

## **TOOLS AND SCIENCE BASE FOR EVALUATING STREAM ENGINEERING, MANAGEMENT, AND RESTORATION PROPOSALS.**

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### **Abstract**

Stream management projects have damaged many aquatic ecosystems important to the survival of listed species. Many management schemes did not accommodate the physical processes in their setting, and require repeated interventions for stability. Stream stabilization, restoration, or enhancement projects typically employ site-specific designs. Also, site-scale habitat improvement projects have become the default solution to many habitat deficiencies, problems and constraints. Whether for river management such as stabilization, or habitat enhancement, site-scale projects are often planned and implemented without consideration of their geomorphic fitness, or the broader scale problems that may be contributing to habitat degradation, project resiliency to flood events, accounting for possible changes in climate or watershed land-use, or ensuring the long term function and sustainability of the project.

To address these issues, NOAA Fisheries and USFWS collaboratively commissioned research in 2008-09 to develop a *Science Document* and accompanying tools to support more consistent and comprehensive reviews of stream management and restoration proposals. The *Science Document* synthesizes the body of knowledge in fluvial geomorphology and river management, and presents it in a way that is accessible to the Services staff biologists, who are typically not experts in fluvial geomorphology and river management. Accompanying the *Science Document* are three tools: (1) a *Risk Matrix* that relatively ranks risks due to project and risks due to stream response potential; (2) a *Project Information Checklist* to assist in evaluating whether a proposal includes all the information necessary to allow critical and thorough project evaluation; and (3) a project evaluation tool named *RiverRAT* that guides reviewers through the steps necessary to critically evaluate the quality of the information submitted, the goals and objectives of the project, project planning and development, project design, geomorphic-habitat-species relevance, and risks to listed species. The tools and supporting *Science Document* are publically available at [www.restorationreview.com](http://www.restorationreview.com). Training materials in the use of the tools have also been developed, and training has been given in several field centers to Services staff and interagency partners.

The longer term goals of this effort include: enabling consistent, comprehensive, transparent, and documented reviews that are completed in a timely fashion by

regulators; facilitating improved project planning and design by proponents; encouraging projects that are attuned to their watershed and geomorphic contexts; questioning perceived constraints on project design and encouraging alternatives analysis; reducing the use of hard structures and encouraging deformability; encouraging designs that address both risk and uncertainty in applying engineering design standards; allowing for future climate and land use changes; and encouraging post-project monitoring, appraisal and project aftercare.