USER GUIDE FOR THE

Hydropower Environmental Decision Support Toolkit



JANUARY 2026 | VERSION 7.2

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1. Introduction

The Hydropower Environmental Decision Support (EDS) Toolkit at hydroeds.ornl.gov has been developed by Oak Ridge National Laboratory (ORNL) through the support of the U.S. Department of Energy Water Power Technologies Office (WPTO) and through collaboration with the National Laboratory of the Rockies (formerly known as NREL). The EDS Toolkit is designed to help focus discussions among interested parties engaged in hydropower project planning by providing a systematic and transparent platform for considering potential environmental impacts from the proposed hydropower project, be it a new project or the addition of hydropower to an existing nonpowered dam—including, but not limited to, Federal Energy Regulatory Commission (FERC) hydropower licensing proceedings. For existing dams, the EDS Toolkit focuses only on the environmental impacts created by the proposed hydropower addition. The current EDS Toolkit is not intended to address pumped storage or conduit projects.

The EDS Toolkit was developed to provide interested parties with a systematic and transparent process for identifying potential environmental impacts that might be caused by a hydropower project's construction and/or operations. (See Section 10 for a set of potential use cases from different stakeholder perspectives). The EDS Toolkit helps identify gaps and provides space for documenting existing relevant environmental datasets. The *Impacts* module of the EDS Toolkit was developed through an extensive review of environmental metrics which integrated the viewpoints of multiple interested parties and the scientific research community.

To use the EDS Toolkit, one should start with the *Impacts* module and work through the remaining menu items from left to right as shown in **Figure 1**. It will likely take you about 60-90 minutes to work through the *Impacts* module, although that time will vary based on the skip logic underlying the *Questionnaire*. Through a series of up to 87 questions, the *Questionnaire* will identify key functions of the riverine ecosystem, known as river function indicators (RFIs), that may be affected by a hydropower project's construction and/or operations. The *Results* can then be slimmed down to 3-5 *Key Topics* and *Uncertain Topics* for further investigation through use of the *Prioritization* modules.

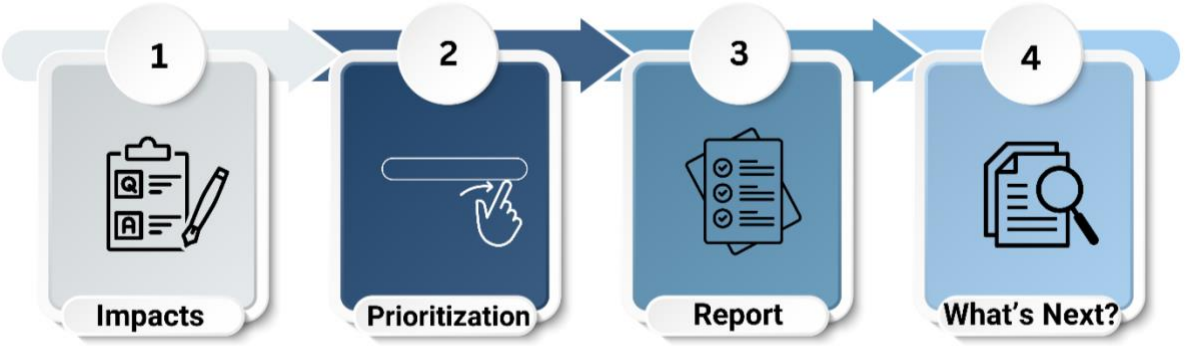


Figure 1. The four primary modules of the EDS Toolkit

Version 7 of the EDS Toolkit provides a *What's Next?* module to explore after identifying potential environmental impacts. Examples of previously implemented environmental studies and protection, mitigation, and enhancement (PME) measures from U.S. hydropower projects are linked to the retained *Key Topics* and *Uncertain Topics*. This module also connects the identified and retained RFIs to relevant information from DOE's Regulatory and Permitting Information Desktop (RAPID) Toolkit for Hydropower. Potential connections between the EDS Toolkit and the RAPID Toolkit are illustrated in **Figure 2**.

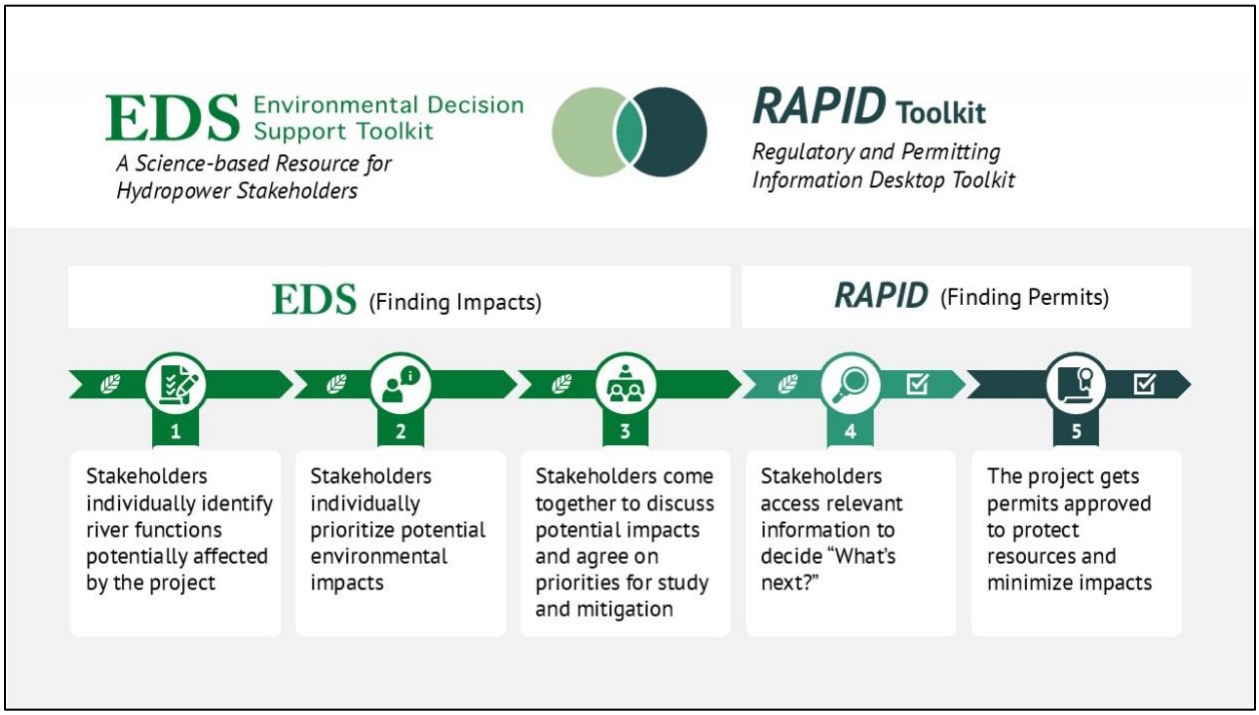


Figure 2. Steps for linking the EDS and RAPID Toolkits.

If you would like to explore the EDS Toolkit's capabilities before filling out the *Questionnaire* yourself, you may view a completed example version of the *Questionnaire* by downloading the "JoeTester" JSON file found on the EDS Toolkit's *Instructions* page within the *Impacts* module. Upload this set of answers into the Questionnaire by using the "Import/Export Answers" button.

Please note that while the information provided by the EDS Toolkit may be used as a resource during the study plan development phase of a FERC licensing proceeding, the EDS Toolkit does not recommend specific study methodologies or suggest any PME measures. Also note that the provided examples of PME measures resulted from license negotiations, including settlement agreements, specific to U.S. hydropower projects within different geographic contexts.

2. River Function Indicators

The EDS Toolkit is based on a set of river function indicators (RFIs) organized into six categories of potential environmental impacts defined in **Table 1**: Biology & Biota, Connectivity & Fragmentation, Geomorphology, Landscape, Water Quality, and Water Quantity. Each RFI represents a group of environmental metrics used to measure an important characteristic of an ecosystem. More information about the 42 RFIs may be found in Pracheil et al. 2019, and more information about the database of over 3000 environmental metrics for hydropower that was created and used to develop these RFIs may be found in Parish et al. 2019. The RFIs and the set of questions designed to "flag" these RFIs as potential environmental impacts were developed by integrating the viewpoints of a cross-sector of hydropower stakeholders and scientific researchers over six years (2016-2022). Names and descriptions of the 42 RFIs may be explored on the *Introduction* page of the EDS Toolkit.

Table 1. The six categories of river function indicators (RFIs) and their importance for understanding hydropower impacts (Parish et al. 2019)

Category of RFIs	Definition	Importance for understanding hydropower impacts
Biota & Biodiversity (BB)	Metrics related to the types of plant and animal species found in the watershed, as well as their absolute abundance and relative abundance to each other.	Shifts in aquatic, riparian and terrestrial populations and communities have been linked to several aspects of hydropower construction and operation, including decreased longitudinal connectivity and changes in flow velocities in rivers, inundation of uplands upstream of dams, changes in ground water depth both upstream and downstream of dams, and changes in sediment, flow, and temperature regimes. Accurate assessments of population and community changes reflect the overall health of the ecosystem.
Connectivity & Fragmentation (CF)	Metrics assessing the degree to which a particular land cover type or ecosystem maintains continuity (connectivity) or the degree to which an ecosystem or land cover type is disconnected (fragmentation).	Dams and their associated infrastructure can disrupt aquatic, riparian, and terrestrial connectivity, as well as groundwater connectivity, all of which can directly affect the habitat quantity and quality for organisms in an ecosystem. Quantifying connectivity changes is therefore important for a full accounting of the environmental effects of hydropower.

Category name	Definition	Importance for understanding hydropower impacts
Geomorphology (GM)	Metrics related to the dynamic evolution of topographic and bathymetric features created within an ecosystem.	Hydropower development can disrupt a river system's geomorphologic processes and equilibrium through altered sediment and flow regimes. These changes have the potential to impact the availability and quality of habitat for plants and animals within the system.
Hydrology (HD)	Metrics used to characterize the amount of water found within streams, reservoirs and/or groundwater aquifers as well as the flows between them.	Hydropower development can alter the hydrologic cycle through the impoundment of previously free-flowing water, increased evaporation rates, and altered groundwater recharge patterns. Because hydropower systems may be operated to fill a variety of purposes, changes to water quantity may occur at a variety of temporal scales. Changes to hydrologic regimes can ultimately affect human and wildlife populations through altered water availability and habitats.
Landscape (LC)	Metrics associated with characterizing the physical material at earth's surface pre- and post-hydropower development.	Land cover type is an important measure of ecosystem health because it influences many other environmental properties ranging from river and floodplain sedimentation rates to fragmentation of habitats and wildlife populations at multiple spatial scales. Land cover changes can be used to more-fully describe ecosystem changes associated with hydropower development, such as increases in wetted surface from reservoir formation, and fragmentation of the surrounding landscape through installation of supporting infrastructure (e.g., transmission lines, roads).
Water Quality (WQ)	Metrics related to water quality characteristics, including water temperature, dissolved oxygen levels, and nutrient and pollutant concentrations.	Water quality characteristics can be directly or indirectly affected by hydropower development and operation. Changes in water quality can adversely affect the health of humans and wildlife.

