoration Act, popularly know as the Pittman-Robertson Act, was approved by Congress on September 2, 1937. The purpose of this Act was to provide funding for the selection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management and research. Funds are derived from an 11% federal excise tax on sporting arms, ammunition, and archery equipment, and a 10% tax on handguns. Funds are apportioned to each state by a formula that considers the total area of the state and the number of licensed hunters in the state. Funds for hunter education and target ranges are derived from one-half of the tax on handguns and archery equipment. The program is a cost-reimbursement program, where the state covers the full amount of an approved project then applies for reimbursement through the Wildlife Restoration Program.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Grants cover up to 75% of the project expenses. The state must provide at least 25% of the project costs from a non-federal source.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Although to date there are no examples, funds can be used for dam removal. Funds could also be used to restore riparian habitat areas in conjunction with dam removal.

ELIGIBILITY:

☐ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $165.4 million
FY 2000: $178.5 million

CONTACT INFORMATION:

Contact regional or local office, see Web site for contact information:
www.fws.gov/where/regfield.html
Fish and Wildlife Service, Division of Federal Aid, 703-358-2156
Web site: *fa.r9.fws.gov/wr/fawr.html*

Interior Department (funding for all services and bureaus including Agriculture Department, U.S. Forest Service)

Land and Water Conservation Fund (LWCF)

DESCRIPTION:

This program provides funds to acquire and protect land and water resources and is funded with revenues from off-shore oil drilling leases. Program funding has varied widely over decades depending on Congressional appropriations. Although in the past large grants were made to states for local land acquisition and park development, virtually all funding in recent years has going to federal agencies for land purchases. In FY 2000, $40 million was made available to states while federal purchase totaled approximately $610 million. A bill currently before Congress, the Conservation and Reinvestment Act (CARA) would create permanent funding of $3 billion annually for various conservation and historic preservation programs. It includes permanent funding of $900 million – $450 million for federal land acquisition and $450 million in grants to states on a 50/50 matching basis.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

LWCF funds provided to states may be used for grants to local governments for park and conservation land acquisition and recreational development. Typically, states require a 40% local match. State and local projects must be identified on each state's Statewide Comprehensive Outdoor Recreation Plan (SCORP) in order to be eligible for funding.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☑ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Funds could be used to purchase lands including dams and could be used for riparian area protection and restoration associated with dam removal.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 2000: $650 million total, including $40 million in grants to states

CONTACT INFORMATION:

Contact your state Dept. of Natural Resources or Environmental Protection or comparable agency to learn more about state LWCF-funded grants
www.ncrc.nps.gov/lwcf

Interior Department (National Park Service)

Historic Preservation Fund Grants-in-Aid

DESCRIPTION:

This program provides matching grants to states to identify, evaluate, and protect historic properties; provides matching grants to states to expand their National Register of Historic Places; assists states and local communities in carrying out historic preservation activities; and provides grants to Indian Tribes to preserve their culture. Grants are made to states and can be sub-granted to local governments, nonprofits, and for-profit groups based upon project priorities. Examples of funded projects:

- Documentation of 11 silos and 20 buildings that formed Titan II missile wing at Little Rock Air Force Base in Arkansas.
- Repair and transformation of historic Goffstown, NH high school into 38 low-income senior citizen apartments (also included federal historic Preservation Tax incentives, low income tax credits and Community Development Block Grants)
- Exterior repairs to historic Indiana building, including rotted roof trusses, bell tower rehabilitation, and masonry tuckpointing.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Grants must be applied for through state historic preservation office.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to assess, document, and develop plans for repair or relocating of historic dam structure features.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☐ Local gov't. ☐ Organizations ☐ Individuals

Note: Local governments and organizations are eligible for project grants administered by states.

FUNDING LEVEL:

FY 1999: $42 million (estimated)
FY 2000: $80.5 million (estimated)

CONTACT INFORMATION:

Contact state historic preservation office
Assoc. Director, Cultural Resource Stewardship and Partnerships, NPS, 202-343-9564
Web site: *www2.cr.nps.gov*

Interior Department (National Park Service)

Rivers, Trails, and Conservation Assistance Program (RTCA)

DESCRIPTION:

The purpose of the program is to provide staff assistance to support partnerships between government and citizens to increase the number of rivers and landscapes protected and trails established nationwide. RTCA has helped communities revitalize neglected areas, restore natural floodplains, identify potential Wild and Scenic Rivers and develop community-based consensus management plans for various kinds of public and natural resources. Projects are locally initiated by landowners, public officials, and citizens, who then work cooperatively with RTCA staff. RTCA has 80 staff located in 25 offices around the country. Applications for project assistance are competitive and are considered by the local RTCA offices along with projects submitted.

ASSISTANCE PROVIDED:

☑ technical assistance ☐ grant ☐ loan

Staff time is provided free to projects selected for assistance. Cooperating applicant groups must demonstrate commitment of cost-sharing, which may include donations of time, cash, and services.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☑ parks and open space
☑ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to assist with consensus-based decision making regarding dam repair or removal, as well as plans for river restoration and community revitalization related to dam removal projects.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $7 million (estimated staff expenses)
FY 2000: $10.5 million (estimated staff expenses)

CONTACT INFORMATION:

Contact nearest regional of local RTCA office (see Web site for regional contact information)
National Office, 202-565-1204
Web site: *www.ncrc.nps.gov/rtca*

Interior Department (National Park Service)

Urban Park and Recreation Recovery (UPARR)

DESCRIPTION:

The program's purpose is to provide Federal grants to local governments for the rehabilitation of urban recreation areas and facilities. The program provides planning grants to local communities and rehabilitation capital grants to rebuild, remodel, or expand existing facilities. The funds may not be used for routine maintenance and upkeep, nor may they be used for land acquisition. ELIGIBILITY is based on need, economic and physical distress, and the relative quality and condition of urban recreation facilities. A register of qualified communities can be obtained from the National Park Service (or online at *www.ncrc.nps.gov/uparr/upar-el1.htm*). Communities not listed as eligible can qualify for 15% of UPARR funds set aside for discretionary grants, provided they are within a metropolitan statistical area and meet socio-economic criteria. The program has been unfounded for years, but received $2 million in 2000. Legislation pending in Congress calls for permanent UPARR funding of $125 million per year.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Planning grants are provided on a 50/50 federal/local matching fund basis. Community Development Block Grants may be used as part of the match, although no other federal funds may be used.

Capital rehabilitation grants are provided on a 70% federal and 30% local matching fund basis.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to rehabilitate riverfront parks or structures associated with an urban dam removal.

ELIGIBILITY:

☑ Tribal gov't. ☐ State gov't. ☑ Local gov't. ☐ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $0
FY 2000: $2 million

CONTACT INFORMATION:

National Center for Recreation and Conservation, NPS, 202-565-1200
Web site: *www.ncrc.nps.gov/uparr/*

National Fish and Wildlife Foundation (NFWF)
Numerous programs

DESCRIPTION:
The National Fish and Wildlife Foundation is a nonprofit charitable organization dedicated to the conservation and management of fish, wildlife, and plant resources, and the habitats on which they depend. It receives funds from federal agencies through natural resource damage assessments and direct donations, as well as from private foundations and businesses.

NFWF Challenge Grants
NFWF funds projects to conserve and restore fish, wildlife, and native plants. The Foundation awards challenge grants to projects that address priority actions promoting fish and wildlife conservation, involve other conservation and community interests, and leverage Foundation funding.

Chesapeake Bay Small Watershed Grants
Provides small grants to organizations working on a local level to protect and improve watersheds in the Chesapeake Bay basin, while building citizen-based resource stewardship.

Five-Star Restoration Challenge Grants
A partnership program of NFWF, the National Association of Counties, the National Association of Service and Conservation Corps, Wildlife Habitat Council, U.S. Environmental Protection Agency, and the National Marine Fisheries Service. The program provides grants to support community-based wetland and riparian restoration projects.

Pacific Grassroots Salmon Initiative
The program is a partnership between the Foundation and the U.S. Bureau of Reclamation, and NMFS. Grants selected under this program will benefit salmon (with emphasis on coho and Chinook), steelhead, trout, and their aquatic habitats.

ASSISTANCE PROVIDED:
☐ technical assistance ☑ grant ☐ loan

Grant size and matching requirements vary. All matching funds must be non-federal and may not be used to match any other federal funds. Most NFWF grants require at least a 2:1 match, and proposals with ratios of matching funds greater than 2:1 are more competitive.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation	☐ parks and open space
☐ dam safety/removal	☐ recreation/sportfishing
☐ drinking water	☑ riparian/wetland restoration
☑ environmental damage mitigation	☐ transportation infrastructure
☑ fish passage	☐ community revitalization
☐ flood hazard	☐ water quality
☑ habitat enhancement	

APPLICABILITY FOR DAM REMOVAL:
NFWF funds have been in a wide range of dam removal, habitat restoration and fish passage projects. Examples include restoring the free flow of the Naugatuck River by removing the

Anaconda Dam, Connecticut; removal of the LaValle Dam on the Baraboo River, Wisconsin, opening up 100 miles of spawning grounds for native fish; and removing an irrigation diversion dam along Yale Creek in southeast Oregon.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:
FY 1999: $1 million (estimated)
FY 2000: $1.2 million (estimated)

CONTACT INFORMATION:
National Fish and Wildlife Foundation, national office, 202-857-0166
Web site: *www.nfwf.org*

National Service Corps

Americorps

DESCRIPTION:

Americorps is a program of the Corporation for National and Community Service, a federally-funded organization. Americorps' National Civilian Conservation Corps (NCCC) volunteers work on many types of community service projects, including building disabled access facilities, trails, community parks and other projects. Teams of 10-14 young people supervised by a trained crew leader are available for four- to six-week or longer projects. Most Americorps members expenses are covered by the program, although the project sponsor must cover some costs (see below). Project requests are considered on a competitive basis and should be submitted to the nearest one of the five Americorps "campuses," located throughout the country.

ASSISTANCE PROVIDED:

☑ technical assistance ☑ grant ☐ loan

Americorps crew labor is free, and travel is also provided. Project sponsors are expected to cover costs of materials and equipment, technical supervision, training, and orientation, and assistance with food and lodging (note: lodging can be as simple as camping space, and is not required if the project area is within 90 minutes of an Americorps campus location).

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☑ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☑ habitat enhancement
☑ parks and open space
☑ recreation/sportfishing
☑ riparian/wetland restoration
☐ transportation infrastructure
☑ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Americorps crews have been used for portions of dam removal projects and related restoration work, including the removal of the Grist Mill on Souadabscook Creek, Maine.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:

FY 1999: $237 million
FY 2000: $234 million
FY 2001: $284 million

CONTACT INFORMATION:

Contact nearest regional campuses: (West) San Diego, CA, 619-524-0749; (Capital Area) Washington, DC, 202-561-1382; (Northeast) Perry Point, MD, 410-642-2411 x6850; (Southeast) Charleston, SC, 803-743-8600 x3007; (Central) Denver, CO, 303-340-7305
Web site: *www.americorps.org*.

Transportation Department

TEA-21

DESCRIPTION:

TEA-21 (Transportation Equity Act for the 21st Century) is the current six-year cycle of federal transportation funding that expands on the highly successful ISTEA (Intermodal Surface Transportation Efficiency Act) program to promote and fund alternatives to highway transportation. All funding and grant programs are coordinated through state transportation, and in some instances, state natural resource or environmental protection agencies.

TEA-21 provides funding on a 50/50 matching basis for environmental protection through a number of funding programs. Funds are dispersed through state agencies and program guidelines and priorities vary widely from state to state. There are three main programs that me be useful in dam removal. Although to date no TEA-21 funds have been used for dam removal, the USDOT is open to the prospect of states using funds for this purpose.

Congestion Mitigation and Air Quality Improvements (CMAQs): $8.1 billion over six years is provided to state and local governments in areas that do not meet (or were formerly in nonattainment, but currently do meet) national ambient air quality standards. CMAQ funds have been used to build bike and pedestrian facilities, among many other uses.

Transportation Enhancements: $3.3 billion over six years is available to communities for projects that enhance cultural and historic, aesthetic, and environmental benefits. Newly eligible are safety education activities for pedestrians and bicyclists, establishment of transportation museums, and projects to reduce vehicle-caused wildlife mortality.

Recreational Trails: $270 million is available over 6 years to create and maintain recreational trails. Thirty percent must be used for motorized use, 30% for nonmotorized use, and 40% for diverse trail uses. The federal share of costs is raised to 80% and other federal program funds may provide an additional federal share up to 95%. In-kind contributions and other "soft match" provisions are allowed, but may vary state to state.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

See above descriptions for more information on funds available and matching requirements.

PROGRAM'S PRIMARY PURPOSE(S):

☑ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☑ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Dam removals are unlikely to be directly fundable under TEA-21. However, there may be situations where some dam removal costs could be covered in association with a trail or historic protection project.

In addition, state transportation departments can spend up to 20% of the cost of reconstructing, rehabilitating, resurfacing, or restoring a transportation facility to address water pollution and wetland restoration needs associated with current or past projects. This is not a separate pot of funding, but something that state transportation departments can elect to do that is explicitly encouraged by the TEA-21 legislation. This funding, if available, could also be tapped for restoration work related to a dam removal if a transportation facility is involved.

ELIGIBILITY:
☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☐ Individuals

FUNDING LEVEL:
See program descriptions above

CONTACT INFORMATION:
For more information on your state's TEA-21 programs, contact the appropriate TEA-21 granting agency (*e.g.*, state Dept. of Transportation or Dept. of Natural Resources)
To learn more about the TEA-21 program see USDOT web site:
www.fhwa.dot.gov/tea21/sumenvir.htm#cmaaqi

Transportation Department (Coast Guard)

Bridge Alteration

DESCRIPTION:

Program to provide funds for bridge alterations necessary to provide clear navigation under highway bridges.

ASSISTANCE PROVIDED:

☐ technical assistance ☑ grant ☐ loan

Funds are reimbursed as direct payments to bridge owners to cover payments of the federal government's share for work performed in altering the obstructive bridge to specifications required for navigation and approved by the Coast Guard. Matching funds are not required. Most projects are undertaken on large waterways with significant commercial and recreational traffic, and documented accidents. There are significant restrictions regarding which costs can be reimbursed.

