

National Management Measures to Control Nonpoint Source Pollution from Hydromodification

Additional Resources

Full document available at
<http://www.epa.gov/owow/nps/hydromod/index.htm>

Additional Resources

The following are additional resources that may be used to obtain supplementary information for topics presented in this document.

Background on Streams, Restoration, and Hydrology

The following are basic references regarding stream ecology, restoration, and hydrology:

Allan, J.D. 1995. *Stream Ecology—Structure and Function of Running Waters*. Chapman and Hall, New York.

Brookes, A. and F.D. Shields, eds. 1999. *River Channel Restoration: Guiding Principles for Sustainable Projects*. John Wiley and Sons, Chichester, U.K.

Cooke, G.D., E.B. Welch, S.A. Peterson, and P.R. Newroth. 1993. *Restoration and Management of Lakes and Reservoirs*. 2nd ed. Lewis Publishers, Boca Raton, FL.

Fischenich, C. 2000. *Glossary of Stream Restoration Terms*.
<http://el.erdc.usace.army.mil/elpubs/pdf/sr01.pdf>. Accessed October 2004.

Gordon, N.D., T.A. McMahon, and B.L. Finlayson. 1992. *Stream Hydrology: An Introduction for Ecologists*. John Wiley and Sons, Chichester, U.K.

Kondolf, G.M. 1995. Five elements for effective evaluation of stream restoration. *Restoration Ecology* 3(2):133-136.

Kondolf, G.M., and E.R. Micheli. 1995. Evaluating stream restoration projects. *Environmental Management* 19(1):1-15.

National Research Council (NRC). 1992. *Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy*. National Academy Press, Washington, DC.

Poff, N., J.D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegard, B.D. Richter, R.E. Sparks, and J.C. Stromberg. 1997. The natural flow regime: A paradigm for river conservation and restoration. *BioScience* 47:769-784.

Ponce, V.M. 1989. *Engineering Hydrology: Principles and Practices*. Prentice-Hall, Englewood Cliffs, New Jersey.

Rosgen, D.L. 1996. *Applied River Morphology*. Wildland Hydrology, Colorado.

USEPA. 1995. *Ecological Restoration: A Tool to Manage Stream Quality*. EPA 841-F-95-007, U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC. <http://www.epa.gov/owow/nps/Ecology>.

Detailed Information for Practices to Achieve Management Measures

Additional information about practices, their effectiveness, limitations, and cost estimates are available from a number of sources, including:

Allen, H.H. and J.R. Leech. 1997. *Bioengineering for Streambank Erosion Control: Report 1 Guidelines*. U.S. Army Corps of Engineers, Environmental Impact Research Program, Technical Report EL-97-8. <http://el.erdc.usace.army.mil/elpubs/pdf/trel97-8.pdf>.

American Society of Civil Engineers and the U.S. Environmental Protection Agency (ASCE and USEPA). 2007. *International Stormwater Best Management Practices (BMPs) Database*. <http://www.bmpdatabase.org>.

Center for Watershed Protection (CWP). 2007. *The Stormwater Manager's Resource Center*. <http://www.stormwatercenter.net>.

Federal Interagency Stream Restoration Working Group (FISRWG). 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. http://www.nrcs.usda.gov/technical/stream_restoration.

Fischenich, J. C. and H. Allen. 2000. *Stream Management*. ERDC/EL SR-W-00-1, U.S. Army Engineer Research and Development Center, Vicksburg, MS. <http://el.erdc.usace.army.mil/elpubs/pdf/srw00-1/srw00-1.pdf>. Accessed October 2004.

Knutson, P.L., and M.R. Inskeep. 1982. *Shore Erosion Control with Salt Marsh Vegetation*. Coastal Engineering Technical Aid No. 82-3. U.S. Army Corps of Engineers Coastal Engineering Research Center, Vicksburg, MS.

National Association of Home Builders (NAHB). 1995. *Storm Water Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers*. National Association of Home Builders, Washington, DC. <http://www.nahbrc.org>.

Oregon Association of Conservation Districts. 1999. *Protecting Streambanks from Erosion: Tips for Small Acreages in Oregon*. <http://www.or.nrcs.usda.gov/news/factsheets/fs4.pdf>.