3. Before You Begin

To use the EDS Toolkit effectively, you will need:

1) a device (e.g., laptop, tablet, smart phone) with an Internet browser (Chrome works well),
2) familiarity with the hydropower project and its geographical setting, and
3) an understanding of the FERC definition of "project nexus" as defined by 5.9(b)(5) of the 2012 "Guide to Understanding and Applying the Integrated Licensing Process Study Criteria." Project nexus means that there needs to be a reasonable connection between project development or operation and potential effects on the environmental resource in question. For a case of relicensing, note that page 10 of the Guide states that FERC staff will not require an applicant to reconstruct pre-project conditions because that is not the baseline from which the project conducts its environmental analysis. FERC's choice of current environmental conditions as the baseline for environmental analysis in relicense cases was affirmed in *American Rivers v. FERC*, 187 F.3d 1007, amended and rehearing denied, 201 F.3d 1186 (9th Cir., 1999); *Conservation Law Foundation v. FERC*, 216 F.3d 41 (D. C. Cir. 2000).

It will likely take 60-90 minutes to answer the *Questionnaire* portion of the *Impacts* module, although this will vary depending on the underlying skip logic and your knowledge of the hydropower project. You may exit and return to the EDS Toolkit as often as needed. The EDS Toolkit will automatically save your answers within your local browser cache (only), thereby ensuring that you can keep your responses private. However, **this also means that if you are going to switch devices or browsers (or if you use a high-privacy browser like DuckDuckGo), you will need to export your answers to save your work.** Do this by clicking on the *Import/Export Answers* button in the upper right portion of the screen, as indicated by the red arrow in **Figure 3**, and looking at the menu of options shown in **Figure 4**. Click on the *Export Answers* button to generate a JSON file that can be saved and imported on another device and/or used with another browser as needed. Click on the *Import Answers* button to add previous answers to the tool on a new device or browser. Because the tool autosaves answers within your local browser cache (only), you will need to clear your previous answers to restart the Questionnaire should you need to start over or begin work on another hydropower project. The *Clear Answers* button can be found at the bottom of the *Import/Export Answers* menu shown in **Figure 4**.

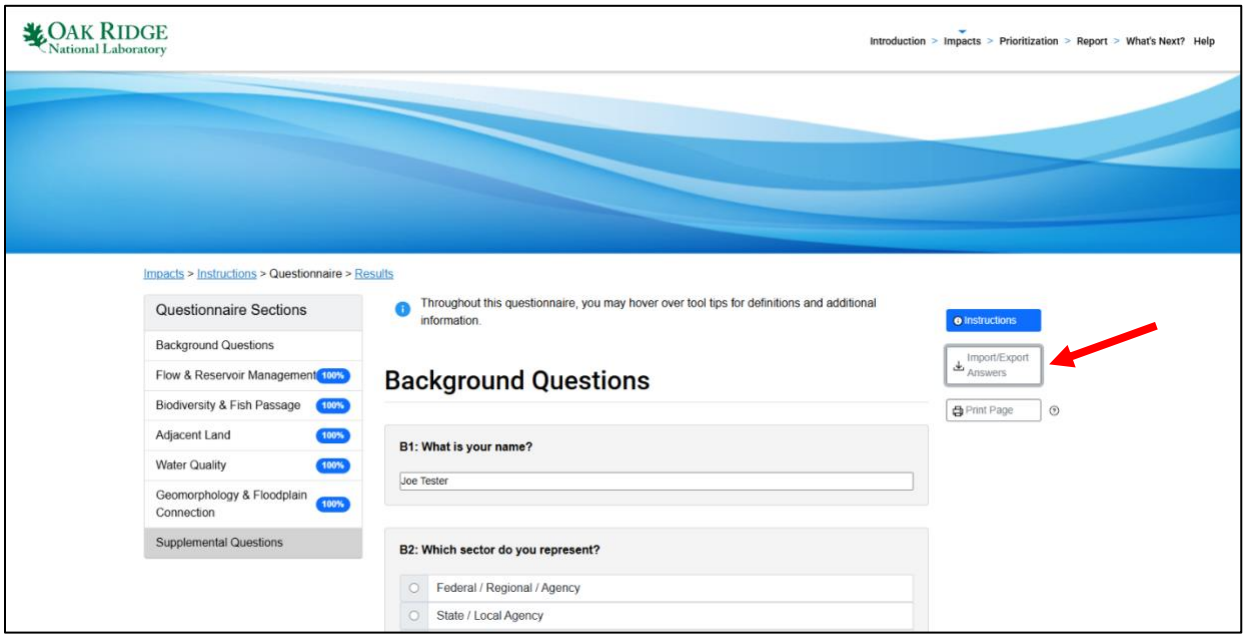


Figure 3. Location of the *Import/Export Answers* button with a laptop view. On a smart phone, this button may be found at the very bottom of the page.

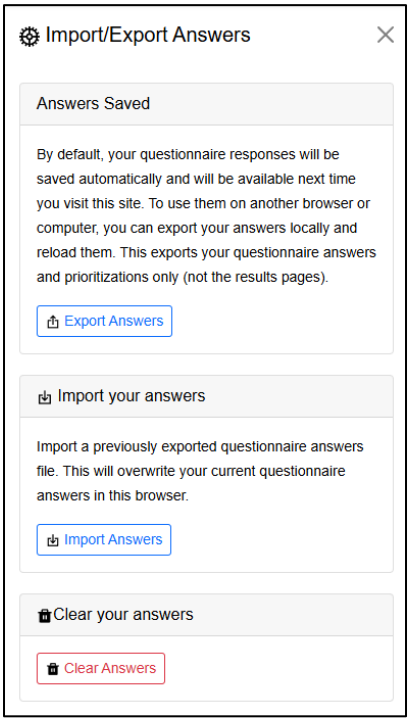


Figure 4. The menu of options made available by clicking on the *Import/Export Answers* button shown in Figure 2.

The menu bar at the upper-righthand side of the hydroeds.ornl.gov webpage the sequence of steps needed to use the EDS Toolkit. After reviewing the *Introduction*, users should work through the modules from left to right, starting with the *Impacts* module with its underlying *Instructions*, *Questionnaire* and *Results*, and then moving on to the two types of *Prioritization* modules and reviewing the final *Report*. The *What's Next?* module contains three underlying modules about *Studies*, *Mitigations* and *Regulations* that can be accessed in any order. Note that the information shown in the *What's Next?* module will be based on the lists of *Key Topics* and *Uncertain Topics* retained through the *Prioritization* modules and shown in the *Report*. These *What's Next?* modules will not be usable until the previous modules have been completed. To explore the capabilities of these modules, you may want to try downloading and importing the "JoeTester_CompletedQuestionnaire" file available from step 1 on the EDS Toolkit's Introduction page (**Figure 5**). There is also an option to download spreadsheets of all of the collected environmental studies, mitigations, and regulatory information from the Introduction page of the EDS Toolkit in the description of step 4 (**Figure 5**).

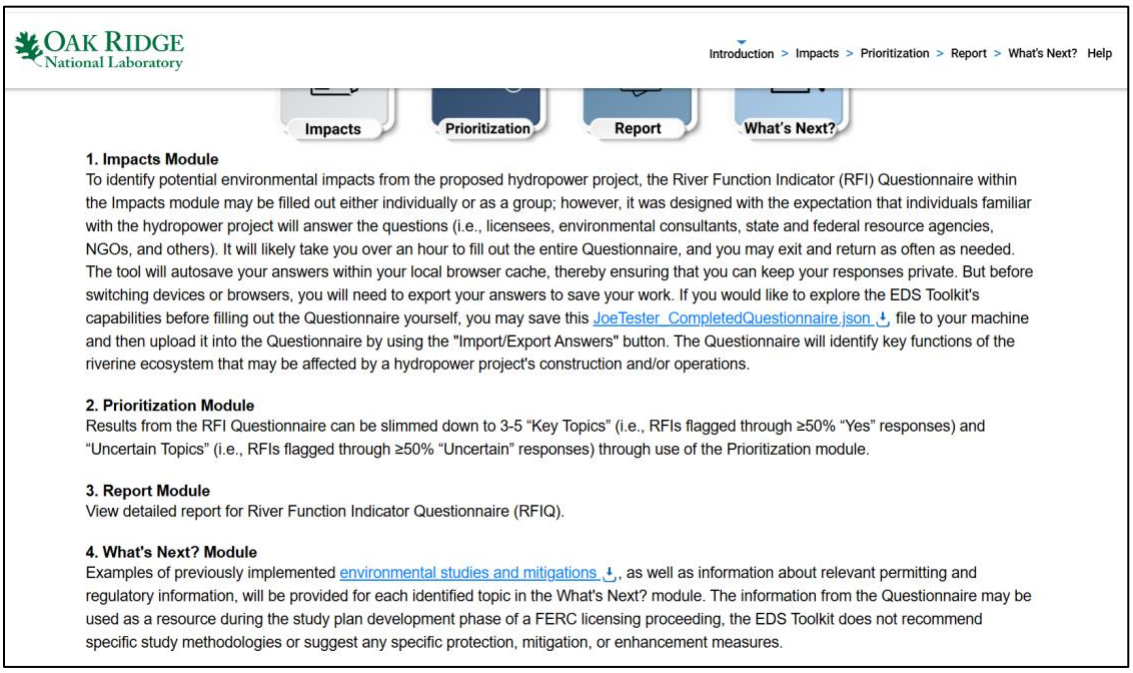


Figure 5. On the Introduction page, the step 1 hyperlink will enable you to download a JSON file of a complete set of answers to important into the *Impacts* module for testing out the subsequent modules. The step 4 hyperlink will let you download spreadsheets of all of the environmental studies, mitigations, and regulatory information contained in the *What's Next?* modules of the EDS Toolkit.

After completing the *Questionnaire* in the *Impacts* module, click on the interactive *Results* submodule to explore the RFI tallies and supporting information. If the answers look correct, then proceed to the *Prioritization* modules. This two-step module allows you to review lists of *Key Topics* and *Uncertain Topics* identified through high proportions of *Yes* and *Uncertain* responses. The default prioritization threshold is 50%, but you can adjust this threshold in 10% increments to see shorter or longer lists of key and uncertain RFI topics to consider further. Use drag and drop to retain or discard these RFI

"topics" for the final *Report*. We recommend retaining no more than 3-5 *Key Topics* and 3-5 *Uncertain Topics* for further investigation and productive discussion with other stakeholders.

If any *Questionnaire* responses are altered after working on the *Prioritization* modules, you will be warned that the *Prioritization* modules are being re-set. This means that you will need to review the lists of *Key Topics* and *Uncertain Topics* again before generating the *Report*.

Results from the *Questionnaire* and *Prioritization* modules will be summarized on the *Report*. A "Print to PDF" capability is available through your browser for each of these reports and can be accessed by clicking on the *Print Page* button (typically found on the upper right portion of the screen).