PROGRAM'S PRIMARY PURPOSE(S):

☐ cultural/historic preservation
☐ dam safety/removal
☐ drinking water
☐ environmental damage mitigation
☐ fish passage
☐ flood hazard
☐ habitat enhancement
☐ parks and open space
☐ recreation/sportfishing
☐ riparian/wetland restoration
☑ transportation infrastructure
☐ community revitalization
☐ water quality

APPLICABILITY FOR DAM REMOVAL:

Could be used to fund bridge modifications required to address significant commercial and recreational boating hazards caused by impoundment drawdown and/or relocation of riverway after dam removal.

ELIGIBILITY:

☑ Tribal gov't. ☑ State gov't. ☑ Local gov't. ☑ Organizations ☑ Individuals

Bridge must carry railroad or highway traffic or both.

FUNDING LEVEL:

FY 1999: $14,000,000 (estimated)
FY 2000: $11,000,000 (estimated)

CONTACT INFORMATION:

Contact District Bridge Administrator in district offices
Commandant's Office, 202-267-1977
Web site: *www.uscg.mil*

APPENDIX B:
A Summary of Selected State Dam Removal Funding Sources

This appendix provides a summary of state funding sources for dam removal and associated restoration efforts. These funding sources generally fall into two categories: (1) dam safety and (2) natural resource protection.

A. General Overview

State governments play an important part in funding local dam removals through various dam safety and river restoration grant programs. Generally, states have funded dam removals for one of two reasons or a combination of both: (1) safety concerns or (2) environmental concerns, such as water quality, fish passage, or habitat improvement.

Nearly all states have dam safety inspection and compliance programs, often housed in the state's chief water or natural resources agency.[21] Their task is to assess the structural soundness of public and private dams, and to ensure that necessary repairs are made to ensure against a loss of life or property from dam failure. In instances of an imminent threat of dam failure or dams with other safety concerns, many states have emergency authorization procedures to provide funds to repair or remove dams that pose a hazard. Typically, states use general revenue contingency funds for these emergency removals, and often the state will attempt to recoup the costs from the dam owner.

The impetus for dam removal in many states has come from natural resource departments whose primary interest is improving fisheries, recreation, and overall river ecology. These agencies use a variety of line-item budgets, state natural resource grant programs, federal grant programs, as well as local government and private party funding to pay for dam removals and river restoration. There is also increasing interest in the role that dams and their operation may play in water quality. In Ohio on the Cuyahoga River, for example, Ohio EPA is considering several dams for removal as the most practical and cost-effective means to meet dissolved oxygen water quality standards.

B. Updating this Summary

It is difficult to track accurately which states are involved in funding dam removals, and exactly how they are funding these projects. As a result, the following information is undoubtedly incomplete. American Rivers welcomes all information about state funding of dam removal. We will periodically update this report to provide more complete information as it becomes available. Please contact Margaret Bowman or Elizabeth Maclin at American Rivers (202-347-7550, *mbowman@amrivers.org*, *emaclin@amrivers.org*) if you have information about other state programs that should be included in this Appendix.

[21] For a list of state dam safety officials, please see damremovaltooklit.americanrivers.org and click on "State Agencies with Regulatory Authority Over Dams."

C. Index to Selected State Funding Programs

The following states have one of more of the following programs: (1) dedicated dam safety funding; (2) general environmental funding that has been, or could be, used for dam removal; (3) dedicated dam removal funding; and (4) other state assistance and initiatives.

The state program's profiled in this Appendix include:

- California
- Connecticut
- Maine
- Massachusetts
- Michigan
- Minnesota
- New Hampshire
- New Jersey
- New York
- North Carolina
- Ohio
- Pennsylvania
- Utah
- Wisconsin

California

DAM SAFETY FUNDING

California does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

California has various stream restoration initiatives; two of the most significant for dam removal are the Anadromous Fish Restoration Program (AFRP) and CALFED Bay-Delta Program.

Central Valley Improvement Act, Anadromous Fish Restoration Program (AFRP). The Central Valley Project Improvement Act, a major federal-state initiative to protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California directs the Secretary of the Interior through the Anadromous Fish Restoration Program (AFRP) to undertake a program to at least double natural production of anadromous fish in California's Central Valley streams. Since 1995, the AFRP has helped implement over 70 projects to restore natural production of anadromous fish, including fish passage, irrigation ditch screening and dam removal projects, among others.

CALFED Bay-Delta Program. This program is a massive State-Federal program to fund additional water projects and restore habitat and water resources in the San Francisco Bay/Sacramento-San Joaquin River Delta. It involves at least six federal agencies (Bureau of Reclamation, Fish and Wildlife Service, U.S. EPA, National Marine Fisheries Service, the Army Corps of Engineers, and the Natural Resources Conservation Service), as well as two California state agencies (California Resources Agency and California Environmental Protection Agency). These combined agencies provide policy direction and oversight for the Bay-Delta region, including: water quality standards formulation; coordination of State Water Project and Central Valley Project operations with regulatory requirements; and long-term solutions to problems, such as endangered species listings, in the Bay-Delta Estuary.

Millions have already been spent for ecosystem restoration under CALFED. CALFED funds have already been used to remove dams on Butte Creek. On Battle Creek, $30 million in CALFED Ecosystem Restoration funds will be used to remove five dams, provide fish passage at other dams, and screen irrigation pipes to prevent entrainment of fish into irrigation ditches. In October 2000, $390 million in state funding passed by voters under Proposition 204 is expected to be released to fund CALFED restoration and other projects over ten years (pending a final Environmental Impact Statement for water projects in the region. Between 1999 and 2005, a total of over $8 million in CALFED/Proposition 204 funding is slated for dam removal studies of dams in the Bay-Delta region. In addition to Proposition 204 and matching federal dollars, California voters recently passed bond resolutions of $2.1 billion for parks and $1.9 billion for water-related restoration (Propositions 12 and 13). Some of these funds also will be available for ecosystem restoration in the Bay-Delta region.

FOR MORE INFORMATION

Dan Castleberry, Central Valley Project Improvement Act, (AFRP), 209-946-6400 x 304, *dcastleb@delta.dfg.ca.gov*, *www2.delta.dfg.ca.gov/afrp/afrp.asp*.

Ted Frink, California Department of Water Resources, Integrated Storage Investigations Branch, CALFED, 916-327-1757, *tfrink@water.ca.gov*, *www.calfed.water.ca.gov/ecosystem_rest.html*.
Steve Evans, Friends of the River, 916-442-3155 x 221, *www.friendsoftheriver.org*.

Connecticut

DAM SAFETY FUNDING

Connecticut does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

Long Island Sound License Plate Program. The Connecticut Department of Environmental Protection provides funding for habitat restoration using funds from its Long Island Sound License Plate Program. Dam removal projects qualify for grants, but to date funds have only been used for fish passage around dams and other obstructions. Under the program, $35 of the $50 one-time license plate fee is deposited into a fund that can be used for habitat restoration, research, education, outreach, and new and improved access to Long Island Sound. Grants of a recommended maximum of $25,000 per project can be made to municipalities, nonprofit groups, and schools. A grant was made to a local land trust for fish passage on the Oyster River over a low-head dam that blocked alewife and herring migration. A local Trout Unlimited chapter received another Long Island Sound Fund grant to provide passage for alewife, herring, and sea-run brown trout around a road culvert on Trading Cove Brook.

MITIGATION / ENVIRONMENTAL PENALTY

Supplemental Environmental Penalties. Connecticut has used supplemental environmental penalties in lieu of environmental enforcement penalties to help finance planning, design, engineering, and demolition costs on several dams on the Naugatuck River (see Naugatuck River case study in the *Dam Removal Success* report; go to *damremovaltoolkit.americanrivers.org*, click on "Case Studies of Completed Dam Removals" and then click on "Dam Removal Success Stories Report.")

FOR MORE INFORMATION

Long Island Sound License Plate Program:
Kate Hughes, Connecticut DEP, 860-424-3034,
www.dep.state.ct.us/olisp/licplate/licplate.htm

Supplemental Environmental Penalties:
Susan Peterson, Connecticut DEP, Bureau of Water Management, Clean Water Fund, Management Office, 860-424-3854

Maine

DAM SAFETY FUNDING

Maine recently passed legislation to create a $400,000 dam repair fund to be administered by the Maine Department of Environmental Protection (DEP). Maine DEP is currently developing rules for the program, and it is unclear at this time if the funds will be available for dam removal.

OTHER STATE ASSISTANCE AND INITIATIVES

Although the State of Maine does not provide funding for dam removal, it has provided assistance for removal of dams. To help facilitate removal of the Edwards Dam on the Kennebec River in Maine, the State took title to the dam and removed it using non-state funds to cover removal costs. The State is continuing this role, agreeing to take title to other dams that will be removed with non-state funds, including the Smelt Hill Dam on the Presumscot River.

FOR MORE INFORMATION

Dana Murch, Maine Department of Environmental Protection, Bureau of Land and Water Quality, 207-287-3901, *dana.p.murch@state.me.us*

Massachusetts

DAM SAFETY FUNDING

The Massachusetts Department of Environmental Management (DEM) has an authorized program to provide funding to local communities for dam repairs, this funding can also be used for dam removal. The program pays up to 75% of dam repair/removal costs, with in-kind contributions accepted toward the required 25% local cost-share. In the past, the program has had $5 million in funding, and funded projects have ranged from $25,000 to $1 million. No funds have been appropriated to the grant program for 2000.

OTHER STATE ASSISTANCE AND INITIATIVES

In 1999, Massachusetts launched "River Restore," a program administered by DEM's Department of Fisheries, Wildlife and Environmental Law Enforcement. The program works across agencies on regulatory and funding issues and works cooperatively with DEM's Office of Dam Safety. The River Restore program is dedicated to reconnecting natural and cultural river communities by selective removal of dams and other obstructions. The program focuses on "dams that are no longer serving their original purpose and/or no longer able to contain and pass storm flows safely. DEM's Office of Dam Safety estimates that Massachusetts has 3,000 dams, most of which were built before 1900 for water supply, industrial use, power supply, and recreation. The River Restore program has set up a dam decommissioning task force, and established interdisciplinary teams of engineers, ecologists and fisheries biologists to evaluate unsafe dams to compare the feasibility of repair versus removal options.

FOR MORE INFORMATION

Karen Pelto, River Restore Coordinator, 617-626-1542, *karen.pelto@state.ma.us*

Michigan

DAM SAFETY FUNDING

Michigan does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

Michigan has been actively removing unsafe dams whose removal would provide habitat and recreational benefits using a variety of federal, state, local, and private funding sources. State appropriated general funds have been used on a case-specific basis. Two state funding programs that have also been used to fund dam removals are the Inland Fisheries Grant Program and the Michigan Natural Resources Trust Fund, although these funds were not intended to specifically address dam removal needs.

Inland Fisheries Grant Program. The Michigan Department of Natural Resources (DNR) manages this program that is designed to support projects that protect, maintain, or rehabilitate inland aquatic environments on waters capable of supporting significant public fisheries resources, primarily through property acquisition. The Michigan legislature appropriates $200,000 annually to the program from fish and game license revenues. Grants are made once per year, at a maximum of $20,000 per project, with a required 50% match.

Michigan Natural Resources Trust Fund. This DNR program provides grants to local units of governments for acquisition and development of outdoor recreation or protection of Michigan's natural resources. Approximately $20 million to $25 million are available annually to this program from the sale of oil and gas leases on state land. Grants are made twice per year for a minimum of $15,000 and maximum of $500,000 for development projects (there is no minimum or maximum for land acquisition projects). The City of Williamston, MI was awarded a Natural Resources Trust Fund grant to remove a dam to create a "whitewater" rapids for kayaks on a previously dammed stretch of Grand River.

FOR MORE INFORMATION

Sharon Hanshue, Michigan DNR, Fisheries Division,
517-335-4058, *hanshus1@state.mi.us*
Jim Hayes, Michigan DNR, Dam Safety, 517-335-3170.

Minnesota

DAM SAFETY FUNDING

Minnesota does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

The Minnesota state legislature has funded numerous dam repair and removal projects through direct appropriations (see the Cannon and Kettle River case studies in the *Dam Removal Success Stories* report; go to *damremovaltoolkit.americanrivers.org*, click on "Case Studies of Completed Dam Removals" and then click on "Dam Removal Success Stories Report.") The Minnesota Department of Natural Resources (DNR) provides a list of priority projects to the legislature every two years. One to two dam removals are normally included in the list, resulting in about one dam removal per year. This pace is expected to continue for at least 10 years, according to the DNR.

FOR MORE INFORMATION

Craig Regalia, Minnesota DNR, 651-296-0525, craig.regalia@dnr.state.mn.us.

New Hampshire

DAM SAFETY FUNDING

New Hampshire does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

New Hampshire's Fisheries Habitat Program is a new program that provides funding for fish habitat protection, enhancement, and restoration. The program, administered by the New Hampshire Fish and Game Department, provides funding for removing barriers to fish movements within watersheds, including removal of dams. Funding for the program comes from a $1 surcharge on all fishing licenses sold in the state. The program is generating approximately $175,000 to $250,000 per year for habitat improvement projects. Combined with federal matching funds, the Fish and Game Department anticipates that approximately $500,000 per year will be available through the program. Three privately owned dams on the Ashuelot River are scheduled to be removed using funds from this program. The state's dam safety agency is collaborating closely with the Fish and Game Department on the Ashuelot River projects and will conduct the actual dam removal work.

FOR MORE INFORMATION

Scott Decker, New Hampshire Fish and Game Department, 603-271-2744, *sdecker@wildlife.state.nh.us*

New Jersey

DAM SAFETY FUNDING

In 1992, New Jersey voters approved by referendum the Green Acres, Clean Water, Farmland and Historic Preservation Bond Act, which authorized the issuance of $15 million in state bonds to finance a revolving loan program to rehabilitate dams. The New Jersey Department of Environmental Protection (DEP) launched the Dam Restoration and Clean Water Trust Fund in 1994. The loan program is open to private dam owners, such as homeowner associations, but they are required to have a municipal co-borrower. Under the provisions of the law, the municipality can assess the properties that benefit from the project in order to pay off the loan.

