

Environmental Decision Support Toolkit: Science-Based Tools for Hydropower Stakeholder Collaboration



Background

Most privately owned hydropower facilities must obtain a license from the Federal Energy Regulatory Commission (FERC). This process can take five to seven years and is stakeholder driven. Early in the licensing process, stakeholders, tribes, and state and federal agencies work together to determine a project's environmental impacts and whether additional studies or mitigation will be needed. Hydropower stakeholders have identified this part of the licensing process as one of the most challenging since the diversity of priorities and perspectives among participants can lead to communication breakdowns and delays.¹ The Environmental Decision Support (EDS) project was launched in 2016 to develop a set of science-based tools that can help address these challenges.

Objectives

The EDS Toolkit is designed to:

- **Characterize and summarize** the best-available science for use by diverse hydropower stakeholders seeking to better understand potential hydropower project impacts on the riverine ecosystem.
- **Provide transparent and consistent methodology** for identifying and discussing potential environmental impacts during hydropower licensing negotiations.
- **Point users toward key river function indicators of concern** to reduce the time and cost of hydropower licensing negotiations and promote greater certainty in federal authorization processes for hydropower development and relicensing.

A River Function Indicator (RFI) represents a group of environmental metrics used to determine whether an ecological function of the river could be impacted by the proposed hydropower project.

EDS Toolkit Contents

Datasets:

- Database of 3000+ environmental metrics related to riverine ecosystems discovered through literature review: <https://hydrosourc.ornl.gov/dataset/environmental-metrics-hydropower-database>
- FERC Licensing Proceeding Environmental Study Life Cycle: <https://hydrosourc.ornl.gov/dataset/ferc-licensing-proceeding-environmental-study-life-cycle>
- Database of studies requested, modified, rejected, and approved by FERC for 29 hydropower projects: <https://hydrosourc.ornl.gov/dataset/ferc-licensing-proceeding-environmental-study-determination-letter>

Publications:

- Parish ES, Pracheil BM, McManamay RA, Curd SL, DeRolph C, Smith B (2019) Review of environmental metrics used across multiple sectors and geographies to evaluate the effects of hydropower development. *Applied Energy* 238:101-118. <https://doi.org/10.1016/j.apenergy.2019.01.038>
- Pracheil B, McManamay R, Parish E, Curd S, Smith B, DeRolph C, Witt A, Ames S, Day MB, Graf W, Infante D, McCoskey D, Rugani K, Vezina C, Welch T, West A (2019) A Checklist of River Function Indicators for hydropower ecological assessment. *Science of The Total Environment* 687: 1245-1260. <https://doi.org/10.1016/j.scitotenv.2019.06.049>
- McManamay RA, Pracheil BM, Curd SL, Smith BT, Parish E, Witt A, West A, Rugani K, DeRolph CR, Day MB (2019) Instruction Manual: River Function Questionnaire (v1). Oak Ridge National Laboratory. ORNL/TM-2019/1184. <https://info.ornl.gov/sites/publications/Files/Pub126248.pdf>
- Aldrovandi M, Parish ES, Pracheil BM (2021) Understanding the Environmental Study Life Cycle in the United States Hydropower Licensing and Federal Authorization Process. *Energies* 14: 3435. <https://doi.org/10.3390/en14123435>
- Levine A, Pracheil B, Curtis T, Smith L, Cruce J, Aldrovandi M, Brelsford C, Buchanan H, Fekete E, Parish E, Uria-Martinez R, Johnson M, Singh D (2021). An Examination of the Hydropower Licensing and Federal Authorization Process. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-79242. <https://www.nrel.gov/docs/fy22osti/79242.pdf>.

River Function Indicator Questionnaire

The centerpiece of the EDS Toolkit is an online, interactive, and science-based River Function Indicator (RFI) Questionnaire (v5) that provides stakeholders with a systematic and transparent method for identifying the potential environmental impacts of a hydropower project. Each RFI represents a group of environmental metrics used to measure an important characteristic of the river's ecosystem. The RFI Questionnaire is accompanied by a User Guide, training video, and recording of a January 2022 DOE Deep Dive webinar.

The RFI Questionnaire can be applied to multiple types of hydropower projects, including conventional projects, relicenses, and the addition of hydropower to existing non-powered dams. The RFI Questionnaire does not consider recreational, cultural, or other nonenvironmental impacts, nor does it recommend specific measures.

However, the tool points users to project-specific environmental effects that should be discussed and provides suggestions for additional resources that may help to identify study methods and protection, mitigation, and enhancement measures related to potential impacts. Given that the number of hydropower facilities needing to be relicensed is expected to double by 2030, this tool should be especially useful for hydropower stakeholders over the next decade.

How to Use the RFI Questionnaire

The graphic below outlines the suggested process for using the RFI Questionnaire to understand the potential environmental impacts of a hydropower project.

Access the RFI Questionnaire at rfiq.ornl.gov



*Can consult the [database of previous FERC-approved studies](#).

**Can consult the [database of previous mitigations](#).

Access the EDS Toolkit on DOE HydroSource at hydrosource.ornl.gov

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