At any point, return to the top of the page by clicking on the up arrow button (**Figure 6**). On most devices, this will be located on lower right portion of the screen.



Figure 6. Clicking on this up arrow will quickly take you back to the top of the current page without having to scroll up.

The remaining sections of this User Guide provide detailed instructions for working through each of the tool's modules and some suggested next steps that can be taken after the *Report* has been generated.

4. Questionnaire

The River Function Indicator Questionnaire (RFIQ), shortened to *Questionnaire*, is located within the *Impacts* module of the EDS Toolkit. The *Questionnaire* consists of seven sections listed in an interactive menu on the upper left side of the screen (**Figure 7**). Click on these seven menu items to go back and forth between the seven sections as needed:

- The *Background Questions* section presents seven basic questions about the specific user and hydropower project. Note that responses to questions "B5: In which state is this project located?" and "B9: Which FERC licensing process is being undertaken for this project?" will affect information presented in the *Regulations* section of the *What's Next?* module.
- The next five sections of questions entitled *Flow & Reservoir Management, Biodiversity and Fish Passage, Adjacent Land, Water Quality*, and *Geomorphology & Floodplain Connection* contain questions developed to "flag" potential environmental impacts as represented through the 42 RFIs. Note that most of the questions are tied to multiple RFIs, often from more than one category of potential environmental impacts. These 87 questions are the backbone of the tool, and all five sections need to be completely answered before moving on to the other modules of the EDS Toolkit. However, most users will be presented with fewer than 87 questions due to the tool's skip

logic. In other words, as you work through these *Questionnaire Sections*, some questions will likely become hidden based on your responses to previous questions, and you may notice discontinuous numbering. You can track your progress through these five sections of questions by referring to the percent complete icons shown to the right of each section name. Note that these progress buttons turn from red to blue once all of the questions in the section have been completed (Figure 6).

- To explore the tool's underlying logic structure, you may open this interactive HTML file called "Hydropower Environmental Decision Support (EDS) Toolkit Version 7 River Function Indicator (RFI) Questionnaire". This "Logic Flow" graphic shows the RFI codes associated with each question and explains which answers lead to some questions being skipped over.
- The *Supplemental Questions* section contains up to 17 optional questions that can be answered to provide additional contextual information about several of the RFIs. Answering these Supplemental Questions will have no effect on the RFI tallies used for the *Results* and the *Prioritization* modules, but these responses will be listed in the *Report* and may lead to additional regulatory information being provided in the *What's Next?* module's *Regulations* section.

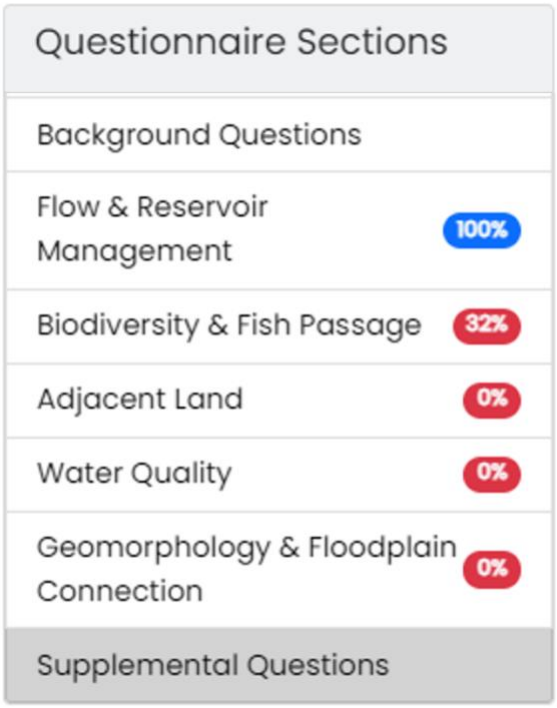


Figure 7. The menu of seven sections in the *Questionnaire* module with progress indicators displayed for the five sections of questions tied to the RFI tallies. The progress indicators turn from red to blue when a section is 100% complete.

Most of the RFI-related questions in the *Questionnaire* module will ask you to select one of four possible answers (selected with a radio button) to indicate the topic's relevance to the project's nexus, agency goals, etc. (see example question in **Figure 8**):

- *Yes* means that the topic is relevant to the hydropower project.
- *No* means that the topic is not relevant to the hydropower project.
- *Uncertain* means that the user does not have the expertise needed to answer this question and/or that there may be information gaps about the topic in relation to the hydropower project.
- *Not Applicable* suggests that the resource does not exist at the hydropower project location.

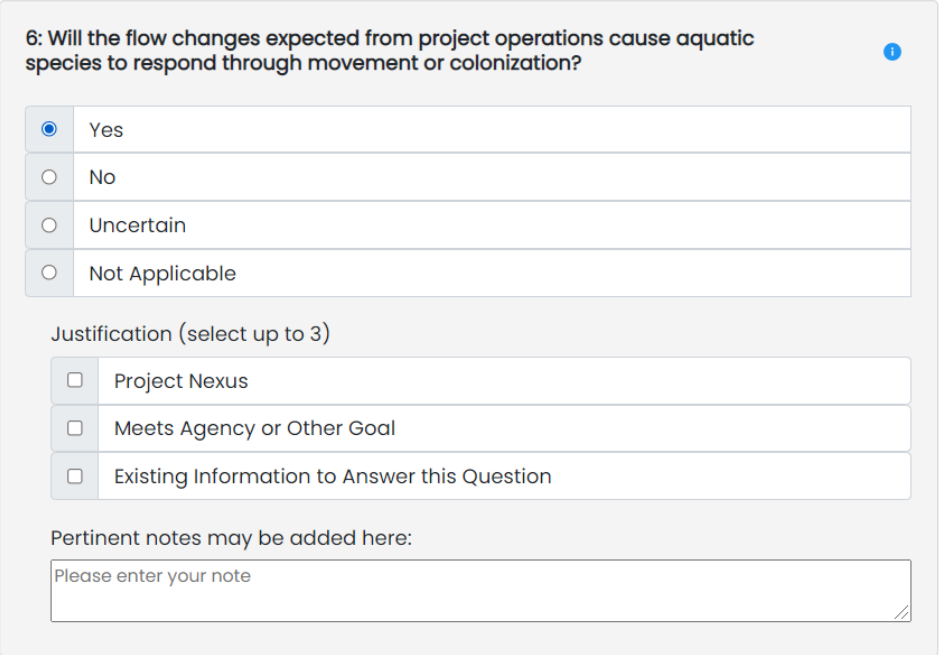


Figure 8. Example RFI-related question showing four radio button responses, three justification checkboxes that follow *Yes* and *No* responses, and a text entry box.

If you select an answer of *Yes* or *No*, then you will next select up to three types of Justification checkbox options to support the answer (**Figure 8**):

- *Project Nexus* means that there is a reasonable connection between project development or operation and potential effects on the resource in question, as defined by 5.9(b)(5) of the 2012 FERC "A Guide to Understanding and Applying the Integrated Licensing Process Study Criteria".
- *Meets Agency or Other Goal* means that there is a documented connection between the resource in question and an agency's goal and/or the management goals of one or more project stakeholders. (We suggest that you add a note to specify the source/type of existing information in the *Pertinent notes* text box.)
- *Existing Information to* Answer *this Question* means that an answer of *Yes* or *No* is supported by an existing dataset.

A *Pertinent notes* text box accompanies each question so that you can enter project-specific information about, for example, existing data sources or species of concern. If you have indicated that there is *Existing Information to Answer this Question*, then we strongly suggest that you add a note to the

"Pertinent notes" text box specifying the source or type of existing information and (if available) a URL where the information can be downloaded.

Several questions have a tool tip icon to the right of the question (round blue symbol; Figure 7). Hovering over this information icon with the pointer will provide question-specific definitions and clarification (**Figure 9**).

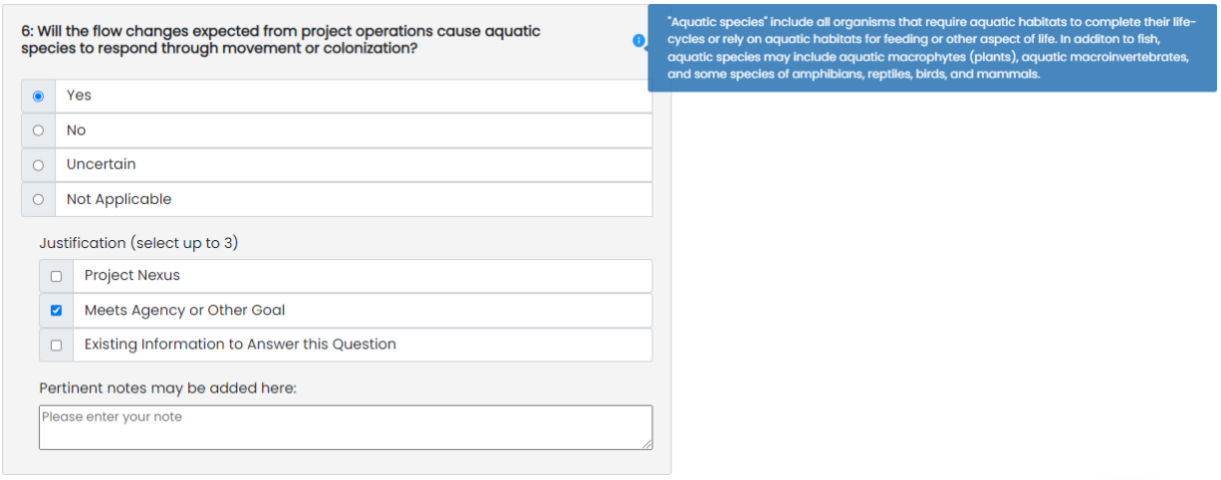


Figure 9. Example of a tool tip. Hovering over the round blue "i" icon with your pointer will allow you to see question-specific information.

Selecting *Uncertain* or *Not Applicable* as an Answer option will cause the follow-on Justification options to become hidden (**Figure 10**). However, the text box will remain available for notes no matter which radio button you select for your Answer.

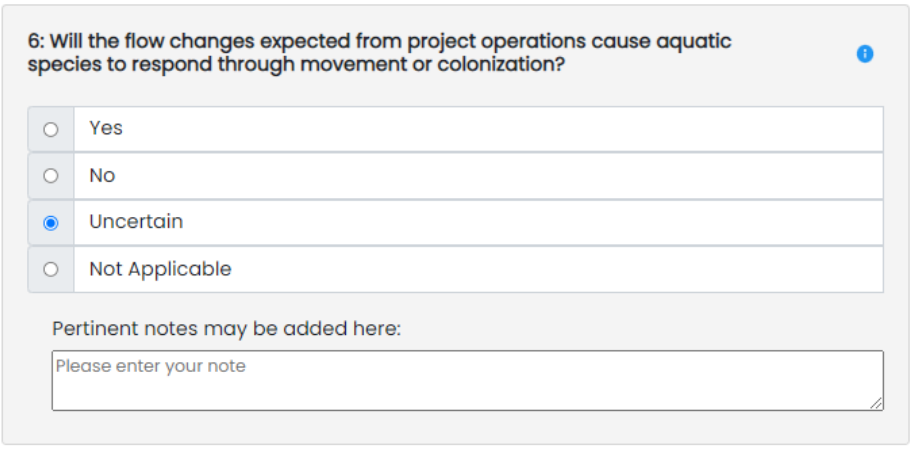


Figure 10. The Justification check boxes will become hidden if you answer the initial question with an *Uncertain* or *Not Applicable* response. However, the text box always remains available to accept pertinent notes.