Urban Drainage and Flood Control District. 1999. *Urban Storm Drainage Criteria Manual: Volume 3—Best Management Practices*. Urban Drainage and Flood Control District, Denver, CO. <http://www.udfcd.org>.

U.S. Army Corps of Engineers (USACE). 2007. *Engineer Research and Development Center (ERDC) Web site*. <http://www.erdc.usace.army.mil>.

U.S. Department of Agriculture, Forest Service (USDA-FS). 2002. *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*. <http://www.fs.fed.us/publications/soil-bio-guide>.

U.S. Environmental Protection Agency (USEPA). 2002. *Development Document for Proposed Effluent Guidelines and Standards for the Construction and Development Category*. EPA-821-R-02-007. <http://www.epa.gov/waterscience/guide/construction/devdoc.htm>.

U.S. Environmental Protection Agency (USEPA). 2007. *National Menu of Stormwater Best Management Practices*. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm>.

Additional information about hydromodification, soil bioengineering, and restoration is available from the following:

Ann Riley, Urban Stream Restoration: A Video Tour of Ecological Restoration Techniques (<http://www.noltemedia.com/nm/urbanstream>): This video, which can be ordered online, is a documentary tour of six urban stream restoration sites. It provides background information on funding, community involvement, and the history and principles of restoration. The demonstration includes examples of stream restoration in very urbanized areas, re-creating stream shapes and meanders, creek daylighting, soil bioengineering, and ecological flood control projects. Ann Riley, a nationally known hydrologist, stream restoration professional, and executive director of the Waterways Restoration Institute in Berkley, California, leads the tour.

California Forest Stewardship Program. Bioengineering to Control Streambank Erosion (<http://ceres.ca.gov/foreststeward/html/bioengineering.html>): This fact sheet discusses various bioengineering techniques applicable to California streams.

Lower American River Corridor River Management Plan (<http://www.safca.com>): The plan provides information on aquatic habitat management goals, including restoration to improve aquatic habitat impaired by low flows from channel modification of the Lower American River.

Natural Resources Conservation Service, Watershed Technology Electronic Catalog (<http://www.wcc.nrcs.usda.gov/wtec/wtec.html>): This online catalog is a source of technical guidance on a variety of restoration techniques and management practices, to provide direction for watershed managers and restoration practitioners. The site is focused on providing images and conceptual diagrams.

North Delta Improvements Project (<http://ndelta.water.ca.gov/index.html>): The North Delta Improvements Project (NDIP), which is under the California Department of Water Resources, presents unique opportunities for synergy in achieving flood control and ecosystem restoration goals.

Ohio Department of Natural Resources. Stream Management Guide Fact Sheets (http://www.dnr.state.oh.us/water/pubs/fs_st/streamfs.htm): This is a compilation of fact sheets offering technical guidance for streambank and instream practices, general stream management, and stream processes.

Sacramento River Riparian Habitat Program (<http://www.sacramentoriver.ca.gov>): The Sacramento River Riparian Habitat Program is working to ensure that riparian habitat management along the river addresses the dynamics of the riparian ecosystem and the reality of the local agricultural economy.

Schueler, T. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs*. Metropolitan Washington Council of Governments, Washington, DC.

South Delta Improvements Program (http://baydeltaoffice.water.ca.gov/sdb/sdip/index_sdip.cfm): The purpose of the South Delta Improvements Program (SDIP) is to incrementally maximize diversion capability into Clifton Court Forebay, while providing an adequate water supply for diverters within the South Delta Water Agency and reducing the effects of State Water Project exports on both aquatic resources and direct losses of fish in the South Delta.

South Sacramento County Streams Project (<http://www.spk.usace.army.mil>): South Sacramento County Streams Project provides flood damage reduction to the urban areas of the Morrison Creek and Beach Stone Lake drainage basins in the southern area of Sacramento, as well as around the Sacramento Regional Waste Water Treatment Plant. The project will fund stream restoration in southern Sacramento County.

USDA Natural Resources Conservation Service, Stream Visual Assessment Protocol (<http://www.nrcs.usda.gov/technical/ECS/aquatic/svapfnl.pdf>): This document outlines methods for field conservationists and landowners to evaluate stream ecological conditions.