Under the program, low-interest loans (2% interest) with a 20-year maturity were made to 19 projects ranging in funding amount from $175,000 to $2.2 million. All of the original loan funds from the original program have been allocated, but will be available again on a revolving basis as loans are repaid. None of the funded projects have been dam removals, but there is nothing in the law or program rules that precludes the funding from being used for that purpose.

In January 2000, the state legislature appropriated an additional $9.5 million to the program. In addition to revolving loans, grants up to 100% of a project's cost are available to local governments. These funds also can be used for dam removal.

FOR MORE INFORMATION

John Ritchey, New Jersey DEP, Dam Safety Section, 609-984-0859, *jritchey@dep.state.nj.us*, *www.state.nj.us/dep/nhr/engineering/damsafety*

New York

DAM SAFETY FUNDING

New York does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

In 1996, New York voters approved a $1.75 billion Clean Water/Clean Air Bond Act that included $790 million in funding for municipal wastewater treatment improvement, pollution prevention, agricultural and non-agricultural nonpoint source abatement and control, and aquatic habitat restoration, and $265 million in funding for safe drinking water revolving loans. The bond act also authorized $15 million in assistance to municipalities for dam safety projects. As of February 2000, $5 million of a total $7 million appropriated had been committed to fund 18 projects. The governor's current 2000/2001 budget recommends an additional $2 million appropriation. Although none of the funded projects have involved dam removal, the funds can be used for that purpose. The program provides grants for 75% of eligible costs with a minimum local match of 25%. There is a cap of $300,000 of Bond Act funding per project.

FOR MORE INFORMATION

Mike Stankiewicz, New York DEC, Dam/Flood Protection Section, 518-457-0834, *mrstanki@gw.dec.state.ny.us*

North Carolina

DEDICATED FUNDING

North Carolina does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

North Carolina has three general environmental funding programs that have been used, or could be used, for dam removal:

Clean Water Management Trust Fund. Created by North Carolina's state legislature in 1996, this program provides grants to enhance or restore degraded waters, protect unpolluted waters, contribute to a network of riparian buffers and greenways, or all three. The program applies 6.5% of the state's budget surplus, or a minimum of $30 million, each year to a trust that is then used to provide grants on a competitive basis to state agencies, local governments, and nonprofit organizations. Although the program's budget is set by law, funds must be appropriated every year by the state legislature. To date, appropriations to the program have averaged $44 million per year. The funds have not yet been used to fund dam removals, but program funds may be used for this purpose.

North Carolina Marine Fisheries Resource Grant Program. Funds from this program provided nearly $100,000 in 1998 for two dam removals on the Neuse River. The removal of Quaker Neck dam and a smaller tributary dam on the Neuse River was accomplished with additional funding through Coastal America from the U.S. EPA and a grant from the National Fish and Wildlife Foundation. (See Neuse River case study in the *Dam Removal Success Stories* report*;* go to *www.damremovaltoolkit.americanrivers.org*, click on "Case Studies of Completed Dam Removals" and then click on "Dam Removal Success Stories Report.")

North Carolina Water Resources Development Project Grant Program. This program provides direct grants in seven categories of eligible projects, including water management and stream restoration. The program, which is funded through capital funds appropriated by the state legislature, has been used to remove a private and state-owed dam on the Little River. Removal of the privately owned dam was funded by the U.S. Fish and Wildlife Service and the National Fish and Wildlife Foundation with a matching grant of $100,000 from this state grant program. The state dam removal was also funded with $72,000 in grant funds from this program.

FOR MORE INFORMATION

John Sutherland, North Carolina Division of Water Resources, Department of Environment and Natural Resources, 919-715-5446, *John.Sutherland@ncmail.net*, *www.dwr.ehnr.state.nc.us*

Steve Bevington, Clean Water Management Trust Fund, 252-830-3222, *steve@cwmtf.net*, *www.cwmtf.net/welcome.html*

Ohio

DAM SAFETY FUNDING

The Ohio Department of Natural Resources (DNR) and the Ohio Water Development Authority (OWDA) collaborated in 1999 to create two revolving loan programs to assist public and private dam owners to fund safety-related repairs and improvements. DNR regulates the safety of nearly 1,800 Ohio dams, and OWDA provides financing to local governments for projects related to water supplies and water pollution control, such as wastewater treatment and stormwater control facilities as well as dam repairs. Eligible costs for ODWA financing include engineering and design fees, construction costs, and legal and inspection fees. Grants are made on a first-come, first-served basis. Neither program has yet been used to finance a dam removal, but removals are allowed under the program. The two dam safety loan programs are summarized below.

Ohio Water Development Dam Safety Loan Program (DSLP). This program offers loans to local governments (city, county, state agency, and water/sewer/conservation district) to finance improvements and repairs to dams as mandated by Ohio DNR. Loans are approved each month at an interest rate that is set at 50 basis points above the average for an index of 20-year general obligation bonds. Loan terms can be from 5 to 25 years.

Ohio Water Development Dam Safety Linked Deposit Program (DSLDP). This program is similar to the DSLP except that loans can be made to individuals, private organizations, and businesses for improvements and repairs to dams. The program is unique in that it provides low-interest loans through private banks that participate in the Linked Deposit Program. Interest rates to borrowers are set at a predetermined rate below current rates for U.S. Treasury notes and bonds.

GENERAL ENVIRONMENTAL FUNDING

Ohio DNR removed the Jacoby Road Dam from the Little Miami River in 1997 using funds from the state's Scenic Rivers License Plate Program. Under the program, $15 of a $25 special license plate fee generates approximately $250,000 per year that DNR uses for projects to protect and preserve Ohio's scenic rivers. DNR uses the fees to fund its river restoration projects, such as removing the Jacoby Road Dam. Currently, there is no mechanism in place to provide grants with money generated by this program.

FOR MORE INFORMATION

Mark Ogden, Ohio DNR, 614-265-6727, *mark.ogden@dnr.state.oh.us*, *www.dnr.state.oh.us/odnr/water/dsafety/damloans.html*

Pennsylvania

DAM SAFETY FUNDING

Pennsylvania does not have dedicated funding for dam repair or removal.

GENERAL ENVIRONMENTAL FUNDING

In 1999 a new initiative, called Growing Greener, authorized as much as $650 million in state funding ($473 million in general revenue funds and $172 million in Recycling and Hazardous Sites Cleanup and Landfill Closure funds) over five years to protect open space, reclaim mines, refurbish state parks, and restore watersheds, among other objectives. The Growing Greener program includes $37 million for watershed grants administered by the Pennsylvania Department of Environmental Protection (DEP). The grants are awarded on a 100% basis, with no local match required. All local units of government and non-profit organizations are eligible.

Over $370 million in grant applications—10 times the available funds—were received in the first round. Growing Greener grants were used to fund 34 already-approved watershed restoration projects in 1999 for a total of $537,000. At least two dam removal projects were among the funded projects, including two grants of $30,000 each to remove two small dams and restore streambanks. In 2000, a $400,000 study was funded to allow the Philadelphia Academy of Natural Sciences to assess the impacts of dam removal in the Delaware River basin. The Governor's 2000/2001 proposed budget allocates approximately $50 million in Growing Greener watershed protection and restoration grants. It is anticipated that the same level of funding also will be available in year 2002/2003. Dam removal projects are eligible but must score well in relation to other proposed projects in order to be funded.

OTHER STATE ASSISTANCE AND INITIAT IVES

The Pennsylvania Fish and Boat Commission (PFBC) is an independent state agency that regulates and manages fisheries and boating in the state. The PFBC has been actively involved in removing small dams and other obstructions to migratory fish passage on the Susquehanna River. Using fish passage funds from the U.S. EPA's Chesapeake Bay Program (which requires a 50% non-federal match), the Fish and Boat Commission has worked with local communities to remove at least 31 dams, with plans to remove 30 more. A study of dam removal impacts in the Susquehanna River basin was also funded with $80,000 in EPA Chesapeake Bay Program funds. The Fish and Boat Commission provides assistance to local communities in the form of free engineering design. It has worked with Pennsylvania DEP, which has created a streamlined process of restoration waivers of permitting processes to make dam removal less costly and more efficient.

FOR MORE INFORMATION

Growing Greener program:
Growing Greener Grants Center, 717-705-5400, *GrowingGreener@dep.state.pa.us*, *www.dep.state.pa.us/growgreen*

Pennsylvania Fish and Boat Commission:
Scott Carney, 814-355-2225, *scarney@lazerlink.com*, *www.fish.state.pa.us*.

Utah

DAM SAFETY FUNDING

Utah has a dedicated funding program for dam repair that has not been, but could be, used to fund dam removals. Individuals, towns and counties are eligible for grants from 80 to 95% of the total cost required to bring high hazard irrigation and water supply dams up to standard. The program's $4.5 million in funds are generated through a combination of $1 million in general revenue plus half the revenue from a one-eighth-cent sales tax. The Utah state legislature created the sales tax fund in 1983 to address flood control problems. Half of the revenue generated with this tax is now used for dam safety grants.

FOR MORE INFORMATION

Richard Hall, Utah DNR, Division of Water Rights, 801-538-7240, *rhall@state.ut.us*, *www.nrwrt1.nr.state.ut.us*

Wisconsin

DAM SAFETY FUNDING

Wisconsin has developed several dedicated funding sources for dam removal.

Dam Maintenance Repair, Modification, Abandonment, and Removal Program. Grants on a 50% matching basis are available for dams owned by municipalities or lake districts up to a maximum $200,000 state share for dam repair, reconstruction, or removal. About 12% of the $11.5 million in funds available over the program's 10-year life have been used for dam removal. Nearly all of the $11.5 million originally authorized in special bond funds has been allocated. No additional bonding authority for the program has been authorized.

Abandoned Dam Fund. This program is the only program in the country dedicated to funding removal of abandoned dams that pose safety threats and offer environmental benefits. Wisconsin Department of Natural Resources (DNR) formally declares a dam abandoned and undertakes removal. In the early- to mid-1990s, DNR removed two to three dams per year in this way. In the past, DNR had line item budget funds averaging $50,000 per year for this purpose. It is now using approximately $100,000 of designated bonding for this purpose. DNR also could allocate additional funds through the municipal grants program to remove abandoned dams.

Small Dam Removal Grant Program. This new program will provide funding through an additional $250,000 in bonding for the removal of small dams and stream restoration. Small dams are defined in the law as less than 15 feet high and less than 100 surface acres of inpoundment. The law clearly states that the funds may be used to remove private dams. The program guidelines are being developed, but the program will likely provide 50% matching grants.

GENERAL ENVIRONMENTAL FUNDING

River Ecosystem and Habitat Restoration Program. Legislation creating this program was passed in fall 1999. The program provides planning and project grants related to river protection and habitat restoration activities. The planning grants are capped at $10,000 and project grants at $50,000, with a 35% match required from the applicant. Dam removal and land acquisition related to dam removal could qualify for funding under this program.

FOR MORE INFORMATION

Meg Galloway, Wisconsin DNR, Bureau of Watershed Management, 608-266-7014, *gallom@dnr.state.wi.us*, *www.dnr.state.wi.us/org/caer/cfa/bureau/programs.html#dam*

Appendix K:

Fact Sheet: Funding Sources for Dam Removal

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Commonwealth of Massachusetts

RIVERWAYS PROGRAM

Building Partnerships, Protecting Rivers

stream restoration through small dam removal

FACT SHEET: Funding Sources for Dam Removal

Dam removal projects often require a combination of different funding sources. Funding is usually awarded to projects with multiple partners and strong state support. Staff at Riverways can assist local restoration advocates apply for funding, provide letters of support, and help match federal dollars. Don't hesitate to contact Riverways for assistance in determining which funding source best fits your projects goals.

NATIONAL SOURCES

National Fish Passage Program (U.S. Fish and Wildlife Service)

http://www.fws.gov/fisheries/FWSMA/FishPassage/fpprgs/GetInvolved.htm

The U.S. Fish and Wildlife Service's National Fish Passage Program is a non-regulatory program that provides funding and technical assistance toward removing or bypassing barriers to fish movement. August deadline.

Contact: Region 5 – Northeast Dave Perkins 413/ 253-8405, David_Perkins@fws.gov

U.S. Fish and Wildlife Service Partners

http://www.fws.gov/partners/

The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife program offers technical and financial assistance to private (non-federal) landowners to voluntarily restore wetlands and other fish and wildlife habitats on their land. Restoration projects include reestablishing fish passage for migratory fish by removing barriers (dams) to movement.

Funded Silk Mill dam removal in Becket

National Fish Habitat Initiative
Brook Trout Habitat Restoration Program

www.fishhabitat.org

NFHI is a nationwide strategy that harnesses the energies, expertise and existing partnerships of state and federal agencies and conservation organizations. The goal is to focus national attention and resources on common priorities to improve aquatic habitat health. November deadline.

General Matching Grant Program (National Fish and Wildlife Foundation)

http://www.nfwf.org/guidelines.cfm

The National Fish and Wildlife Foundation operates a conservation grants program that awards matching grants to projects that: address priority actions promoting fish and wildlife conservation and the habitats on which they depend; work proactively to involve other conservation and community interests; leverage available funding; and evaluate project outcomes. Funding Range: $10,000-$150,000, deadline in September.

Funded Billington Street dam removal in Plymouth, and Silk Mill dam removal in Becket

Open Rivers Initiative (NOAA)

http://conservationconference.noaa.gov/case/open_river.html
http://www.fedgrants.gov/Applicants/DOC/NOAA/GMC/NMFS-HCPO-2006-2000405/Grant.html

NOAA has oversees a competitive grant program focused on community-driven, small dam and river barrier removals in coastal states to help repair vital riverine ecosystems, to benefit communities, and to enhance populations of key trust species. Funding range: $50,000-$250,000, January deadline.

NOAA/Ocean Trust/National Fisheries Institute

http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners/otnfi.html

NOAA partners with Ocean Trust to fund habitat restoration projects that enhance living marine resources *around the coastal U.S*. *The applicant must be an individual, association or company in the fish and seafood industry*. Funding range: $5,000-$20,000, deadlines in July and November.