5. Results

The *Results* portion of the *Impacts* module will display an interactive bar chart summarizing all *Questionnaire* responses across each of the six categories of RFIs (Table 1) and the 42 individual RFIs defined on the *Introduction* page. The percentages are based on the total number of possible questions for each RFI. The River Function category results are summarized in the bars with colored labels (e.g., *Connectivity & Fragmentation*, *Biota & Biodiversity*, *Hydrology*, etc.). Percentage bars summarizing responses to questions about the individual RFIs are nested underneath the category bars. For example, **Figure 11** shows that the percentage bars connected to the orange *Connectivity & Fragmentation* label summarize the aggregate responses for the four RFIs nested under this category: "Mitigated fish passage (CF3)", "Dendritic network and riverscape (CF2)", "Unmitigated fish passage (CF4)", and "Basin Area (CF1)". In this example, the *Questionnaire* module has not yet been completed, so portions of the bars are in the bright blue "Not Answered" color. In this example, 5% of the questions related to *Connectivity & Fragmentation* have received *Yes* responses and 5% of the questions related to *Connectivity & Fragmentation* have received *No* responses, but ~84% of the questions related to this RFI category have not been answered yet. Looking at the nested bars for the individual RFIs, you can see that 50% of the questions related to "Mitigated fish passage (CF3)" have been answered with *Yes* responses and that 50% of the questions related to this RFI have not been answered yet.

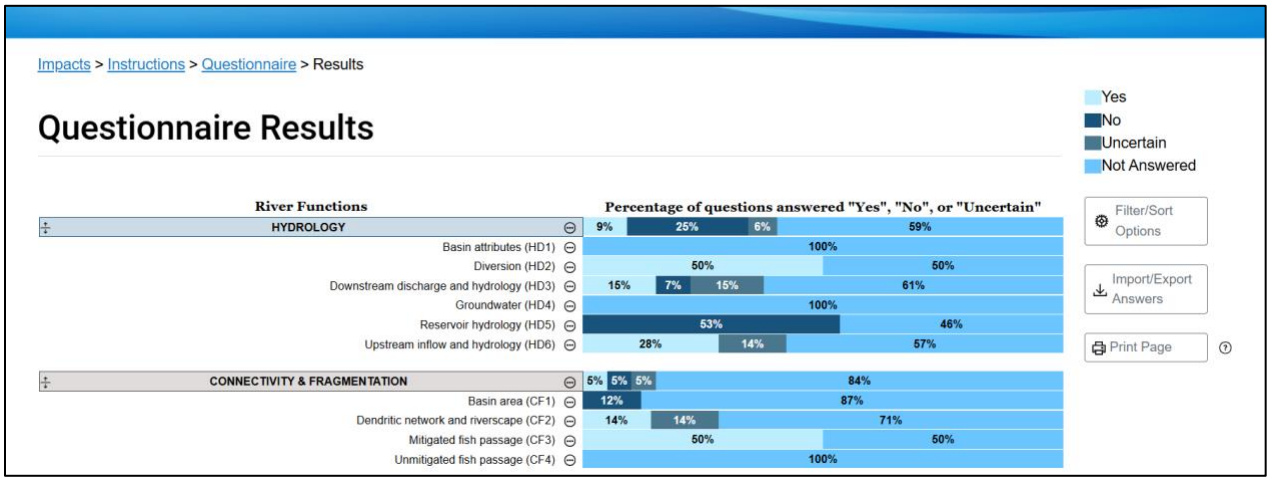


Figure 11. Example *Results* view when the *Questionnaire* module is incomplete.

After completing all RFI-related questions in the *Questionnaire* module, the menu in the upper left corner of that module will show five blue 100% icons (**Figure 12**). Now is the ideal time to proceed to the *Results* by clicking on the menu option. This will provide the ability to explore your normalized responses of *Yes*, *No* and *Uncertain* across all individual RFIs and RFI categories.

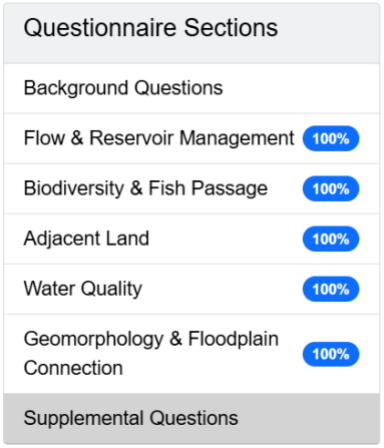


Figure 12. Once all key sections of the *Questionnaire* have all questions answered (i.e., 100% complete), summaries can be viewed or downloaded from the *Results* menu item.

The data presented in the *Results* (**Figure 13**) bar chart are normalized to percentages because different hydropower projects, or questionnaires filled out by different stakeholders for the same hydropower project, might have variable numbers of questions answered due to the skip logic described in Section 4. Normalizing allows comparison within RFI categories across these different possible scenarios.

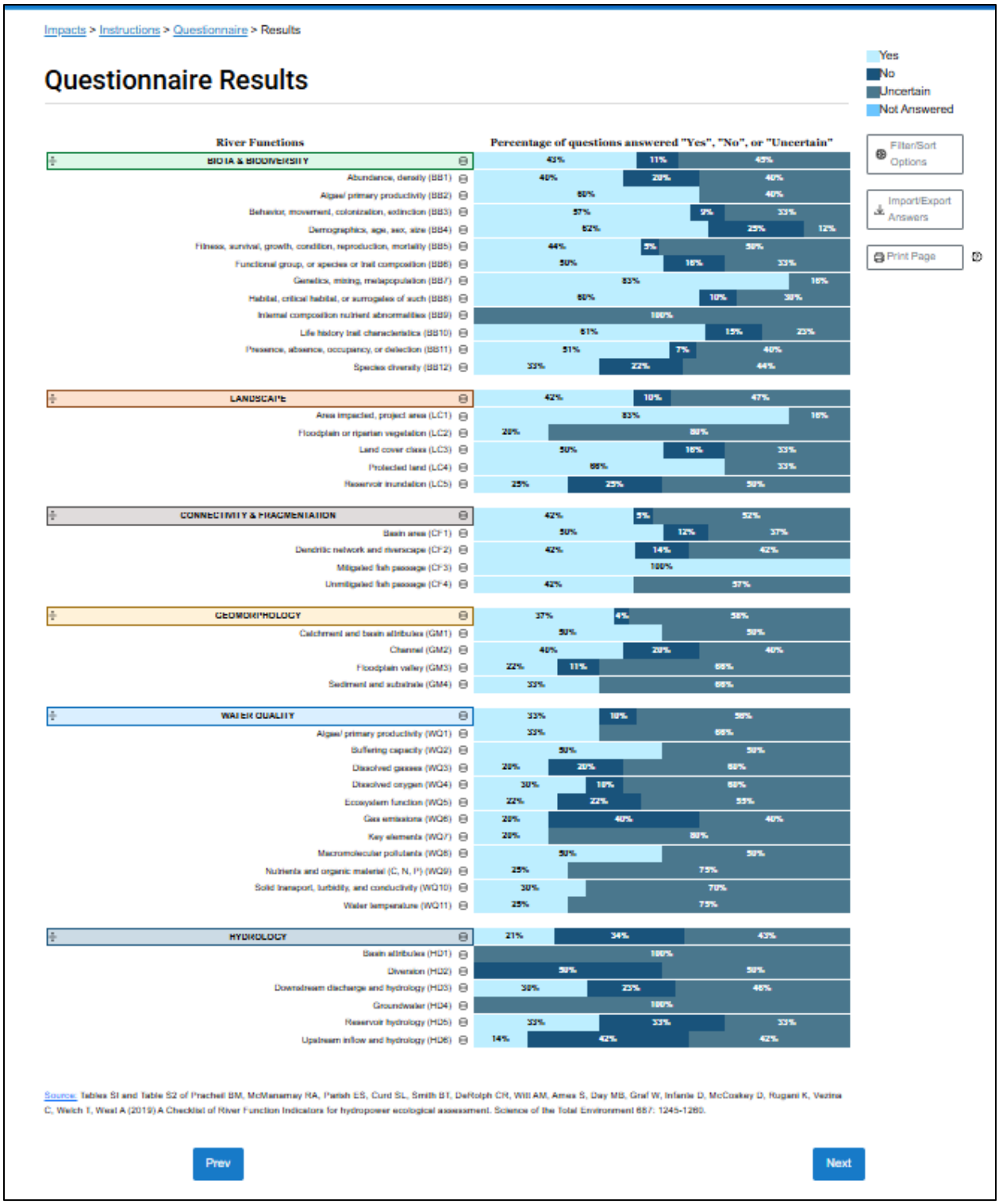


Figure 13. Example *Results* view after the *Questionnaire* module has been completed.

By default, the *Results* will present results in rank order by highest percentage of *Yes* responses for each category of RFIs. Clicking on the *Filter/Sort Options* button located under the chart's legend will open a menu of alternative ways of displaying the *Results* (**Figure 14**). For example, toggling the *Show/Hide River Functions under Categories* from the default option of *Displayed* to the alternative option of *Hidden* results in a short summary of the six categories (**Figure 15**). You can also sort the results by RFI code ID rather than by percentage, etc.

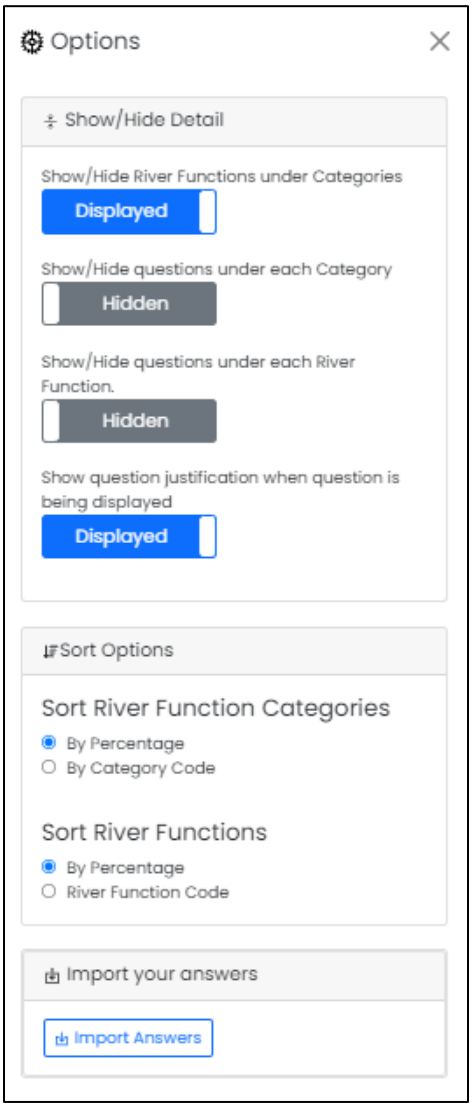


Figure 14. The *Page Option* menu provides several options for changing the way in which the categories and RFIs are displayed on the *Results* page.

