

# Natural Channel Design

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Log vane after a growing season; toe wood structures on stream bank; large woody debris-covered logs.<sup>1</sup>

<b>DESCRIPTION</b>	Applies the principles of stream geomorphology to maintain a state of dynamic equilibrium among water, sediment and vegetation that creates a stable channel connected to a floodplain.		
<b>HOW DOES IT MITIGATE FLOOD RISK?</b>	<ul style="list-style-type: none"> <li>+ <b>Flood attenuation:</b> The reduction in peak discharge of a flood by temporary storage of water or the slowing of channel flows.</li> <li>+ <b>Improved river/floodplain capacity and storage:</b> The holding of floodwaters during a flood which are then gradually released.</li> </ul>		
<b>WHAT OTHER BENEFITS DOES IT PROVIDE?</b>	<ul style="list-style-type: none"> <li>+ <b>Habitat restoration/enhancement:</b> Changing the physical, chemical or biological characteristics of a site with the goal of returning or improving the natural functions to the lost or degraded native habitat.</li> <li>+ <b>Improved water quality:</b> Increasing suitability of water for a particular use based on selected physical, chemical and biological characteristics.</li> </ul>		
<b>SCALABILITY</b>	Cumulative effects require coordinated planning.		
Advantages Relative to Traditional Flood Management		Potential Barriers or Issues Relative to Traditional Flood Management	Potential Synergies with other NBS
<ul style="list-style-type: none"> <li>+ Low maintenance once vegetation is established.</li> <li>+ Passive operation.</li> </ul>		<ul style="list-style-type: none"> <li>+ Challenges of incorporating the full array of ecosystem benefits into cost-effectiveness calculations.</li> <li>+ Societal expectations that natural channels must be altered by clearing, snagging, dredging or channelization to maximize their flood risk benefits are at odds with scientific understanding of rivers as dynamic, spatially heterogeneous, nonlinear ecosystems.</li> <li>+ Lack of state and local expertise, capacity and availability of technical resources.</li> </ul>	<ul style="list-style-type: none"> <li>+ Riparian Vegetation Restoration.</li> <li>+ Environmental Flows.</li> </ul>

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RESOURCES	
EVALUATION TOOLS	DESIGN SUPPORT
<ul style="list-style-type: none"> <li>+ <b>National Stormwater Calculator:</b> <a href="https://www.epa.gov/water-research/national-stormwater-calculator">https://www.epa.gov/water-research/national-stormwater-calculator</a></li> <li>+ <b>USACE Ecosystem Restoration Model Library:</b> <a href="https://cw-environment.erdc.dren.mil/model-library/cfm?CoP=Restore&amp;Option=Search&amp;Type=Restore&amp;Id=ALL">https://cw-environment.erdc.dren.mil/model-library/cfm?CoP=Restore&amp;Option=Search&amp;Type=Restore&amp;Id=ALL</a></li> <li>+ <b>INVEST Habitat Quality:</b> <a href="http://releases.naturalcapitalproject.org/invest-userguide/latest/urban_flood_mitigation.html">http://releases.naturalcapitalproject.org/invest-userguide/latest/urban_flood_mitigation.html</a></li> <li>+ <b>Automated Geospatial Watershed Assessment (AGWA) Tool:</b> <a href="https://www.epa.gov/water-research/automated-geospatial-watershed-assessment-agwa-tool">https://www.epa.gov/water-research/automated-geospatial-watershed-assessment-agwa-tool</a></li> </ul>	<ul style="list-style-type: none"> <li>+ Harman, W., R. Starr. 2011. <i>Natural Channel Design Review Checklist</i>. US Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD and US. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Wetlands Division. Washington, D.C. EPA 843-B-12-005</li> <li>+ W. H. Harman, K.L. Tweedy, W.S. Hunt, J. Calmbacher, T. Norton, K. Van Stell, and C.H. Kaiser. 2012. <i>Natural Channel Design Protocol, v1</i>. San Antonio River Authority, San Antonio, TX</li> </ul>
CASE STUDIES	<ul style="list-style-type: none"> <li>+ <b>Phillips Creek:</b> <a href="https://www.deltaland-services.com/interactive-map/">https://www.deltaland-services.com/interactive-map/</a></li> <li>+ <b>Cypress Creek in Houston:</b> <a href="https://www.biohabitats.com/project/cypress-creek-restoration/">https://www.biohabitats.com/project/cypress-creek-restoration/</a></li> </ul>

1 From: W. H. Harman, K.L. Tweedy, W.S. Hunt, J. Calmbacher, T. Norton, K. Van Stell, and C.H. Kaiser. 2012. *Natural Channel Design Protocol, v1*. San Antonio River Authority, San Antonio, TX