The Nature Conservancy/NOAA Habitat Restoration Partnership

http://nature.org/initiatives/marine/strategies/art9023.html

NOAA partners with The Nature Conservancy (TNC) to fund marine and anadromous fish habitat restoration projects *around the coastal U.S. The applicant must be a TNC local chapter*. Organizations that have project ideas should contact their local TNC chapter to discuss forming a partnership to apply for project funds under this request for proposals. Funding Range: $25,000-$85,000, deadline in March.

The mission of the Riverways Program is to promote the restoration, protection and ecological integrity of the Commonwealth's rivers, streams and adjacent lands.

Silk Mill Dam, Becket, MA April 2000

Yokum Brook two years after Silk Mill Dam removal, October 2005

River Restoration
Tim Purinton,
Restoration Planner
617-626-1542
tim.purinton@state.ma.us

Riverways Program
Dept of Fish and Game
251 Causeway St.
Suite 400
Boston, MA 02114
http://www.massriverways.org

Trout Unlimited/NOAA Partnership

http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners/troutunlimited.html

Provides matching grants that require 1:1 match from a non-federal source or sources. Typical awards are from $10,000 to $100,000, and can cover any aspect of a habitat restoration project, including construction, engineering, planning, or outreach. There is no formal application process. Project must be sponsored by a TU chapter or State Council, or by TU staff.

NOAA Community-Based Habitat Restoration Project Grants

http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners_funding/callforprojects.html

The program invites the public to submit proposals for available funding to implement grass-roots habitat restoration projects that will benefit living marine resources, including diadromous fish, under the NOAA Community-based Restoration Program. Funding range: $50,000-$200,000, October deadline.

Funded Silk Mill dam removal in Becket

Conservation Law Foundation Estuary Restoration

http://www.clf.org/programs/cases.asp?id=531

CLF launched this program to distribute funds for estuary restoration projects to communities in New England. Partners in this venture include Restore America's Estuaries, the NOAA Restoration Center, the U.S. Fish and Wildlife Service and the New England states. Winter deadline.

Community-Based Restoration (NOAA/ American Rivers)

http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners/americanrivers.html

NOAA partners with American Rivers to fund voluntary dam removal and fish passage projects. Funding range: $5,000-$25,000, November deadline.

FishAmerica Foundation/NOAA

http://www.fishamerica.org/faf/projects/noaa.html

FishAmerica, in partnership with the NOAA Restoration Center provides funding for on-the-ground, community-based projects to restore habitat for marine and diadromous fish in the United States. Funding Range: $5,000-$50,000, January deadline.

Funded Billington Street dam removal in Plymouth

Wildlife Habitat Improvement Program (Natural Resources Conservation Service)

http://www.nrcs.usda.gov/programs/whip/

Funding awarded to projects that work to establish and improve fish and wildlife habitat. Contact local USDA Service Center for more information.

Funded Billington Street dam removal in Plymouth

Corporate Wetlands Restoration Partnership (CWRP)

http://www.coastalamerica.gov/text/cwrp.html

CWRP leverages the collective resources, skills and processes of the private and public sectors through dam removal and river projects such as fill removal, channel clearing and enlarging, fish passage construction, and replanting.

Funded Ballou dam removal in Becket

U.S. Army Corps of Engineers

http://www.nae.usace.army.mil/pservices/206.htm

Aquatic Ecosystem Restoration – Section 206, Water Resources Development Act of 1996. Funds from this program can be utilized to remove lowhead dams as a way to improve water quality and fish and wildlife habitat. This funding source is listed under the Continuing Authorities Program.

Wildlife Restoration Act (Pittman-Robertson Act) Dept. of Interior-Fish and Wildlife Service

http://federalasst.fws.gov/wr/fawr.html

The purpose of this Act was to provide funding for the selection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management research, and the distribution of information produced by the projects. **Contact**: The Division of Federal Assistance, FederalAid@fws.gov

STATE SOURCES

Funding for dam removal in Massachusetts would be determined on a case by case basis. Interested proponents should consult with the Riverways Program.

http://www.mass.gov/dfwele/river/programs/riverrestore/riverrestore.htm

LOCAL SOURCES

Funding for fish passage and dam removal on municipal owned land may be funded through the Community Preservation Act (CPA). Check with your local planning department or Conservation Commission, or contact the Community Preservation Coalition.

http://www.communitypreservation.org

ADDITIONAL REFERENCES

American Rivers's Paying for Dam Removal: A Guide to Selected Funding Sources
http://www.americanrivers.org/site/DocServer/pdr-color.pdf?docID=727

EPA Catalog of Funding Sources for Watershed Protection
http://www.epa.gov/owow/funding.html

Wisconsin River Alliance's list of resources (scroll down to view Private funders):
http://www.wisconsinrivers.org/index.php?page=content&mode=view&id=8

The River Network list of Funding Sources
http://www.rivernetwork.org/library/index.cfm?doc_id=114

Appendix L:

NEH 654, Chapter 2,
Goals, Objectives, & Risk

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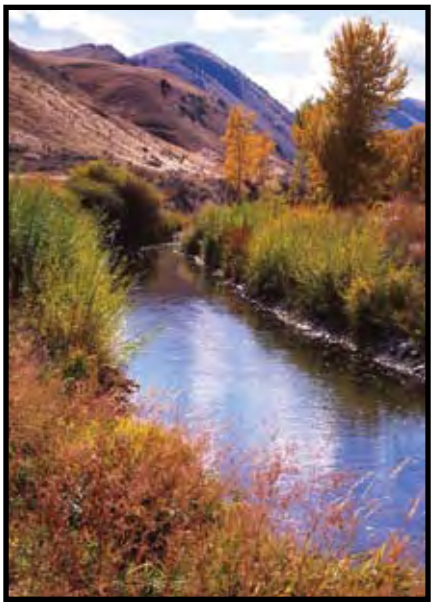
United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

**Part 654 Stream Restoration Design
National Engineering Handbook**

Chapter 2 Goals, Objectives, and Risk



Issued August 2007

Cover photo: Setting quantifiable, realistic, and achievable goals and objectives is a critical early step in planning successful stream restorations.

Advisory Note

Techniques and approaches contained in this handbook are not all-inclusive, nor universally applicable. Designing stream restorations requires appropriate training and experience, especially to identify conditions where various approaches, tools, and techniques are most applicable, as well as their limitations for design. Note also that product names are included only to show type and availability and do not constitute endorsement for their specific use.

Chapter 2 Goals, Objectives, and Risk

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Chapter 2 Goals, Objectives, and Risk

654.0200 Purpose

The purpose of this chapter is to emphasize the need for the clear identification of the desired outcome or result of any action to restore or protect streams. Identification of the true nature and causes of stream problems is a critical step in the overall planning process and one which has been abbreviated or overlooked on many failed or poorly performing restorations.

The selection and evaluation of goals, as well as any design approach or treatment alternative must address risk or consequences of failure. This should be examined from both an ecological perspective, as well as a life and property standpoint. While risk is described at several points in this handbook, it is introduced in this chapter. Designing solutions is also an integral part of the overall planning process. The procedure for designing solutions is described in NEH654.04.

654.0201 Introduction

Conservationists are frequently faced with conditions along and in streams that are characterized as problems because certain functions are not being provided or simply because the overall character of the stream system has changed. It may be that the system is damaged and needs to be repaired or that a shift in perception of stream functions and values has occurred, spurring the need for some sort of action.

Understanding the true nature of stream problems is challenging because of the dynamic nature of streams, their seasonal changes, responses to disturbances, and their ability to recover. Recognizing the current condition of a stream, comparing it to historical conditions, and projecting its future conditions are, therefore, challenging; but, nonetheless, need to be documented and clearly understood to determine appropriate and achievable goals and objectives.

The goal of a stream restoration planning process is to formulate a plan that is feasible and effectively addresses the identified problems and goals of the restoration project without adversely affecting adjacent stream reaches or riparian areas.

The term stream restoration can be used to describe many different activities. Actions that support or lead to designed solutions are a critical part of the stream restoration process to assure that what is designed and implemented fits the goals and objectives of the job or project.

(a) Goals and objectives

The perceived success or failure of many stream restoration projects can be as much a function of the criteria selected as the design. Therefore, the importance of establishing achievable project objectives is critical. Once established, these objectives will delineate the data collection effort, methodologies for assessments, and finally the design itself. An interdisciplinary team is required since few people have all the skills necessary to conduct a successful stream restoration study and design. While the exact makeup of the team can vary, it should include engineering, geomorphological, and ecological expertise.

The team should also include the stakeholders. Stakeholders are the groups who may fund the project, affect the stream directly, or be affected by actions taken on the stream. A trained facilitator and interdisciplinary involvement may be needed to guide the development of goals and objectives and to assure that all stakeholders, problem identification issues, other opportunities, and constraints are fully recognized. Once agreement is reached on the alternatives to be pursued, the design process can proceed.

Generalities in objectives, such as *fixing the stream*, can lead to problems. Narrowing the objectives reduces ambiguity for the study team members. Objectives should be:

- specific
- realistic
- achievable
- measurable

Restoring streams to a given historical condition may be an objective. If this is the approach, care must be taken to ensure that physical or biological changes in the watershed have not prohibited a return to that historical condition. For example, the objective for an incised and widening stream in an urban watershed could be to restore it to support a sensitive fish species that was present before development. Changes in water quality and runoff patterns could make this an unattainable objective. Many restoration projects are actually environmental enhancement projects or rehabilitations, since it may not be feasible to return a system to an historical condition. Another of the principal reasons for this is that good, quantitative data on watershed and stream historical conditions is normally lacking. Restoration, therefore, becomes rehabilitation, since not all ecologically self-sustaining functions and values can be restored to the stream.

Clear objectives that are reachable, within the constraints and capabilities of the stream and its riparian area, will lead to better designs that perform as intended. Some objectives may, at first glance, appear to be realistic, but may need to be reformulated if preliminary design information indicates that either the costs will be too high, the intended results may not be achievable, or that boundary constraints may significantly alter or preclude the implementation of the final design.

Typical goals and objectives

Some typical goals for urban stream restoration and recovery are to:

- prevent streambank erosion on residential properties and protect infrastructure
- prevent flooding of residential properties caused by debris or sediment in the channel
- protect bridge abutments, bridges, and road crossings
- protect valuable agricultural land
- protect a municipal water supply (main source works and water quality)
- maintain or restore fish habitat
- maintain or restore water quality

Residential homeowners may be primarily interested in repairing eroded banks and removing debris or woody material blocking the channel to protect their yards, drainage pipes, septic systems, retaining walls, barns, and houses. A municipal water company may need to have a water main protected. Channel erosion may be causing headcutting of the channel, threatening bridge abutments or a road (fig. 2–1). Other stakeholders, including state and Federal agencies, may have primary interests in maintaining or improving aquatic habitat.

Further refinement of stakeholders' interests may produce more goals and better defined objectives such as:

- Maintain or rehabilitate environmental quality by designing and constructing stream restoration projects that:
  - look natural
  - function naturally with channels connected to flood plains
  - provide desirable stream and riparian habitat, including overhanging root cover and large woody material
  - reduce bank erosion
  - maintain water quality
  - are economical to design and build

- Protect infrastructure in channels and flood plains by designing and constructing stream restoration projects that:
  - do not increase flood profiles
  - do not migrate across flood plains
  - protect valuable riparian infrastructure
  - have a low risk of failure
  - do not send debris or woody material downstream to plug bridges and culverts
  - maintain water quality
  - are economical to design and build

In some cases, a compromise needs to be reached between goals for infrastructure protection and aquatic habitat. Sometimes these goals are incompatible, and sometimes they are mutually supportive. Some instances of incompatibilities are:

- An interest in having a project that can naturally evolve over time or rapidly change in response to large flow events, where the stability of riparian infrastructure requires a fixed and static bankline.
- Woody material can provide valuable habitat benefits, but can also increase flood profiles by plugging bridge openings.

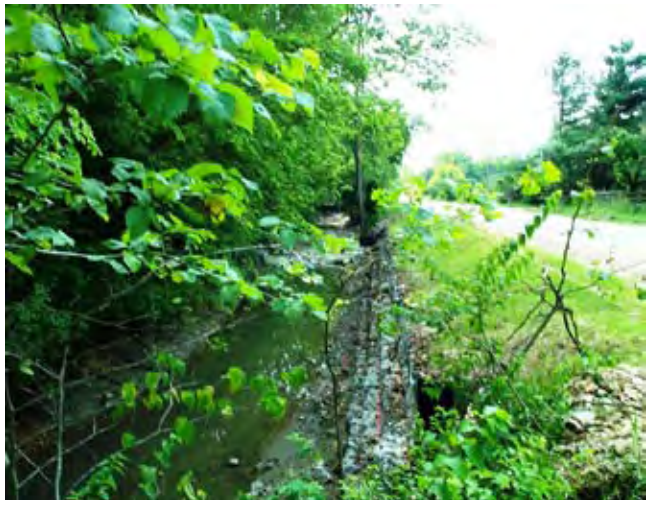
Some instances of mutually supportive goals are:

- Large woody material is valuable for aquatic habitat and on some streams can help achieve channel stability.
- Natural streams with channels connected to flood plains can reduce tractive forces in the channel by dispersing and attenuating high velocity flows, thereby increasing channel stability.

Figure 2–1 Township road threatened by severe degradation of channel bed (Calhoun County, IL) (*Photos courtesy of Michael Hollow*)

(a) March 2003—Original concern about bank failure threatening road expanded to include rock riffle grade control structures to stabilize bed, reduce bank height, and improve aquatic habitat

(b) June 2003—2 months after treatment using rock riffle grade control structures to stabilize bed and gabion baskets to stabilize failing bank near road. Note water impounded in pool.



654.0202 NRCS Conservation Planning Process and stream restoration

A plan is a sequence of logical steps to reach a goal or objective. Most stream restoration projects consist of complex issues involving a number of people and ecological components. Using a multi-disciplinary planning team helps to identify and address many of the issues in a timely manner. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Conservation Planning Process (CPP) follows policy written in the National Engineering Manual (NEM), Part 510, Planning.

The NRCS CPP is referenced because of the need for NRCS field conservationists to recognize how stream work fits into the overall CPP.