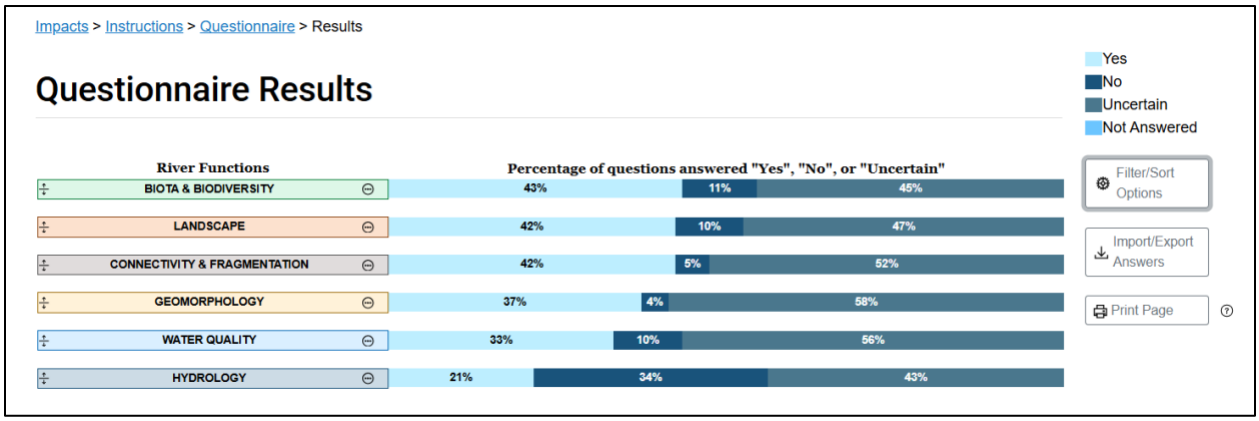


Figure 15. Short summary of responses by category in rank order based on highest percentage of *Yes* responses.

In the default view, clicking on any bar in the *Results* will show a list of all underlying questions and responses for that RFI or category. The example in **Figure 16** shows a display of all possible questions related to the *Biota & Biodiversity* indicator BB1 (Abundance, density). Any skipped (unasked) questions would be shown in italics. Of the 5 questions asked about this RFI, two received answers of *Yes*, 1 received an answer of *No*, 2 received answers of *Uncertain*, and 0 received an answer of *Not Applicable*. Note that the questions *Not Asked* and the questions answered *No* or *Not Applicable* are all lumped together as *No* for the normalized bar chart percentage since none of these questions indicate a potential environmental concern for the hydropower project that is under consideration. Answers of *Yes* mean that the topic is relevant to the hydropower project, and answers of *Uncertain* mean that there may be information gaps about the topic in relation to the hydropower project. Also note that responses to the Justification responses and text entered in the *Pertinent notes* boxes is summarized under each question as applicable.

To change any responses, add more information to the text boxes, etc., click on the question to return to the correct spot in the *Questionnaire* module and make any necessary updates (see example in **Figure 17**). The *Results* will be updated automatically, and you can explore the question again by clicking on the Results menu item. Once you are satisfied with all responses, you can then move on to the *Prioritization* portion of the tool by clicking on the *Prioritization* menu item.

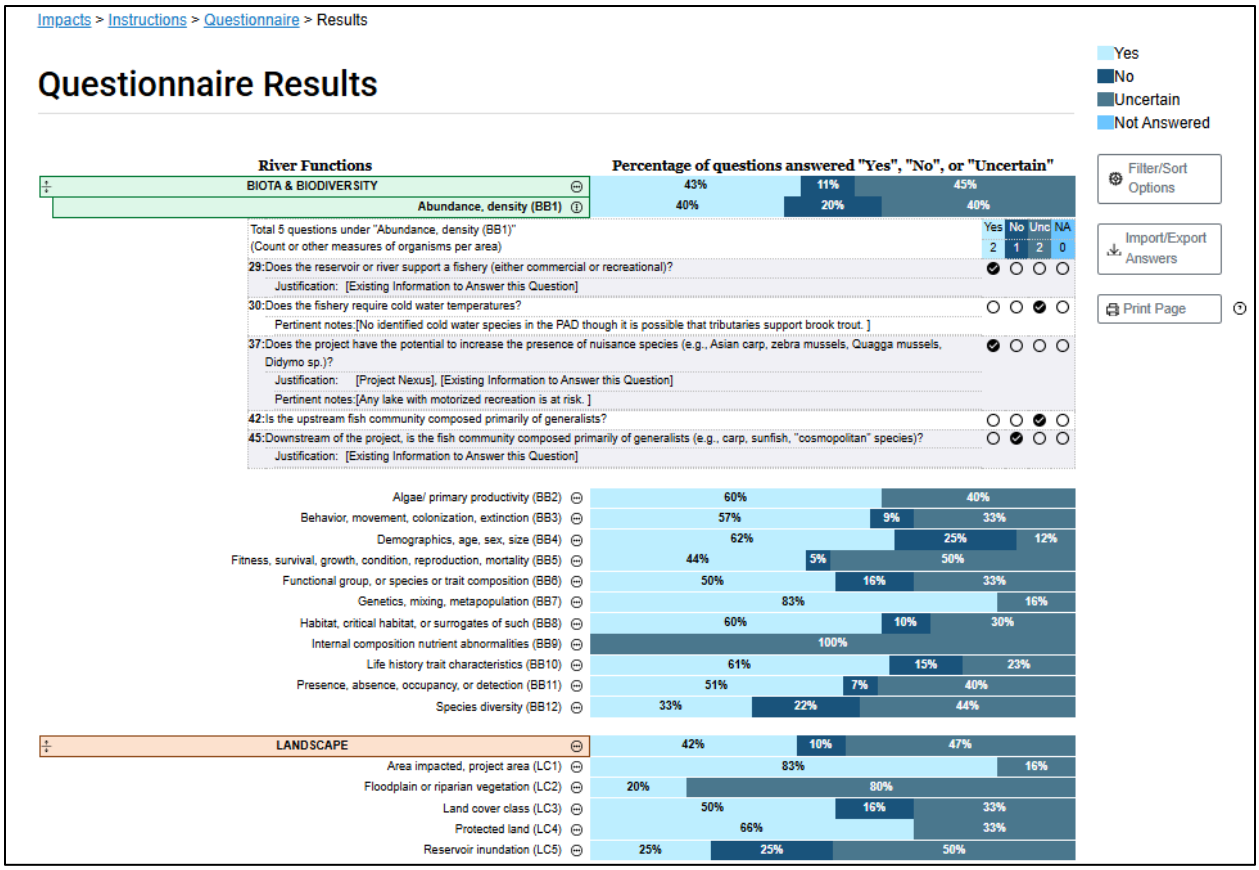


Figure 16. In default view, clicking on a bar in the *Results* will display all the underlying questions and responses associated with individual RFI. This example shows all of the questions and responses pertaining to the BB1 (Abundance, Density) RFI.

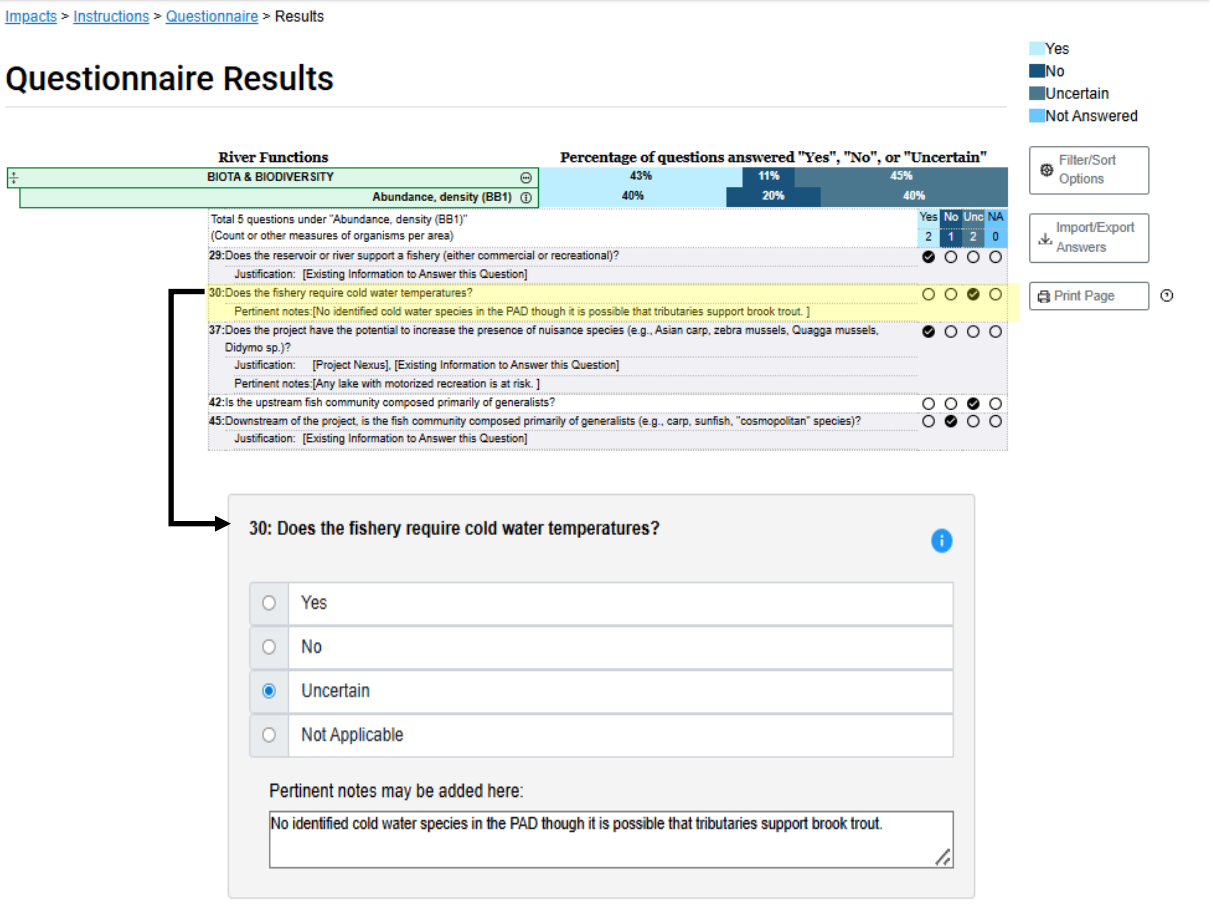


Figure 17. Clicking on a question in the *Results* summary will take you back to the original corresponding question on the *Questionnaire* page. If you change your response, the *Results* will get updated automatically.