Washington State Department of Transportation, Soil Bioengineering Web site (<http://www.wsdot.wa.gov/eesc/design/roadside/sb.htm>): This is a comprehensive Web site, with information on cost, specifications for project design, funding, and case studies.

WATERSHEDSS: Water, Soil and Hydro-Environmental Decision Support System (<http://www.water.ncsu.edu/watershedss>): The “Educational Component” of this Web site contains fact sheets with information on a variety of techniques for management practices, including soil bioengineering and structural streambank stabilization.

Resources for Dams

Thornton, K.W., B.L. Kimmel, and F.E. Payne, eds. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley and Sons, Inc., New York, NY.

U.S. Army Corps of Engineers. No date. *The WES Handbook on Water Quality Enhancement Techniques for Reservoirs and Tailwaters*. U.S. Army Engineer Research and Development Center Waterways Experiment Station, Vicksburg, MS.

Web sites for dam removal include the following:

American Rivers' Rivers Unplugged Program:

http://www.americanrivers.org/site/PageServer?pagename=AMR_content_1270

Association of State Dam Safety Officials: <http://www.damsafety.org>

Friends of the Earth's River Restoration:

<http://www.foe.org/camps/reg/nw/river/index.html>

International River Network's River Revival Program: <http://www.irm.org/revival/decom>

Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement River Restore Program:

<http://www.mass.gov/dfwele/river/programs/riverrestore/riverrestore.htm>

National Performance of Dams Program Stanford University:

<http://www.stanford.edu/group/strgeo/researchcenters.html>

New Hampshire Department of Environmental Services:

<http://www.des.state.nh.us/dam.htm>

Pennsylvania Department of Environmental Protection, Division of Dam Safety, Dam Safety Program:

<http://www.dep.state.pa.us/dep/deputate/watermgt/we/damprogram/Main.htm>

Pennsylvania Fish & Boat Commission: <http://www.fish.state.pa.us>

River Recovery—Restoring Rivers through Dam Decommissioning:

<http://www.recovery.bcit.ca/index.html>

United States Society on Dams: <http://www.usdams.org>

Wisconsin Department of Natural Resources:

<http://www.dnr.state.wi.us/org/water/wm/dsfm/dams/removal.html>

Additional information about dam removal is available from the following resources:

ASCE. 1997. *Guidelines for the Retirement of Hydroelectric Facilities*. American Society of Civil Engineers.

Bednarek, A.T. 2001. Undamming rivers: A review of the ecological impacts of dam removal. *Environmental Management* 27(6):803-814.

Bioscience. 2002. Dam removal and river restoration: Linking scientific, socioeconomic, and legal perspectives. Summer (special issue).

Born, S.M., et al. 1998. Socioeconomic and institutional dimensions of dam removals: The Wisconsin experience. *Environmental Management* 22(3):359-370.

Hart, D.D. and N.L. Poff. 2002. A special section on dam removal and river restoration. *BioScience* 52:653-655.

Heinz Center. 2002. *Dam Removal: Science and Decision Making*. Available at: http://www.heinzctr.org/Programs/SOCW/dam_removal.htm.

International Rivers Network: <http://www.irn.org/pubs/wrr>.

Niemi, G.J., et al. 1990. Overview of case studies on recovery of aquatic systems from disturbance. *Environmental Management* 14(5):571-587.

United States Society on Dams Publications: <http://www.ussdams.org/pubs.html>.

University of Wisconsin-Madison/Extension. 1996. *The Removal of Small Dams: An Institutional Analysis of the Wisconsin Experience*. Extension Report 96-1, May. Department of Urban and Regional Planning.