Prescribing stream corridor restoration design elements requires progression through and iteration of NRCS CPP steps (fig. 2–2 (USDA NRCS National Planning Procedures Handbook (NPPH), 2003b)). As part of this process, alternative resource management systems (RMS) are developed for the conservation management unit (CMU) or, in this case, the stream reach or stream corridor, and an RMS is selected by the client and then implemented. The nine-step process is listed in detail in table 2–1, with relevance to stream restoration. Although sequential in steps, iterations and cycling back to a previous step commonly occur in the planning process. Plans may result in complex solutions involving a balance of watershed, riparian, and instream actions. The actions may be combinations of management, as well as designed and implemented practices and techniques. The planning process may be rapid for simple projects and may require extensive time for complex projects involving many people and resource issues.

Stream solutions start with landowners or stakeholders requesting assistance with a stream-related problem. The problem may be streambank erosion, which may be controlled and simultaneously protect or enhance ecological functions and values of the stream and riparian area. However, the problem may be a much more serious and widespread condition of multiple reach or systemwide instability, requiring detailed planning and coordination with many landowners and stakeholders. The area of streambank of concern to a landowner is also part of the stream system and its watershed. The focus of the planning team must be on the whole system to determine the cause of the problem, formulate alternatives, and evaluate the effects alternatives may have on the rest of the stream system.

Although these steps are listed in sequential order, the process may require an interactive or sometimes iterative approach. For example, the preliminary design for a planned alternative may not fit the site or may otherwise result in unacceptable construction requirements or unintended or poor overall performance. Recycling back through some steps of the planning process may be required to develop a more suitable alternative for which a new design can be developed.

The formulation and selection of an alternative solution should give consideration to the potential problems and human resource availability. Information must be identified that could affect installation such as construction access, safety concerns, material availability, pollution control requirements, and local ordinances. Some of the potential problems a planner may identify are:

- permitting requirements (surveying, clearing, earth-moving, dredging, cultural resources)
- ownership/land rights
- site access (season, timing, and physical limitations)
- material availability (earth materials, plant materials)
- construction scheduling (season, environmental windows flow conditions)
- local ordinances
- tolerance for risk and uncertainty
- utilities (underground, overhead)
- pollution control (instream, parking areas, sediment control, chemical control)
- safety concerns (working on slopes, in water, around heavy equipment, using hand tools)
- threatened or endangered species

Figure 2–2 NRCS CPP showing the dynamic interaction between the steps

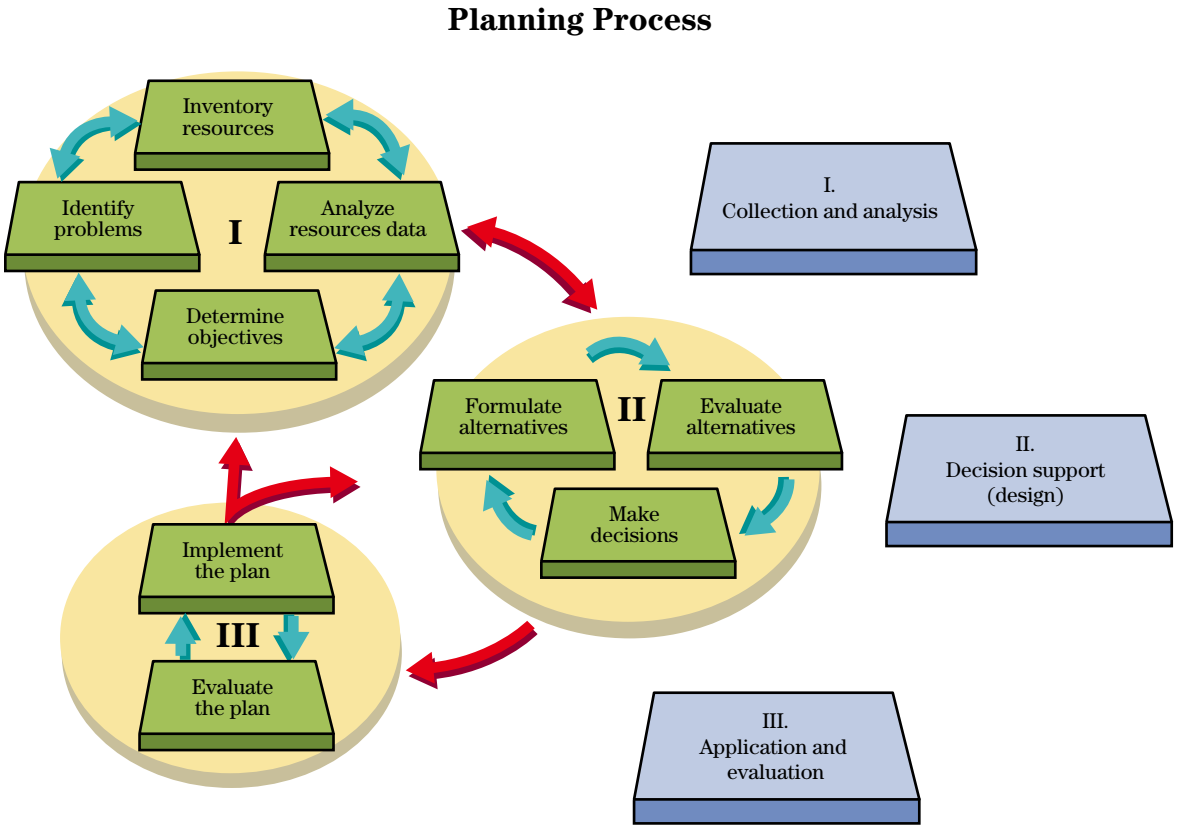


Table 2–1 Stream restoration planning process

Step no.*	Description	Generalized stream restoration planning step	NEH 654 chapter	Detailed stream restoration planning steps	Potential iteration of steps
Phase I—Collection and analysis (understanding the problems and opportunities)					
1	Identify problems and opportunities	Decide what stream characteristics need to be changed	1 2 4 17	Project identification: identify all • Stakeholders • Goals and objectives • Risks • Local vs. systemwide instabilities	Rigor of the assessment depends on the acceptable risk. As each element is addressed, use the information to confirm the initial assessments. It may be necessary to revisit the goals and objectives (may need to revisit step 2).
2	Determine objectives	Describe the desired physical, chemical, and biological changes in the stream			
3	Inventory resources	Study the stream to understand its primary physical processes, dominant impacts on water quality, and abundance and distribution of different biological populations	3 5 6 13 16 17	Assessment: assess the following at the watershed scale and at the site or reach scale: • Geomorphic condition (stream type) • Existing ecological conditions (riparian and instream) • Ecological and physical thresholds • Dominant physical and biological processes and constraints • Sediment budget and stability of existing conditions Acquire hydrologic data (watershed scale) Acquire hydraulic data (stream reach scale) Determine: • Why is the stream in its current condition • What is the ideal condition • What keeps it from naturally adjusting to the ideal condition	
4	Analyze resource data	Examine the collected information and decide what are the most important factors or processes that impact and influence the desired conditions in the stream			
Phase II—Decision support (understanding the solutions)					
5	Formulate alternatives	Determine which processes and factors can be changed, and decide if those changes are sustainable and self-reinforcing	4 5 6 7 8 9 10 11 12 13	Conduct the stability design Select practices or techniques for RMSs Select and design appropriate stabilization techniques • Cross section • Planform • Stabilization, soil bioengineering, integrated techniques • Profile, grade Conduct a sediment budget and stability assessment on the selected design, appropriate to design the practice, so it can be implemented	
6	Evaluate alternatives				
7	Make decisions				
Phase III—Application and evaluation (understanding the results)					
8	Implement the plan	Implement the selected changes to the stream system	15 16 17	Identify construction issues and impacts on design to fine-tune design and implementation Document maintenance and monitoring requirements: • Perform ongoing maintenance • Evaluate success and practice adaptive management	
9	Evaluate the plan	Modify the course of action as new information is collected and analyzed			

*NRCS Planning Procedures Handbook, Amendment No. 4, 180–VI–NPPH, March 2003

During the stream restoration planning process, information is gathered and decisions are made that will direct the design, determine the type of contract or agreement to use, and identify installation concerns. Decisions such as the extent of design needed are determined based on the complexity of the alternative selected, type of contract or agreement, availability of experienced staff to direct construction, and contractor experience.

An understanding of the different types of contracts and agreements is imperative during planning. Contract issues are described in more detail in NEH654.15. Once the planners know the available resources, they can select the type of contract or agreement. Project cost can determine the type of contracting procedure selected such as formal or informal (simplified) acquisition procedures. Funding may also dictate the selection of a particular type of contract. For example, labor may be provided by volunteer groups and the equipment acquired with an equipment rental contract, if funds are limited. A local sponsor may be able to do part or all of the work if they have the equipment, workforce, and experience.

During the planning process, installation must be considered when selecting alternative solutions. For example, complex solutions may require either experienced construction oversight to direct the work or a very detailed design package.

654.0203 Historic approaches for determining goals for stream restoration designs

Knowledge of the behavior of streams in relation to conditions in their watersheds before and during the historical period gives insights to effective watershed management. The design and restoration of streams is often guided by a desire to recover a lost condition. This historic basis requires asking to what standard or for what historical period we are designing. For example:

- What did a stream and its watershed look like at the time of European settlement?
- What did a stream and its watershed look like before the land use became what it is today?
- What did a stream and its watershed look like before the last big storm?
- What did the stream and its watershed look like before its condition became a concern?

The historical approach is not new. Some important earlier studies are by Gilbert (1914); Happ, Rittenhouse, and Dobson (1940); and Vita-Finzi (1969). A more recent, but classic, study using a large assortment of historical techniques for landscape reconstruction is that of Whitney (1995).

(a) Limitations of historical approaches

Goals for a stream restoration project are often determined by picking a point in the past from a photograph, writing, oral history, or from interpretation of landforms and attempt to put the stream back to that condition, or a desired point in time. However, things are not always as they seem. For example, a large Georgia swamp pronounced by authorities as primeval was shown to have been prime agricultural land in the 19th century that had been transformed to swamp by human action (Trimble 1970a). On the other hand, some Australian lakes and rivers commonly thought to have been radically transformed by human action were shown to have changed relatively little, and those changes may have had more natural than human causation (Finlayson and Brizga 1995).

Selecting a stream shape from a photograph and trying to replicate that shape ignores other factors that control the planform and other attributes of the stream and its corridor, including the riparian area. Photos of streams typically focus on crossings, easily accessible points, and cross sections. In many cases, usually little can be learned about the historical pattern and diversity of riparian vegetation from photographs at such locations.

Dynamic changes in timing, frequency and magnitude of flows, and sediment load and transport are also not revealed in photographs. The size, shape, and other physical characteristics of alluvial streams are a function of the types and quantities of sediment in the water and comprising the bed and banks, as well as the nature of the flow conditions. A photograph could easily show a transition phase between two relatively stable states, but may provide little understanding about the direction or magnitude of that change. Refer to NEH654 TS2 for an expanded description on the use of historic information for stream restoration design.

In a physical and possibly biological sense, streams are disturbance-driven systems. The current processes that can be observed in a stream channel were shaped by prior floods, sediment input and transport events, channel changes, vegetation changes, and species interactions. Although it is useful to think of a stream as having a most probable form, each of these extreme events resets or alters that form.

654.0204 Geomorphic approaches for determining goals for stream design

The geomorphic approach to stream restoration work encompasses a number of different activities including stabilizing unstable streambanks and channels, reconfiguring the planform of channelized or aggraded streams, restoring natural substrates and other habitat features, and even daylighting piped streams. Figure 2–3 illustrates a daylighting stream project showing a stream that formerly flowed through a pipe underuground and was restored to a more natural condition. This work can be undertaken on a single stream reach or comprehensively over an entire watershed. The geomorphic approach to stream restoration work provides a way to meet management objectives of:

- protecting streamside property or structures from erosion or reducing sedimentation rates in a downstream reservoir or navigable waterway
- improving ecological conditions for aquatic or riparian life

Work undertaken as compensatory mitigation is included in this latter management objective. Regardless of the management objective, stream geomorphic restoration design and construction techniques strive

Figure 2–3 Daylighting stream project

to produce a stable stream that is natural in appearance to the untrained eye, with minimal detrimental environmental impacts.

A structured planning process is needed for stream work that:

- examines the physical, biological, and chemical processes in and around a stream to determine their hierarchy and interaction
- describes in what historic range of variability those processes functioned
- determines which processes could be modified to bring about desired results
- describes desired results and how long it would take to achieve them
- monitors the results of a modification to a stream to determine the level of success
- adapts future actions according to monitoring and evaluation results

Many stream management and modification practices fail because of oversimplification, application of approaches that are not designed for dynamic fluctuations in site conditions, and a general lack of understanding about how streams function, physically, biologically, and chemically. A goal might be that the number of adult salmon returning to a stream will be increased tenfold in the next 20 years. Until the amount of habitat in the stream and its utilization are described, there may be no way of knowing if these fisheries goals can be achieved.

In addition, physical processes of sediment delivery and transport and streamflow fluctuations create physical habitat units. The amount of flooding and interactions between floodwaters, riparian vegetation, and the shallow alluvial aquifer and hyporheic corridor often play a major role in nutrient redistribution in a stream. This can impact primary food sources and productivity. Until these issues are understood in relative importance to one another, determining if the goal is realistic or sustainable may not be possible.

Ideally, environmental investigations should be conducted in the planning stage, prior to formulating a stream restoration plan. Work proposed to control erosion or sedimentation should be substantially different in scope from work proposed to benefit aquatic life. For the former, environmental planning investigations should be focused on collecting information necessary to develop the optimal design that will meet the erosion and sedimentation control objectives. Designs should keep conditions as natural as possible, and construction practices should be used that minimize adverse environmental impacts to stream life during construction. In contrast, when the management objective is to improve ecological conditions for aquatic life, it is important for restoration planners to determine that a stream is biologically impaired and that degraded geomorphic conditions are, indeed, a principal stressor to aquatic life.