6. Prioritization modules

Clicking on the *Prioritization* tab will take you to the *Prioritization Part 1: Key Topics* module. By default, the left column labeled *RFIs with Key Topics* lists all RFIs that have met a 50% threshold of *Yes* responses in rank order from highest percentage of *Yes* responses to lowest (**Figure 18**). You can adjust this threshold in 10% increments to see shorter or longer lists of key impacts to consider further. Clicking on each RFI box will show you a summary of the underlying questions and responses (**Figure 19**) as you decide which RFIs to retain and which (if any) to discard. Drag and drop RFIs into the *Retain* and *Discard* columns based on your knowledge of the project and each topic's potential importance. Any RFIs that are not deliberately dragged into the *Retain* column will not be displayed as *Key Topics* in the final reports. We encourage you to retain just 3-5 *Key Topics* to ensure a more productive discussion. Note that hovering over the *Legends* boxes will display definitions of the six RFI categories.

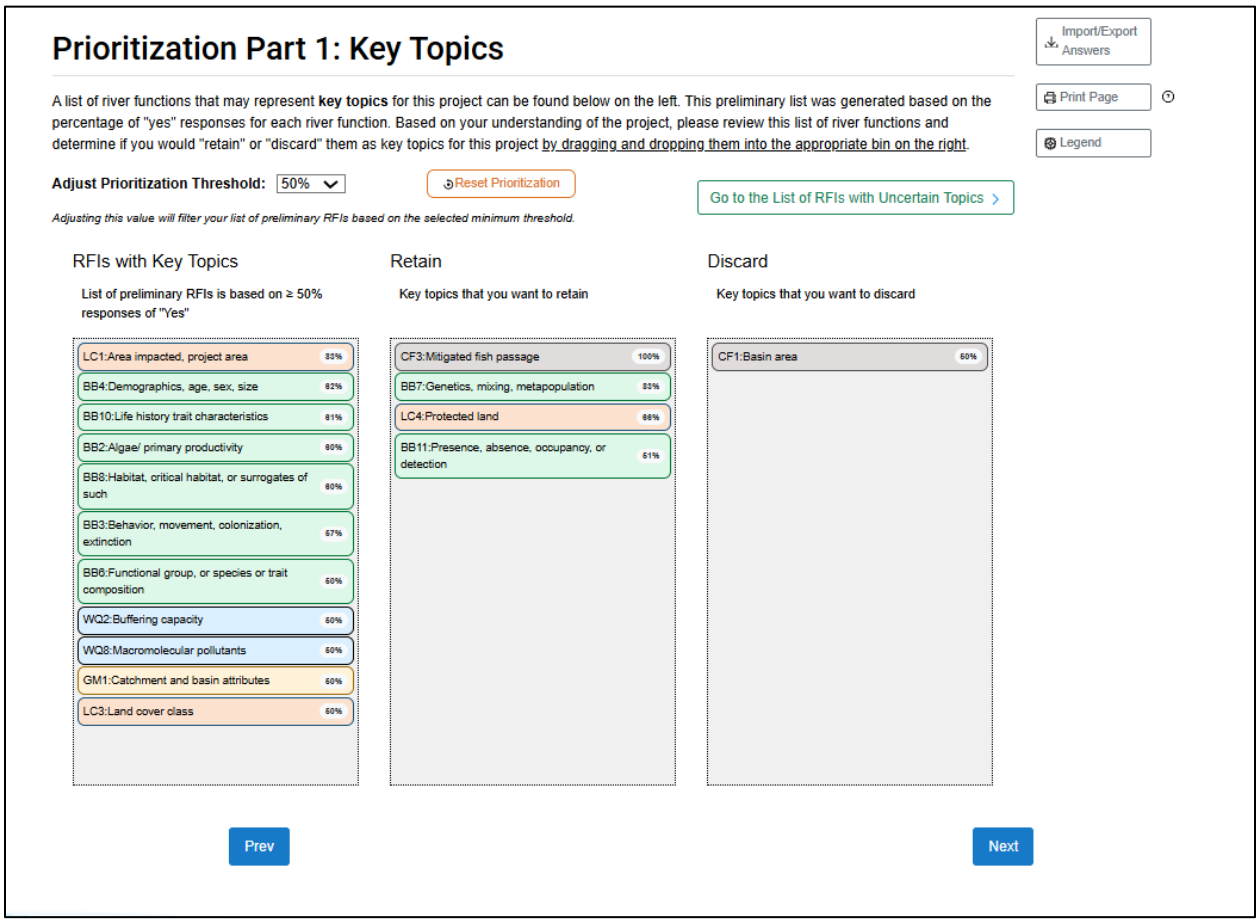


Figure 18. *Part 1* of the *Prioritization* module lists RFIs as potential *Key Topics* if 50% or more of the related questions have been answered with a *Yes* response.

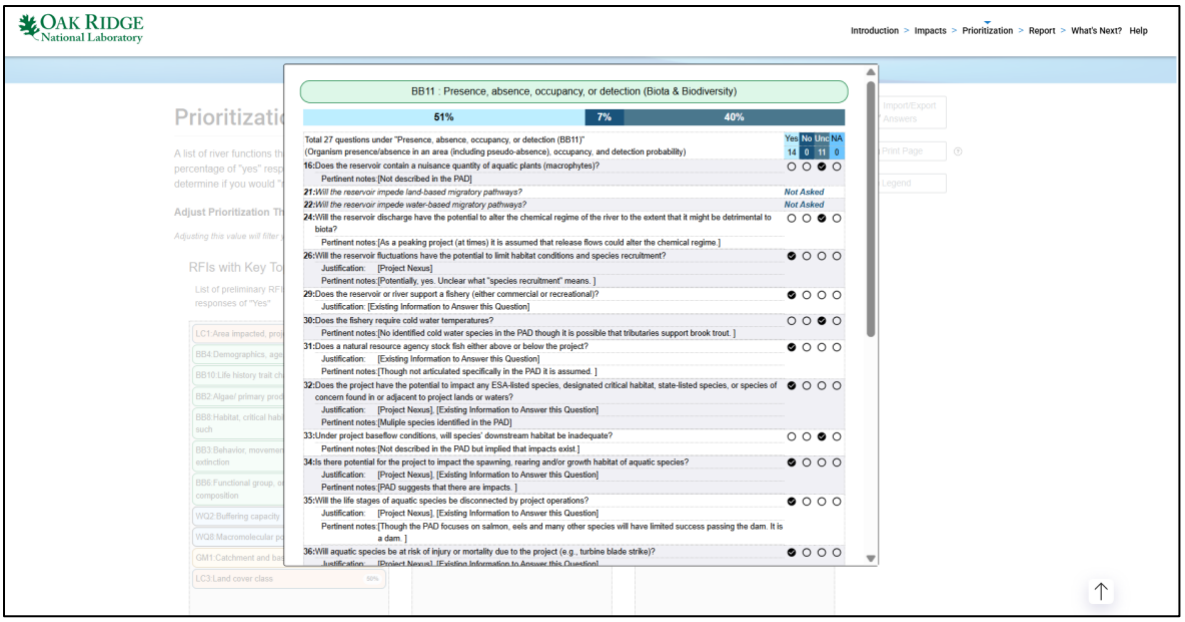


Figure 19. In the *Prioritization* module, click on any of the displayed RFI boxes to see the underlying information. This example shows the underlying questions and responses for BB11.

To get to *Prioritization Part 2: Uncertain Topics*, click on the button above the *Discard* column labeled *Go the list of RFIs with Uncertain Topics.* On this new page (**Figure 20**), you will find a list of those RFIs that met a 50% threshold of *Uncertain* responses shown in rank order. You can adjust this default threshold in 10% increments to see shorter or longer lists of uncertain RFI topics to consider further. You can click on each colorful RFI box to see a summary of the related questions and responses as you decide which of these RFIs to retain and which (if any) to discard. Any RFIs not deliberately dragged into the *Retain* column will not be displayed as *Uncertain Topics* on the final report. We encourage you to retain just 3-5 *Uncertain Topics* to ensure a more productive discussion.

Since most of the questions in the RFI Questionnaire are related to more than one RFI, you will not see a one-to-one relationship between the total number of *Yes* (or *Uncertain*) responses and the total number of RFIs that will be flagged as *Key Topics* (or *Uncertain Topics*). The thresholds of 50% *Yes* and *Uncertain* responses for the pre-populated lists of RFIs were picked as a simple starting point with the idea that these thresholds can be refined as more feedback is gathered from application of the tool to real-world projects. The *Prioritization* exercises are intended to give users the ability to "take things off the table" just in case lists of RFIs include functions known to be irrelevant to the hydropower project under consideration. The *Report* will contain lists of the retained RFIs—i.e., priority topics—that can be printed out and brought to discussions with other stakeholders.

If you change any of your *Questionnaire* module responses after completing the prioritization process, you will receive a warning that you need to re-set your priority topics (**Figure 21**). Since the RFI tallies have been altered, you will need to complete *Prioritization Parts 1 and 2* again before generating the final *Report*.