Wisconsin Department of Natural Resources Projects:

<http://www.dnr.state.wi.us/org/gmu/sidebar/iem/lowerwis/index.htm#baraboo> or

<http://www.dnr.state.wi.us/org/gmu/lowerwis/baraboo.htm>;

<http://www.dnr.state.wi.us/org/gmu/sidebar/iem/milw/index.htm>;

<http://www.dnr.state.wi.us/org/gmu/sidebar/iem/superior/index.htm>;

<http://www.dnr.state.wi.us/org/gmu/sidebar/iem/sheboygan/index.htm>

Noneroding Roadways

The following sources may be used to obtain additional information on noneroding roadways:

Controlling Nonpoint Source Runoff Pollution from Roads, Highways, and Bridges

<http://www.epa.gov/owow/nps/roads.html>

Erosion, Sediment, and Runoff Control for Roads and Highways

<http://www.epa.gov/owow/nps/education/runoff.html>

Gravel Roads: Maintenance and Design Manual—the purpose of the manual is to provide clear and helpful information for doing a better job of maintaining gravel roads. The manual is designed for the benefit of elected officials, managers, and grader operators who are responsible for designing and maintaining gravel roads.

<http://www.epa.gov/owow/nps/gravelroads>

Low-Volume Roads Engineering Best Management Practices Field Guide

<http://zietlow.com/manual/gk1/web.doc>

Massachusetts Unpaved Roads BMP Manual

http://berkshireplanning.org/4/download/dirt_roads.pdf

Planning Considerations for Roads, Highways, and Bridges

<http://www.epa.gov/owow/nps/education/planroad.html>

Pollution Control Programs for Roads, Highways, and Bridges

<http://www.epa.gov/owow/nps/education/control.html>

Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads <http://www.epa.gov/owow/nps/unpavedroads.html>

The “Road Maintenance Video Set” is a five-part video series developed for USDA Forest Service equipment operators that focuses on environmentally sensitive ways of maintaining low volume roads. http://www.epa.gov/owow/nps/maint_videoset.html

Additional Information

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish*, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. <http://www.epa.gov/owow/monitoring/rbp/> Accessed July 2007.

International Commission on Large Dams
<http://www.icold-cigb.org>

International Rivers Network
<http://www.irn.org>

U.S. Army Corps of Engineers, Engineer Research and Development Center
<http://www.ercd.usace.army.mil>

U.S. Department of Agriculture, Farm Service Agency
<http://www.fsa.usda.gov/pas>

U.S. Department of Agriculture, Natural Resources Conservation Service
<http://www.nrcs.usda.gov>

U.S. Department of the Interior, Bureau of Reclamation
<http://www.usbr.gov>

U.S. Department of the Interior, National Park Service
<http://www.nps.gov>

U.S. Department of the Interior, U.S. Fish and Wildlife Service
<http://www.fws.gov>

U.S. Department of the Interior, U.S. Geological Survey
<http://www.usgs.gov>

USEPA. 1994. *A State and Local Government Guide to Environmental Program Funding Alternatives*. EPA 841-K-94-001. <http://www.epa.gov/owow/nps/MMGI/funding.html>

USEPA. 1994. *A Tribal Guide to the Section 319(h) Nonpoint Source Grant Program*. EPA 841-S-94-003.

USEPA. 1994. *Section 319 Success Stories: Volume I*. EPA 841-S-94-004.
<http://www.epa.gov/owow/nps/Success319>

USEPA. *Catalog of Federal Funding Sources for Watershed Protection*
<http://cfpub.epa.gov/fedfund>

USEPA. 1997. *Section 319 Success Stories: Volume II—Highlights of State and Tribal Nonpoint Source Programs*. EPA 841-R-97-001.

<http://www.epa.gov/owow/nps/Section319II>

USEPA. 2002. *Section 319 Success Stories: Volume III*.

<http://www.epa.gov/owow/nps/Section319III>

USEPA Clean Lakes Program

<http://www.epa.gov/owow/lakes/cllkspgm.html>

USEPA Environmental Finance Information Network (EFIN)

<http://www.epa.gov/efinpage/efin.htm>

USEPA Nonpoint Source Pollution Control Program Homepage

<http://www.epa.gov/OWOW/NPS>

USEPA Surf Your Watershed

<http://www.epa.gov/surf>

USEPA Watershed Academy

<http://www.epa.gov/owow/watershed/wacademy>

Watershedss, (Water, Soil, and HydroEnvironmental Decision Support System)—North Carolina State University

<http://www.water.ncsu.edu/watershedss>