(a) Geomorphic analog or reference reach

An analog section of stream, sometimes called a reference reach, can also be used in establishing goals. In this technique, a section of the project stream or a neighboring stream is identified that is thought to function in a desired manner. The reference reach is measured, vegetation is analyzed, and biologic conditions are characterized, and these become the goals for the reach of stream that is deemed to be not functioning properly.

In cases where there have not been substantial changes in sediment supply and hydrologic character, stream reaches up or downstream of the degraded reach could provide an appropriate template for restoration design. This situation is of greatest potential applicability when the cause of channel degradation is from direct channel disturbance or riparian vegetation changes.

More insight is gained by this reference reach approach than the desired point-in-time method, but the technique has some limitations. Directly transferring the properties of one stream to another makes the assumption that the recent disturbance regimes have been similar. Also implicit in this technique is that analog sections are in the same geologic materials and have similar size watersheds, chemical budgets, sediment budgets and sediment particle size distributions, and biologic food chains and predator-prey relationships. The lack of similarity between reference reaches and the restoration stream reach may induce more uncertainty into the process for setting objectives.

Geologic conditions may be controlling stream behavior in the reference reach. These larger scale geologic controls often create stable stream conditions. Unfortunately, this stability is not necessarily transferable to the restoration stream section that is under the influence of different geologic conditions. The limitations of this approach are addressed in more detail in NEH654.09.

654.0205 Ecosystem approaches for determining goals for stream design

Prioritization of stream restoration work should first characterize the existing ecosystem condition, identify stressors, and then prioritize among these stressors. Stream restoration plans should be formulated to focus effort on correcting major stressors. To restore aquatic life, degraded stream conditions should be restored only if these conditions are a priority stressor for aquatic life and will not likely self-correct in a timely manner without intervention.

Several degraded conditions may be harmful to aquatic life. These include constructed fish blockages, upstream migrating headcuts, streams confined in underground pipes, streams confined by concrete, and recently maintained or channelized streams in earthen channels. These stream conditions should generally be considered priority candidates for stream restoration work, since remediation of the condition would likely benefit aquatic life.

The ecologic approach to stream restoration work may provide the greatest benefit to aquatic life in a short reach, but the results could benefit aquatic life over a much greater length of the stream system. When degraded conditions are widespread, the restoration work should be strategically targeted at local reaches that can eventually produce widespread improvement to benefit aquatic life, or work would need to be undertaken on a large scale. Table 2–2 shows likely impact scales for various stream problems.

Two opportunities where localized restoration work benefits aquatic life over a much greater length of stream are where a structure obstructs the upstream passage of aquatic life (fig. 2–4) and when a downstream change in base level causes a rapid upstream migrating headcut (fig. 2–5).

Fish blockages prevent upstream movement of fish and other aquatic organisms that are unable to pass through or over them. Following natural or human-caused events that result in depletion of aquatic species upstream of the blockage, populations occurring downstream may be unable to reoccupy upstream

habitat when conditions improve. Also, following downstream migration, migratory aquatic species may be unable to return upstream of the blockage and cannot survive otherwise suitable habitat. However, it should be noted that fish blockages may be desirable if they are preventing the upstream movement of an unwanted invasive aquatic organism.

Diversion of water flow for irrigation, municipal and industrial water supplies, and recreation can have extreme consequences for aquatic habitat and riparian vegetation along the stream where water is diverted. The degree of impact from these diversions depends on state laws and regulations on instream flow conditions and water rights. In the past, some streams have been totally dewatered due to diversions, resulting in total loss of aquatic habitat. In the past 20 years, many irrigation diversions have installed fish screens with return flows that prevent fish from being diverted into ditches or irrigation fields.

Table 2–2 Situations in which ecologic restoration projects in a stream reach would have a high likelihood of benefiting aquatic life

Stream reach problem	Likely scale of impact
Constructed fish blockage in stream system naturally lacking fish blockages	Watershed
Rapidly upstream migrating headcut	Watershed
Piped stream	Stream reach
Concrete stream channel	Stream reach
Earthen stream channel recently channelized or maintained	Stream reach
Water diversions causing flows too low for fish passage or rearing	Stream reach

Figure 2–4 Fish blockage in stream

Figure 2–5 Upstream migrating headcut; smaller tributaries will also cut into fields, triggering gully erosion

Headcuts proceeding upstream can destabilize streams over a very large area, altering the relationship between the stream and its flood plain, drying out flood plain wetlands, and generating large volumes of sediment that can be harmful to aquatic life. Headcuts are also often fish blockages.

Two degraded geomorphic conditions that present restoration opportunities to improve conditions locally are piped streams and streams with concrete channels (fig. 2–6). When streams are piped or lined with concrete, habitat complexity is completely lost, and flow conditions are often severely altered. Water velocities are greatly increased during high-flow events, while the channels may run nearly dry at other times. Additionally, flow between the stream and ground water underlying the stream (the hyporheic habitat) is prevented, severely restricting the nutrient processing functions that the stream and its aquatic life would otherwise perform. Daylighting piped streams is the restoration of a stream's planform and normally involves substantial design efforts, especially in built-up areas. Removing concrete channel boundaries and restoring a stable planform may be the only way to restore functions to these streams. In either case, a first step is to begin to reconnect riparian areas and people to the streams. In the case of piped streams, the starting point is to gain awareness of what the stream once was and what it can be with daylighting. For concrete-lined channels, reconnecting can start with establishment of green areas and managed riparian areas along the channel.

Channelized streams with earthen channels (fig. 2–7) present unique challenges for restoration. The simplified substrate and depth conditions of the channelized stream constitute a loss in habitat quality for stream life.

Stream channelization is common in regions of the country where large areas of wetlands have been lost (fig. 2–8 (U.S. Fish and Wildlife Service (USFWS))). In these areas, opportunities to restore flood plain wetlands should be investigated as a way to contribute to stream ecosystem restoration. Generally, the self-restoration potential of lost wetlands in absence of intervention is low.

Although excessive sediment in streams is the principal stressor to aquatic life nationwide, restoration projects may not always benefit aquatic life. Excessive sediment, while not desirable, is not typically damaging to all stream aquatic life, as are some other stressors, such as highly degraded water quality and severe

Figure 2–6 Stream encased by concrete channel

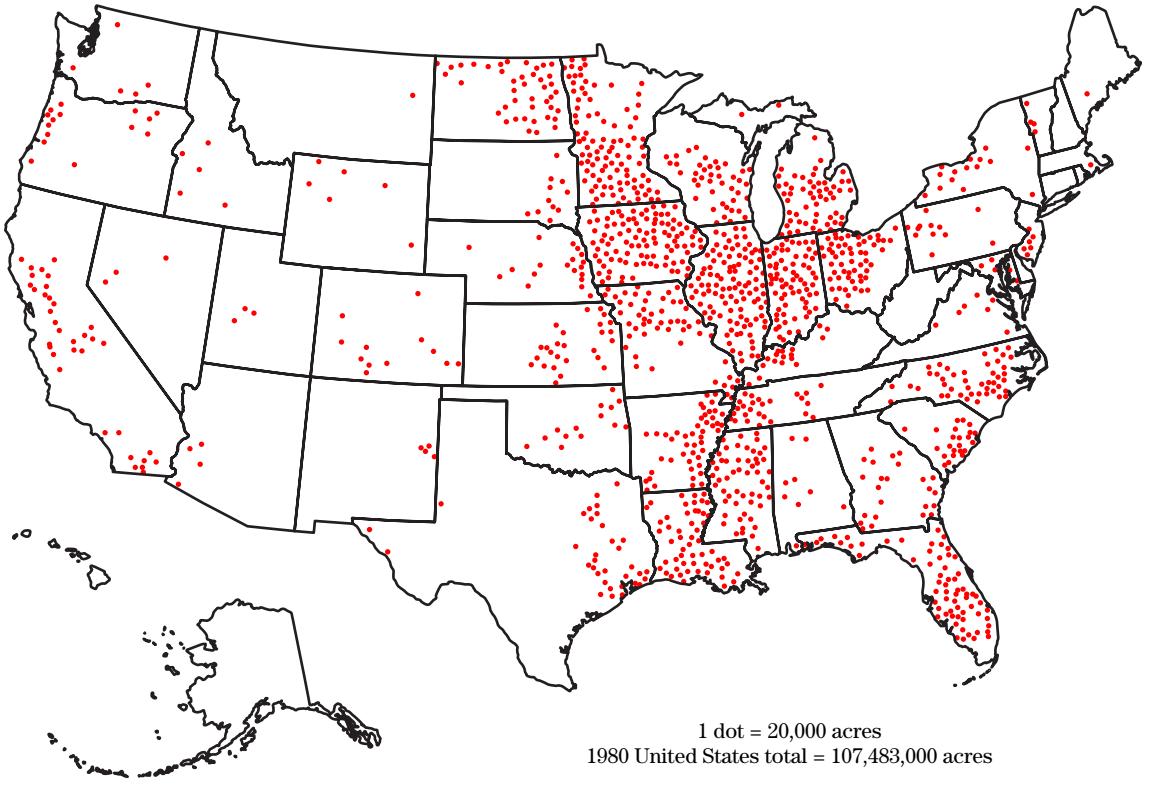
Figure 2–7 Channelized stream (lower left); former natural stream has been assimilated into the regional artificial drainage network

alterations in flows. The impacts of excess erosion and sedimentation impact primarily sediment-intolerant species such as:

- aquatic insect larvae in riffles
- fish that spawn on coarse substrates
- fish that eat insects of coarse substrate bottom habitat
- aquatic organisms that eat submerged aquatic plants

Excessive sediment damages some highly valued aquatic organisms such as many species of trout. Sediment-tolerant organisms, however, may thrive if no other stressors are present. Systemwide strategies may be needed to reduce watershed sediment production. The USDA Agriculture Research Service (ARS), NRCS, and U.S. Army Corps of Engineers (USACE) have undertaken projects to demonstrate such systemwide sedimentation/erosion control strategies in northern Mississippi (Demonstration Erosion Control project).

Figure 2–8 Regions of the country where channelized streams would likely be associated with historic lost wetlands



654.0206 Rural stream restoration

The primary task in most rural situations is to protect an identified resource. Stream restoration in rural areas is often undertaken as a result of an individual landowner request at a specific site where there is no organized effort to restore a larger stream segment. While it may be legitimately questioned whether stream restoration can be accomplished on such a small scale, there are many opportunities to address local conditions and begin the process of education with a long-term goal of restoration on a larger scale. The problems or symptoms leading to the request can be analyzed and documented to determine the feasibility and probable effects of a local solution. The analysis will then conclude whether appropriate action can be taken to offset negative treatment effects and then assess the risk of action or inaction. The time and expense of large-scale studies and data collection may not be justified by a single request from an individual or a small group of individuals. However, in many cases, individual goals and objectives can be achieved by careful problem identification, root cause analysis, and appropriate application of restoration techniques. At the very least, a determination of no feasible action at the individual scale is far superior to an inappropriate attempt at a solution that may have negative impacts at the larger scale.

(a) Issues

Typical rural requests fall into two broad categories: protecting property or restoring and maintaining channel capacity. Both types of requests normally relate to one or more specific problems centered on the loss of tangible property due to bank erosion, excess bed-load deposits, excess woody material, or increased runoff exceeding channel capacity and, therefore, resulting in increased flooding or channel adjustments. The desired condition in these instances is simply to protect what is being damaged: crops, cropland, public roads, utilities, private roads, bridges, and levees. Unfortunately, the problem is seldom as isolated as the landowner's goal of protecting a resource.

The landowner objectives or goals must first be related to an immediate cause and a root cause before a treatment recommendation can be determined. Table 2–3 shows how the most common primary goals relate to problems, immediate causes, root causes, and solutions.

Where possible, it is preferable to address the root cause of the problem. Realistic goals must take into account the accurate assessment of the root cause of the problem. The first task is to broaden the landowner's concept of stream dynamics from merely patching a problem to understanding why the problem exists. Often asking about other current or past stream related problems will lead to a productive discussion about the landowner's longer term goals and objectives. And just as important, it will give the designer insight into the overall stream's behavior and state of equilibrium.

As an example, slope failure affecting an access road may be the problem, but there may also be a problem maintaining a stream crossing or keeping the large logjams out of the channel. Investigation may lead to the conclusion that the channel is degrading, causing the stream crossing to be undermined. The same incision process is then causing excessive slope failure as the bank height increases, resulting in channel widening and large mature trees being undercut and falling into the channel. The landowner may now understand that to patch the slope failure threatening the access road may be futile unless the incision problem is first addressed. The goal of protecting the access road has been broadened to address the cause of the problem. By halting the channel incision on this reach of stream, the landowner's access road can be protected. The stream then can be improved by moving it towards equilibrium, and the aquatic value and aesthetic qualities enhanced.

The task of addressing the immediate problem will remain the landowner's objective, but the method of attaining the goal must address the larger issue of channel instability by treating the root cause of the problem. A decision will then need to be made regarding the scope, risk, and cost analysis of all the proposed treatment alternatives. Before discussing alternatives, explore the secondary goals and objectives of the landowner. The requests are almost always generated by one of the primary objectives, but some landowners will also be interested in such secondary benefits such as aesthetics, aquatic habitat, wildlife habitat, or water quality.