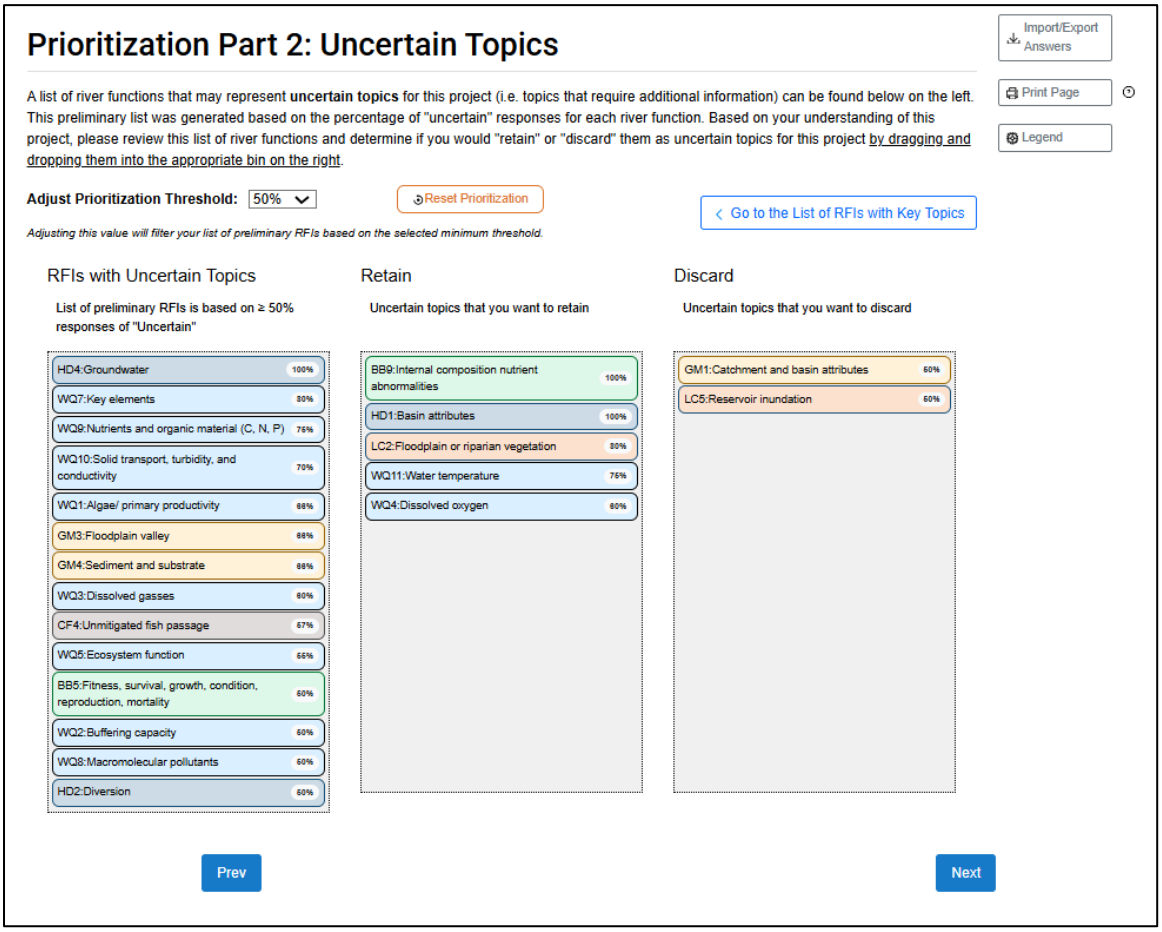


Figure 20. *Part 2* of the *Prioritization* module lists RFIs as potential *Uncertain Topics* if 50% or more of the related questions have been answered with an *Uncertain* response.

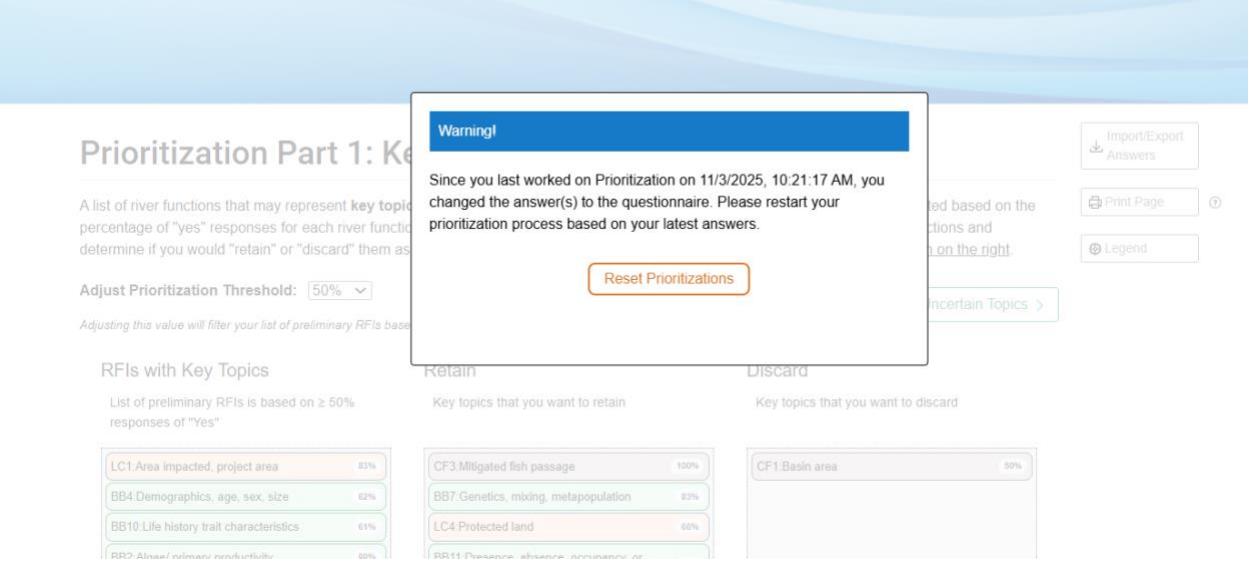


Figure 21. If you alter any Questionnaire responses after completing the Prioritization module, you will receive a warning that the Prioritization module has been reset based on the new RFI tallies.

7. Report

After completing the *Impacts* and *Prioritization* modules, click on the *Report* menu item to access a report detailing your RFI Questionnaire results. This report includes a synopsis of the *Background Questions*, a list of the retained *Key Topics*, a list of the retained *Uncertain Topics*, and a *Results* Summary sorted by river function code. A *Documentation of All Responses* section below the bar chart can be filtered by response type (i.e., Yes, No, or Uncertain) and shows all justification notes and responses to supplemental questions (**Figure 22**). You can now move easily between sections of this lengthy *Report* by using the embedded table of "Report Sections" in the upper lefthand side of the page to click on the section of interest (**Figure 22**). Click on the *Print Page* button on the upper righthand side of the page to send this to a printer or to "print" it as a document in PDF format.

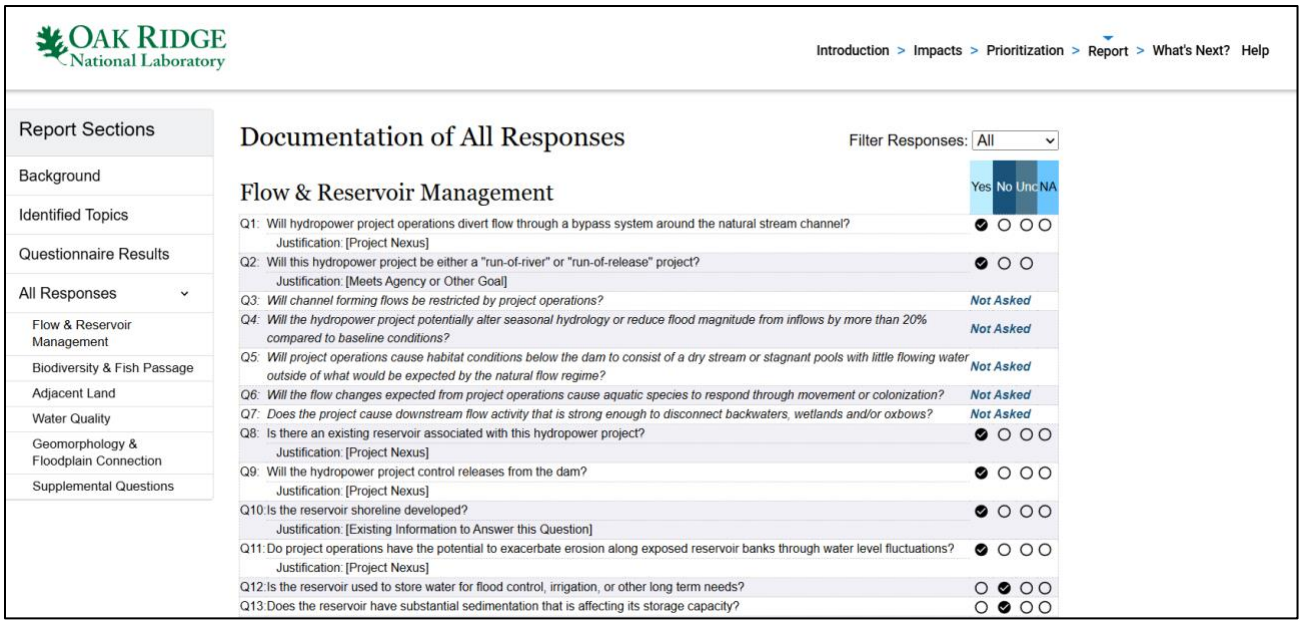


Figure 22. The *Report* module is divided into sections that can be easily accessed through the new menu embedded on the upper left. Note the filtering options at the top of the "Documentation of All Responsees" section that can be used for targeting Questionnaire answers of Yes, No, or Uncertain.

8. Next Steps

The suggested next steps for using the RFI Questionnaire results to understand the potential environmental impacts of the proposed hydropower project are shown in Boxes 3 and 4 of **Figure 23**. Since the RFI Questionnaire responses are autosaved within each user's local browser cache, they are never transferred to ORNL's server. Each respondent will therefore have the sole discretion of deciding how to share their answers and final *Reports*. Ideally, each stakeholder involved in the study negotiation phase of the FERC licensing process will bring his/her reports to a roundtable discussion to compare priority topics, existing information, and knowledge gaps. Clarifying discussions may be required for those RFIs that have generated different responses by different stakeholders involved in the same hydropower project.

Prior to the larger group discussion, stakeholders working as part of a team (e.g., members of an environmental NGO) may wish to share their answer file (in .json format) with one or more colleagues to help complete all 87 science-based questions with the necessary level of expertise. However, *Uncertain* is a valid response to any of the questions, and this *Uncertain* response may be selected to indicate a lack of user knowledge about a particular river function. As shown in **Figure 23**, these knowledge gaps can then be discussed and clarified at the table with other hydropower stakeholders to ascertain whether there is additional information available or whether there may be a need to request a new environmental study.

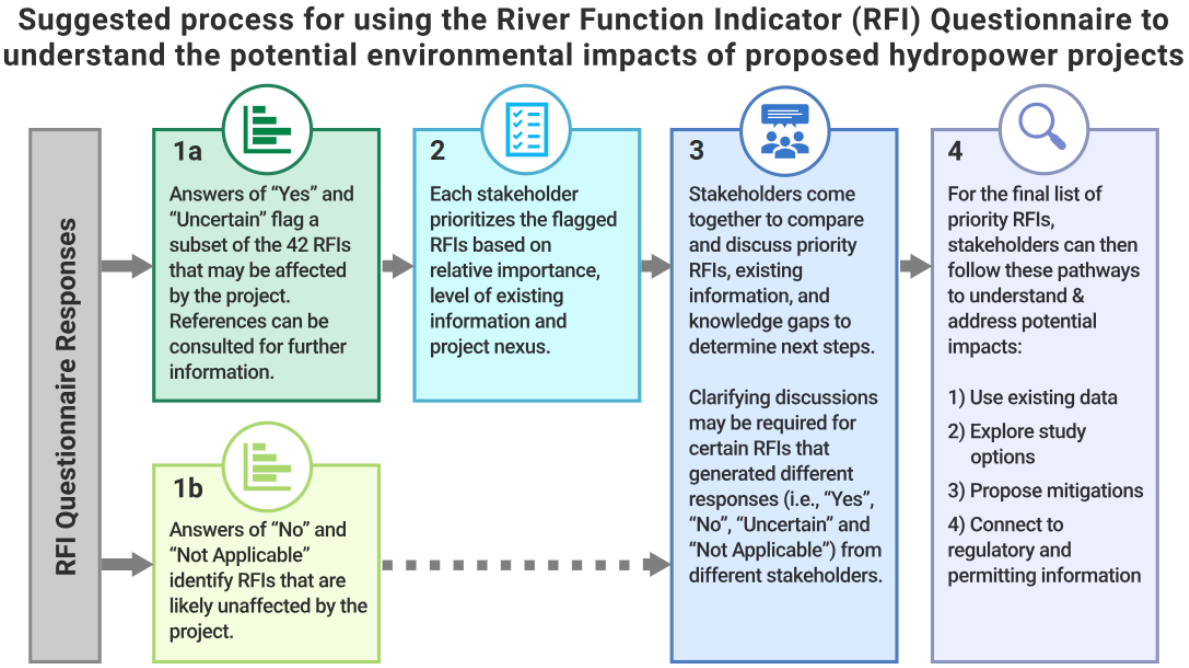


Figure 23. Suggested process for using the RFI Questionnaire to understand the potential environmental impacts of proposed hydropower projects