Table 2–3 Common streambank problems, causes, and solutions

Primary goal	Problem	Immediate cause	Root cause	Solution
Protect property: cropland, forestland, residential land Infrastructure: roads, bridges, utilities, levees	Lateral migration	Excess energy/ increased velocity	Steepened gradient or increased flow	Reduce energy gradient by reducing slope with grade control or re-meandering stream. Increases in flow regime will require watershed treatment and/or temporary storage to reduce discharge
		Inadequate riparian vegetation	Clearing and/or removal of mature vegetation	Restore riparian vegetation and buffer area. Additional treatment (toe protection) may be needed during establishment period
		Channel obstruction	Woody material, landslide has reduced channel capacity at site forcing flow around obstruction	Remove obstruction to restore channel capacity
		Unstable channel planform	Normal lateral migration, channelization or modifications have created small radius bend(s)	Modify channel geometry to conform to natural channel geometry relationships of stable channels. Typically with radius of curvature/bankfull width ratio greater than 2.0
		Excessive bed-load deposition	Excessive erosion upstream generating more bed load than channel can transport. May be result of channel incision and widening upstream of problem. May be aggravated by channel widening, resulting in excessive width depth ratios. May also be depositional area created at delta above confluence with larger stream or reservoir	Find and treat sources generating excessive bed load. Channel may then need to have stable cross section and planform reestablished at problem reach. Attempts to modify channel to transport bed load through the problem reach are only successful in moving the problem downstream
	Slope failure	Critical bank height exceeded	Channel incision has created bank height that exceeds soil strength to resist failure	Stabilize bed to prevent additional incision, and raise bed elevation to restore bank heights that are less than critical height. An alternative after halting incision is to slope banks to an angle that is stable for the materials and heights
			Banks are over steepened by lateral erosion at the toe of the bank resulting in slope failure	Stop lateral erosion at the toe. Refer to causes of lateral migration to insure root cause is addressed
		Geotechnical problems	Banks have internal geotechnical problems resulting in bank failure only indirectly effected by streamflow (seeps, springs, weeps, differing soil materials)	Address the geotechnical problem before attempting any other solution. Consult with appropriate technical personnel for assistance

Table 2–3 Common streambank problems, causes, and solutions—Continued

Primary goal	Problem	Immediate cause	Root cause	Solution
Restore or maintain channel capacity	Bed-load accumulation	Excessive upstream sources	Large bank failures/escarpments or bed degradation contributing excessive bed load	Identify and make appropriate treatment to reduce bed-load contributions
		Reduced velocity in reach resulting in deposition of bed-load material	Change in slope or backwater effects from channel obstruction downstream reservoir or confluence with another stream	May be no effective practical solution without detailed project analysis and major project activity to reduce bed load
	Multiple or frequent logjams	Logjams restrict flow, resulting in loss of channel capacity and increased flooding or bank scour near obstruction	Introduction of woody material from logging, clearing ,or high mortality rate of mature trees upstream of problem, resulting in logjams at site	Locate source, and address problem by removing potential for excessive woody material in channel
			Excessive slope failure upstream causing large woody material from riparian zone to enter channel	Address problem of slope failure upstream of problem. Refer to causes of slope failure to ensure root cause is addressed
	Increased runoff/ flooding	Land use changes in watershed such as urbanization or intensified agricultural use	Change in flow regime resulting in increased peaks or extended durations initiating changes in channel morphology	Make watershed modifications to restore natural flow regime. Alternative is to allow channel morphology to adjust naturally, or make carefully planned adjustments to changes in flow regime

Fortunately, effective treatment to address the immediate problem will usually have positive impacts on these secondary goals if the root causes of the problems are addressed and the stream segment is brought back to a state of near equilibrium. However, by first identifying the secondary concerns, the level of improvement can be enhanced with appropriate design, construction, and operation and maintenance of treatment measures.

(b) Scale

After the root cause has been identified, the scale or scope of the solution must be determined. The question is, "Is this a local instability problem or a systemic problem?" If the problem is local, an individual landowner or cooperation between two or more landowners can implement the needed solutions. However, if it is a systemwide failure, rarely can the rural stream restoration project expand to the watershed level without a local organization to sponsor the project. Figures 2–9, 2–10, and 2–11 illustrate a systemwide stream stability problem, and figure 2–12 shows an example of a local stability problem treated with a grade control structure and stream barbs.

The question then becomes, "Is there a solution that can be implemented by the landowner?" If not, the only answers may either be to expand landowner involvement or abandon the project until the required area of treatment can be addressed.

Fortunately, many areas of the country have a grid of roads, culverts, and bridges that effectively confine many of the channel instability problems to segments between road crossings. Many times, even a systemwide failure may have some solutions or treatments available by working complete segments between these manmade stable points. The root cause again will indicate the extent or scale required to implement a satisfactory solution.

654.0207 Developing watersheds

Public officials are faced with ever-increasing liability pertaining to public safety, public infrastructure, property, and other forms of investment. As rural watersheds transform to urban, municipal governments must accommodate growth by annexing and zoning additional land parcels. Preparation for subsequent development of subdivisions and other construction may include an inventory of streams and other sensitive sites to assess the impact of additional runoff from impervious cover. Other planning measures include updating or revising the comprehensive plan, development codes, ordinances, and other protective measures. Rural communities and areas in the urban fringe undergoing transformation may not have technical or human resources to develop comprehensive plans, ordinances, or to carry out special studies. Others, however, play an active role in planning and guiding development.

In these newly urbanizing areas, as well as areas already urbanized, stream restoration can be viewed as a capital improvement because of the amount of public expenditure involved with working in and around streams. Measures are available to municipal and county governments to minimize future impacts on streams, as well as to protect improvements made along the stream. State legislation grants municipal home rule authority, enabling local jurisdictions to enact and codify ordinances. These legal instruments are used to further protect community assets, which include streams.

The U.S. Environmental Protection Service (EPA) Office of Water compiled a collection of municipal ordinances from various local governments throughout the country. These ordinances were collected as part of a larger partnership effort with organizations, such as the International City Municipal Association (*http://www.icma.org*), American Water Works Association, and others, as a template for those charged with making decisions concerning growth and environmental protection. These ordinances also address aquatic buffers, erosion and sediment control, open space development, stormwater control operations and maintenance, illicit discharges, and post construction controls.

Figure 2–9 Systemwide instability. Heavy bed load from upstream erosion exceeds this stream's capacity to carry bed load. The root cause is channelization and urbanization, resulting in loss of channel capacity as midchannel bars form. (Sugar Creek, McLean County, IL)

Figure 2–10 Systemwide instability. Very heavy bed-load deposits have filled original channel, forcing stream to move laterally into finer grained bank materials. This is an example of an alluvial or bed-load-driven stream. (Sexton Creek, Alexander County, IL)

Figure 2–11 Systemwide downcutting induced by channelization project downstream. Additional landowners must become involved to address the root cause of channel incision to stabilize the entire degrading reach. This is an example of a threshold or flow-driven stream. (Hurricane Creek, Jefferson County, IL)

Figure 2–12 Local instability problem above a township bridge. This channel became misaligned with the bridge opening due to lateral migration. The treatment includes stream barbs and a rock riffle grade control structure to protect against possible degradation as a result of shortening the channel during realignment. (Bay Creek, Pike County, IL)

654.0208 Urban stream restoration

The challenges of working to restore physical and biological functions and values in urban or developed streams and their watersheds focus on hydrologic characteristics that no longer fit a natural stream, as well as the obvious limitations provided by physical and legal boundary constraints. To accurately understand the objectives and risks of stream restoration in a developed watershed both the social complexity, as well as the biophysical complexity of the landscape, must be understood (fig. 2–13). Stakeholder goals and objectives must also be clearly defined and the community's interests prioritized. Implementing any successful project also requires that risks be understood mutually by the community, as well as the planners and designers.

Understanding the temporal and spatial scales of stream processes, channel evolution process, and linkages between flow and sediment movement and channel dynamics is essential in any stream restoration project. Understanding these interrelationships will be incomplete, however, without a dynamic watershed context. Recognizing that many developed watersheds are, in fact, actively developing is essential to implementing a successful stream restoration project.

Figure 2–13 Developed area (urban or suburban)

How streams and their watersheds change over time must be clearly understood. It is important to recognize, at the time of observation, where the channel exits in the space-time continuum of its dynamic equilibrium with the water and sediment of its watershed. Failure to do so can result in the implementation of a stream restoration project which is neither in harmony with the land management objectives of the community nor meets the biophysical needs of the resource.

(a) Issues

The issues and interests of landowners within developed watersheds often are similar to those in rural watersheds. These issues and interests often include loss of property, fish and wildlife habitat, recreational opportunities, risk of flooding, and aesthetics. However, this difference in residence time, so to speak, significantly affects all steps in planning a stream restoration project in an urban area.

The human community affects ecological processes and is also affected by the implementation of a stream restoration project. Fully engaging the community in the planning process to identify issues and interests encourages people to look beyond their own backyards and to identify ways to integrate the complex facets of a given project.

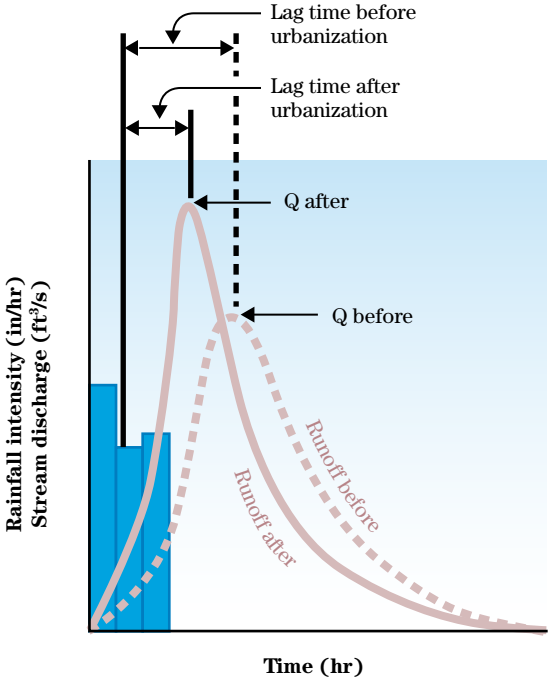
The scale of the project, degree to which the stakeholders wish to participate, and in some cases, the resource issues being evaluated will determine the amount of public participation. An issues and interests meeting has two principal objectives:

- All stakeholders can identify the issues and interests that they feel are important, both as related to the specific project resources and to the area as a whole. These include the natural resources of the area, as well as the social and economic resources of the local community. This allows all members of the community who choose to participate to have a voice in the resource conservation decisionmaking process. By doing so, it creates a way for stakeholders to communicate, explore different perspectives, and see the project in a larger context than might otherwise be possible.
- Stakeholders attending the meeting(s) can participate equally in a collaborative process

to identify the project objectives and focus. The goal is to design and implement a technically sound stream restoration plan that meets the needs of the ecosystem and is in harmony with the resource management objectives of the community and the respective local, state, and Federal agencies. This meeting establishes common threads and common ground for stakeholders and creates a way for their dialogue to be translated into action by implementing an achievable plan to conserve, protect, manage, or rehabilitate the stream corridor resources.

It is of paramount importance to recognize how changes in land use affect watershed hydrology and sediment regime. Urban development produces more impervious surface area, subsurface drains, land grading, and stormwater conveyance systems. The effects of increased imperviousness and the subsequent disconnect of the water infiltration and water storage capacity of the watershed soils and ground water result in a distinct shift of the streamflow hydrograph to the left, as shown in figure 2–14 (Federal Interagency Stream Restoration Working Group (FISRWG) 1998). Both the rising limb and recessional limb of the hydrograph have an increase in slope with a higher peak discharge and a decreased lag time between the onset of a particular storm event and peak streamflows. How this changed and changing hydrology affects the morphology and stability of urban streams and channels must be understood, recognizing that regional curves of typical stream dimensions for various drainage area sizes may not be usable at all.

Figure 2–14 Comparison of hydrographs before and after urbanization



Increased flows in urban watersheds often result in channel incision. In addition, the clear-water discharge associated with present day storm drainage systems results not only in increased streamflows, but also results in streamflows with a higher capacity to transport sediment. The process of incision often results in the simplification of the streambed topography. The pools shorten in length, become shallower, and pool slope is steepened. Riffles become more extensive and steeper.

The process of incision and resulting change in stream morphology operate in a negative feedback loop, perpetuating instability and loss of habitat within the stream. Consider the equation for stream power:

$$\phi = \gamma QS \qquad \text{(eq. 2–1)}$$

where:

ϕ = stream power (ft-lb/s-ft)
γ = specific weight of water (lb/ft^3)
Q = discharge (ft^3/s)
S = slope (ft/ft)

As shown in figure 2–15, development within a watershed results in an increase in stream Q during a storm event. An increase in Q results in a direct increase in stream power. The increase in stream discharge and, thus, in stream power translates to an increased ability to transport sediment. The channel must adjust (incise) to accommodate the increased flows now generated by its watershed.

Incision tends to decrease bed topography, thereby increasing channel slope. An increase in channel slope results in a direct increase in stream power. Again, the increase in stream power translates to an increased capacity to transport sediment, which is expressed as incision. Figure 2–15 illustrates the relationship between changes within a developed or a developing

watershed, relative to incision and loss of habitat, with respect to the variables of the stream power equation.

An often overlooked and misunderstood risk associated with stream restoration in urbanizing or developed watersheds is the acceptance of the project by the community. It is important for the resource professional, both the planner and designer, to recognize that the community is not only one of the resources affected by the project but also one of the resources which affects the project. A stream restoration project, which is technically sound from a biophysical perspective, but not in harmony with the resource management objectives of the community, may also be considered a failure.

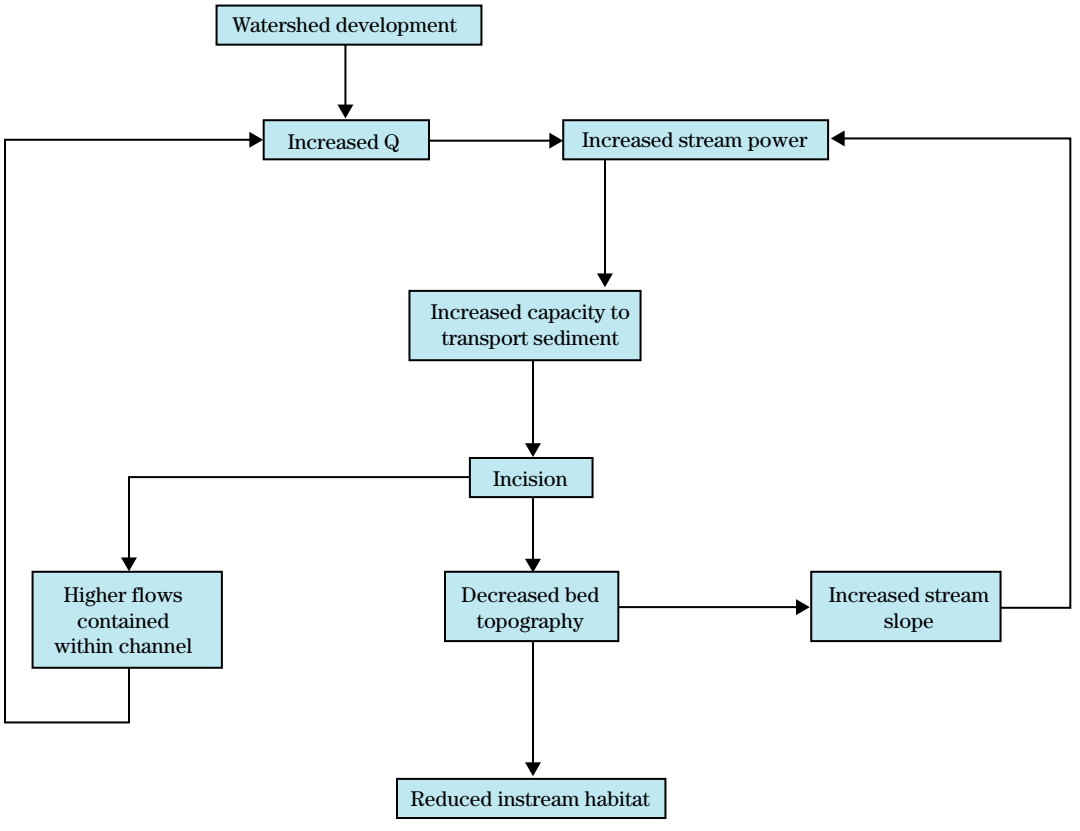
Case study 8 of this handbook, Copper Mine Brook, provides some limited risk analysis for an urban stream restoration project involving concerns about infrastructure, as well as biological and physical stream processes.

(b) Scale

In a rural watershed, the entire stream reach (say, 12 meander wavelengths) may be located on the property of a single landowner who has resided on the property for the past 25 years. The description of the issues and interests of the landowner, relative to the temporal and spatial scales of the channel instability, is comprehensible for the landowner. The landowner has witnessed the evolution of the channel and has a stake in its entire reach.

Conversely, in a developed watershed, that same reach of stream may be home to 30 different property owners who have an average residence time of approximately 5 years. The discussion of issues and interests

Figure 2–15 Potential effects of urban development in a watershed



expands accordingly, and the description of the spatial and temporal scales of the channel process may not be as relevant to these landowners. The perspective of each landowner rarely extends beyond the adjoining properties if it extends beyond their individual property. In addition, their perspective of the channel and its associated processes, on average, do not extend beyond 5 years. They own only a portion of the channel and have been witness to its evolution for only a short period of time.

654.0209 Constraints

Constraints limit the possible actions. Determining project constraints is just as important as establishing objectives. There is a feedback loop between constraints and project goals and objectives. Constraints can be natural anthropogenic. Examples of natural constraints include:

- mountains that limit channel planform
- bedrock outcrops that limit or control channel grade
- water quantity that limits the aquatic species that can use a channel

Examples of anthropogenic constraints include:

- flood plain development or land use that limits channel planform
- tolerance for risk of project failure
- endangered species or regulatory concerns that helps defines acceptable treatment practices

Anthropogenic constraints are particularly common in urban flood plains and include rights-of-way, highways and bridges, utility crossings, buildings, archeological and historical sites, and cemeteries.

Another common concern is contaminated sediment in the streambed or banks. To ensure that these polluted sediments stay in place, it may be necessary to stabilize the banks, preventing the natural channel migration process.

Technical and nontechnical issues affect the feasibility of any stream restoration project. Technical constraints are generally reasons why a particular treatment recommendation cannot function or meet the landowner objective. Nontechnical constraints are generally reasons why the treatment recommendation will not be implemented.

(a) Technical constraints

Data availability—In most rural situations, the existing data are sparse and general in nature. Typically, information is limited to existing aerial photography,

topographic maps, soils maps, and local knowledge. The information from these sources is invaluable, especially historical photography that can be used to determine changes in planform, land use changes, lateral migration, and some bed features such as point bars and central bars.

Additional data collection at these rural sites is usually limited, as the scale of the project will not justify large data collection expenses. If more data are needed than can be collected locally, the technical constraint may then be the lack of sufficient data to make a recommendation or to design a treatment. This constraint must be balanced with the experience and judgment of the designer, as it is unlikely that any project will have all the data the designer would like to have available.

Number of landowners—Another technical constraint enters when the scale of the project requirements exceeds the level of interest. In other words, effective treatment requires work on several properties and there is not the interest or the resources available to implement a solution. The technical decision will then quickly be reduced to answering questions about long- and short-term feasibility and risks. Questions to be asked include:

- Is there a treatment that can be effectively applied within the scope of the project area?
- Would the proposed solution have negative impacts on stream stability on a larger scale?
- Will the effect of upstream or downstream instability threaten the implementation or planned life of the treatment?

If these questions cannot be answered satisfactorily, the treatment is not technically sound and should not be implemented.

Experienced designer(s)—The lack of sufficient data and the lack of justification to devote resources to data collection make experience and professional judgment extremely critical in these rural settings. It becomes essential that the designer investigating these sites has the knowledge, time, and experience to gather basic field information and make sound observations of stream characteristics and behavior both at the site, as well as upstream and downstream, for a considerable distance, before making any treatment recommendation. The investigation must be thorough enough to make sound judgments about the stage of channel evolution in the project reach, sediment transport efficiency, bed-load transport capability, bank materials, presence of geotechnical concerns, planform geometry, geomorphic bankfull dimensions, and incision. Local data are not widespread in the form of reference reach data or localized regional curve information to determine the normal or expected size, shape, and slope of a stable channel in the local physiohydrological region. Therefore, until and unless these resources are developed locally, the designer will need to rely on professional judgment to apply appropriate technical information from other regions and base recommendations on experience gained from similar applications.

Availability of materials, equipment, and labor—For any solution to be implemented, it must be feasible to construct with materials and equipment readily available. Many stream restoration projects are in areas where access is difficult. These types of questions should be asked before finalizing a recommendation:

- Is there access for the necessary equipment to get to the site?
- Is there room for the equipment to operate safely at the site?
- Is the right kind of equipment available locally?
- Will construction be done from the land or bank side or the streamside?
- What kind of environmental damage is likely?
- Will there be damage to roads, lawns, or fences that must be considered?
- Is there access to get materials to the site?
- Are required materials readily available?
- Will access be available for repair or maintenance?
- Are skilled and experienced contractors available?
- Is the labor pool locally restricted during the time of installation?
- Are volunteers available, and can they perform the work?

(b) Nontechnical constraints

Costs—Economic constraints are often the most obvious constraints. In rural areas, the cost may easily exceed the value of the resource to be protected. In many circumstances, protecting rural land may not have a favorable cost/benefit analysis unless other factors, such as improvement to water quality, aesthetics, and habitat enhancements, make the project viable. Landowners may not value these secondary benefits enough to make the project economically attractive. Therefore, a large portion of rural projects often include protection of roads, bridges, utilities, and access points. For this reason, some areas or projects may qualify for financial assistance from Federal, state, or local funding sources to provide landowners an incentive to apply stream restoration practices that would not be economically feasible if the landowner were to bear all costs.

Regulations—Regulatory constraints may also impact the project design and feasibility. All projects are subject to review by regulatory authorities under Section 404 of the Clean Water Act (33 U.S.C. 1344), Section 10 of the Rivers and Harbors Act (33 U.S.C. 403), State Section 401 Water Quality Certification, and Section 106 of the National Historic Preservation Act. Most areas also have state and local regulations that must be met. Become familiar with all the regulatory guidelines in your project area before completing final designs to be submitted to permitting agencies. NEH 654.17 provides additional information and consideration regarding permitting requirements.

Aesthetics—Aesthetic or societal constraints may also affect planning in rural settings, although usually to a lesser degree than in an urban project. By addressing the root cause of the identified problem, the stream segment can be stabilized, and the damage caused by previous erosion or construction activities will be restored through natural regeneration. In settings and locations where natural regeneration is permissible, substantial cost savings can make a project economically viable. In areas with adequate seed supply and fertile soils, sites can naturally revegetate during the first growing season. Figure 2–16 shows a project site on Kickapoo Creek in Illinois, where the banks were revegetated naturally. Some locations will require the restoration of all disturbed or eroded areas with vegetation due to aesthetic, societal, or regulatory requirements.

654.0210 Risk, consequences, and uncertainty

Evaluating risk, consequences, and uncertainty help designers and stakeholders make decisions on what design choices to make. Such measures of probability are described in many texts and handbooks (Fripp, Fripp, and Fripp 2003). Risk is the probability of some event happening. Uncertainty describes the level of error in estimates of risk and consequences. Examples of these are:

- *Risk*—There is a 50 percent chance a 2-year storm will occur each year.
- *Consequences*—If the 2-year storm occurs, the following series of consequences could happen:
  - The streambank could erode 5 feet.
  - Part of a state highway will slide into the river.
  - Motorists could be killed and highway repairs would be expensive.
- *Uncertainty*—Tools to predict the discharge and velocities from various frequency storms are commonly used. Given a certain frequency storm, present tools to evaluate the certainty of the bank eroding with resultant damages are not that accurate or precise.

The analysis of both short- and long-term benefits must consider the risk factor of the proposed treatment alternative. The concept of risk is mentioned here because of its relevance in defining realistic goals for stream restoration.

In rural settings, the risk factor is normally somewhat lower than in an urban setting. If the stream restoration project fails, the consequences are often much greater in a heavily developed area than in an undeveloped area. At the same time, a rural setting can have a high risk factor when infrastructure, such as roads, bridges and buildings, is involved. Generally, the more risk involved in a potential failure, the more caution should be taken in the recommendation and design. This risk assessment should always be considered and discussed with the landowner so that all parties are aware of the level of risk taken. In a low-risk location where only moderate damage may occur, many

Figure 2–16 Project site where banks were vegetated naturally (Kickapoo Creek, IL)

(a) December 2000—lateral bank affecting adjacent cropland

(b) April, 2001—5 months after installation of stream barbs. No shaping or seeding of banks was included in project. Eroding banks will be allowed to vegetate naturally.

(c) September 2001—10 months after installation of stream barbs. Eroding banks have sloughed to stable angle and revegetated.

landowners are willing to accept possible damage that would need some repair, rather than accept substantial cost increases to lower the potential damage. As the riparian corridor matures, a well-designed stream restoration project becomes more stable over time. The greatest risk of damage normally occurs in the period immediately after installation.

More often than not, as a result of increased infrastructure, as well as compromised ecosystem health, the risks of action or inaction tend to be higher in a developed watershed than in a rural watershed. The risks associated with any one particular project vary based on the scope and scale of the subject stream reach and watershed. Although the risks associated with stream restoration are often interrelated, they can be related to the objectives for the social and biological communities.

Different approaches to achieving a given objective may involve varying degrees of risk to public safety, natural resources, property, or infrastructure. They may also offer varying certainties for success. These risks and the probability for success must be weighed against other project considerations when selecting and prioritizing projects. Table 2–4 shows an interpreted range of qualified risks for selected instream treatment techniques.

In any stream project, the "do nothing" alternative should be evaluated. This is also referred to as the "future without action" alternative. However, even this apparently simple approach should not be considered casually. Allowing an unstable condition to continue can have significant detrimental consequences from both a physical, as well as an ecological perspective.

Table 2–4 Potential range of qualified risks for selected instream treatment techniques*

Technique	Risk to habitat	Risk of channel change	Risk to infrastructure, property, or public safety	Uncertainty of technique	Probability of success
Boulder clusters	Low	Low to moderate	Low	High	Moderate
Channel modification	High	High	Low to high	High	Low to high
Drop structures	Low to moderate	Moderate	Low to high	Low	Moderate to high
Fish passage restoration	Low to high	Low	Low to moderate	Low	High
Instream sediment detention basins	Moderate to high	Low to moderate	Moderate to high	High	Low to high
Large wood and logjams	Low	Moderate	Moderate to high	Moderate to high	Moderate
Side channel/off-channel habitat restoration	Low	Low to moderate	Low	Low	High

* Derived from Stream Habitat Restoration Guidelines, September 2004; Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and Washington Department of Ecology: *http://wdfw.wa.gov/hab/ahg/shrg/*

654.0211 Conclusion

The accurate identification and prioritization of the issues and interests of the land user or community is crucial in planning and designing a stream restoration project. Objectives or goals that are preconceived or defined unilaterally for a restoration project often result in failed projects or projects that do not perform properly or meet expectations. Detailed designs, based on poorly formulated goals and objectives, will not normally meet expectations of the restoration. Time and resources should only be expended on detailed designs if the objectives are specific, realistic, achievable, and measurable.

Objectives of a restoration should be as specific as possible, with the resulting conditions clearly described in terms that stakeholders understand. Improving the environment would be a poorly stated objective, without any other description of what will be different with the project in place.

Objectives should be realistic and achievable. Early optimism during project planning should be tempered by what can actually be done. For example, restoration of a cold-water fishery in a stream that has been severely altered by urbanization and watershed changes may not be achievable, even though it is a noble goal. The temperature regime of the stream, both before and after restoration, should be thoroughly understood. Another example might be the desire to restore a stream to an historical condition, but the current watershed conditions differ significantly. It may not be possible to restore all of those historical functions and values to the system, but a few could actually be restored.

Objectives should be measurable. Subjective goals, such as improve water quality, may seem to be good, but should be further refined to state exactly what changes in water quality parameters are the desired outcomes of the restoration. Monitoring of the before and after conditions will reveal exactly how much change has been achieved or to what degree the desired functions and values have been restored to the stream.

The selection of goals and objectives must take into consideration the risk associated with the current, as well as the proposed project condition. This risk must be evaluated from both an ecologic, as well as a life and property prospective. In addition to the risk of the project, the uncertainty associated with the design approach and the probability of success should be taken into account. The evaluation of risk and uncertainty may force a revision of the goals and objectives.

The restoration design should include a balanced approach between structural and management elements. For example, stabilizing streambanks should include not only bank stabilization practices, but also riparian practices to manage cattle crossing (fencing), access to water (designed stream crossing), and grazing management. The final plan and design for the restoration should consider ways to meet the goals and objectives of the stakeholder(s), as well as to benefit or improve water quality, fish habitat, and riparian habitat.