9. What's Next?

The EDS Toolkit does not recommend specific study methodologies or suggest any specific protection, mitigation, or enhancement measures, but the final list of priority RFIs resulting from group discussion identifies potential environmental impacts of the proposed hydropower project that can be used to explore study options and/or propose mitigation measures. Based on the final lists of *Key Topics* and *Uncertain Topics*, the *Studies* module (**Figure 23**) currently provides relevant examples of 555 implemented environmental studies which ORNL has mined from FERC dockets. The *Mitigations* module (**Figure 23**) provides relevant examples of protection, mitigation, and enhancement (PME) measures that resulted from license negotiations, including settlement agreements, for U.S. hydropower projects. The EDS Toolkit currently contains a total of 6,522 mitigation measures which ORNL has mined from FERC dockets. The EDS Toolkit currently contains at least one example of a study and mitigation for each RFI except for WQ6 (because there have not yet been any approved FERC-approved studies or mitigations related to the concentration and ebullition of water-origin greenhouse gases). To the extent possible, we have tried to include examples representing small, medium, and large project sizes from each FERC region (**Figure 24**). The *Regulations* module (**Figure 23**) points users to relevant regulatory and permitting information from DOE's RAPID Toolkit for Hydropower. You can search and sort the examples within each module or download spreadsheets of the data for easier use (**Figure 25**).

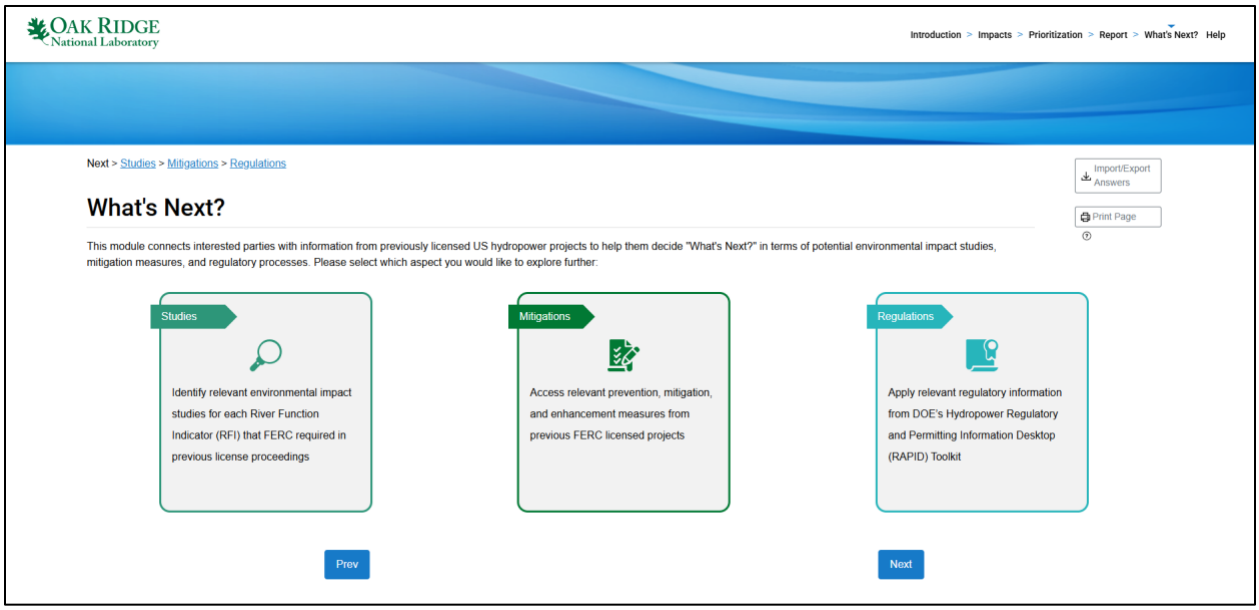


Figure 22. Links to the Studies, Mitigations, and Regulations sections within the *What's Next?* Module

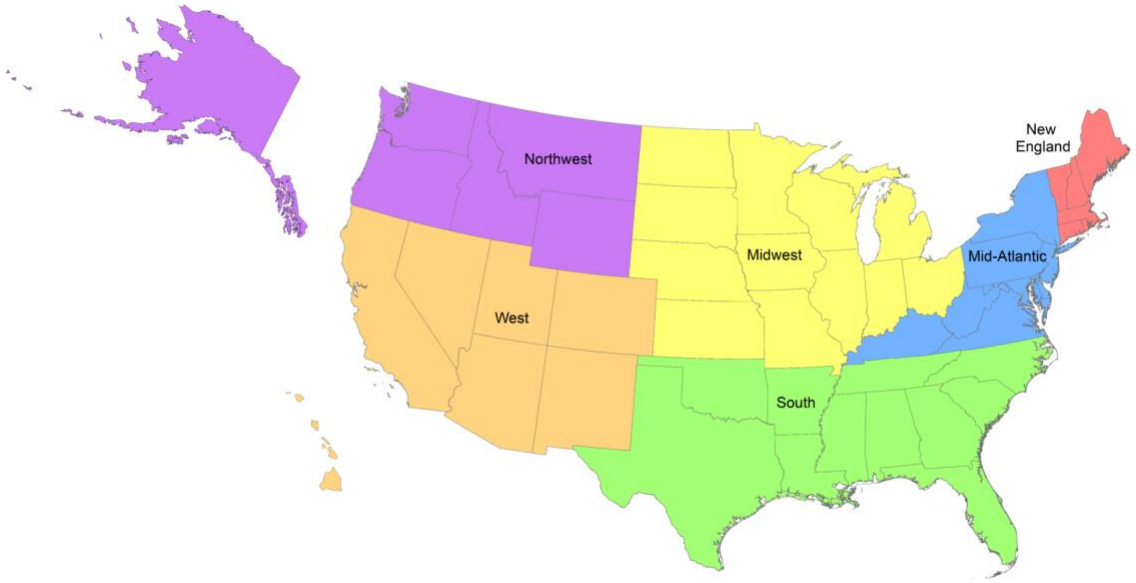


Figure 24. Map of the six FERC regions represented in the EDS Toolkit. We have tried to provide examples of studies and mitigations within each FERC region for small, medium, and large hydropower projects.

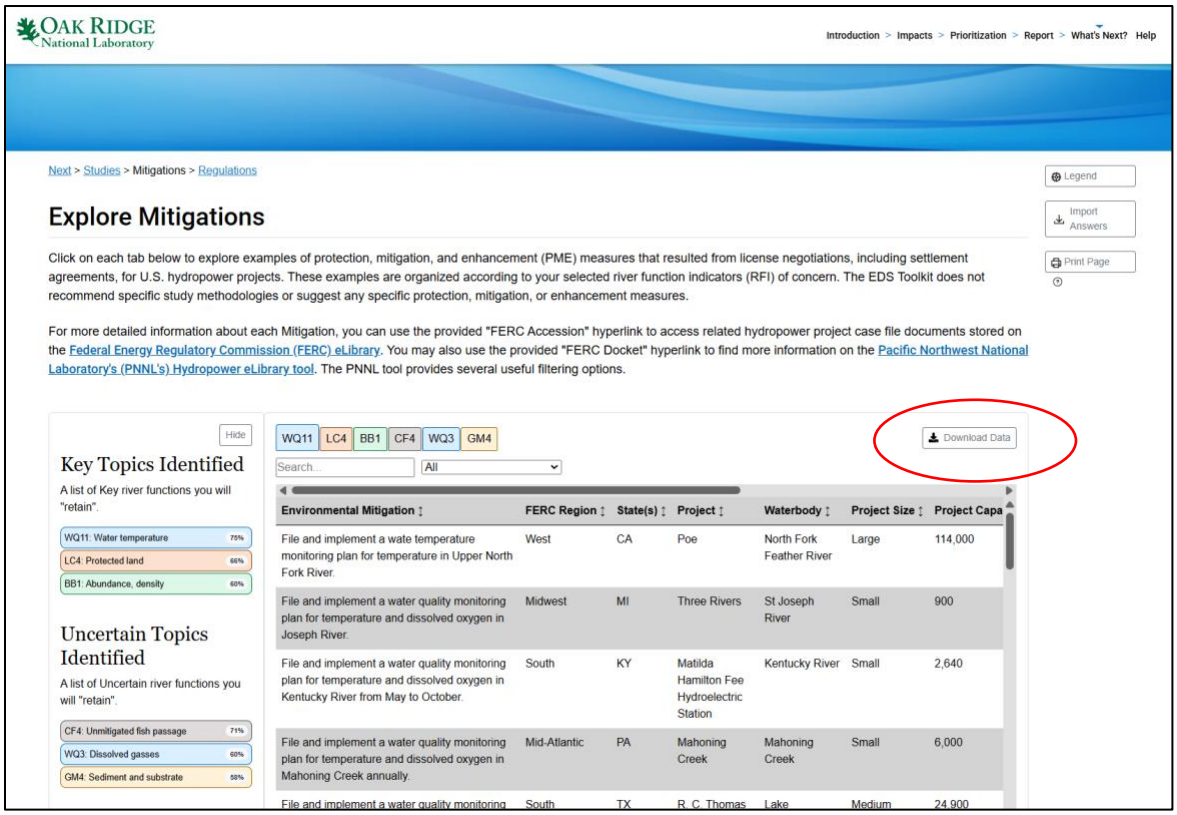


Figure 25. In each of the three *What's Next?* modules, there are options to sort and search the data tables of related examples. There is also an option to download the provided data as a .CSV file for easier use (see button circled in red).

10. Use Case Examples

The EDS Toolkit can be used in different ways and at different points of the licensing process depending on stakeholder needs. Here we provide several examples of ways that the EDS Toolkit might be used by *Drew the Developer* (**Figure 26**), *Ronnie the Regulator* (**Figure 27**), *Nancy the NGO Professional* (**Figure 28**), *Chris the Consultant* (**Figure 29**), and *Alex the Academic* (**Figure 30**). We hope that this set of user personas developed with NLR's Communications Team will give you some good ideas for ways to use the EDS Toolkit to benefit your own project.

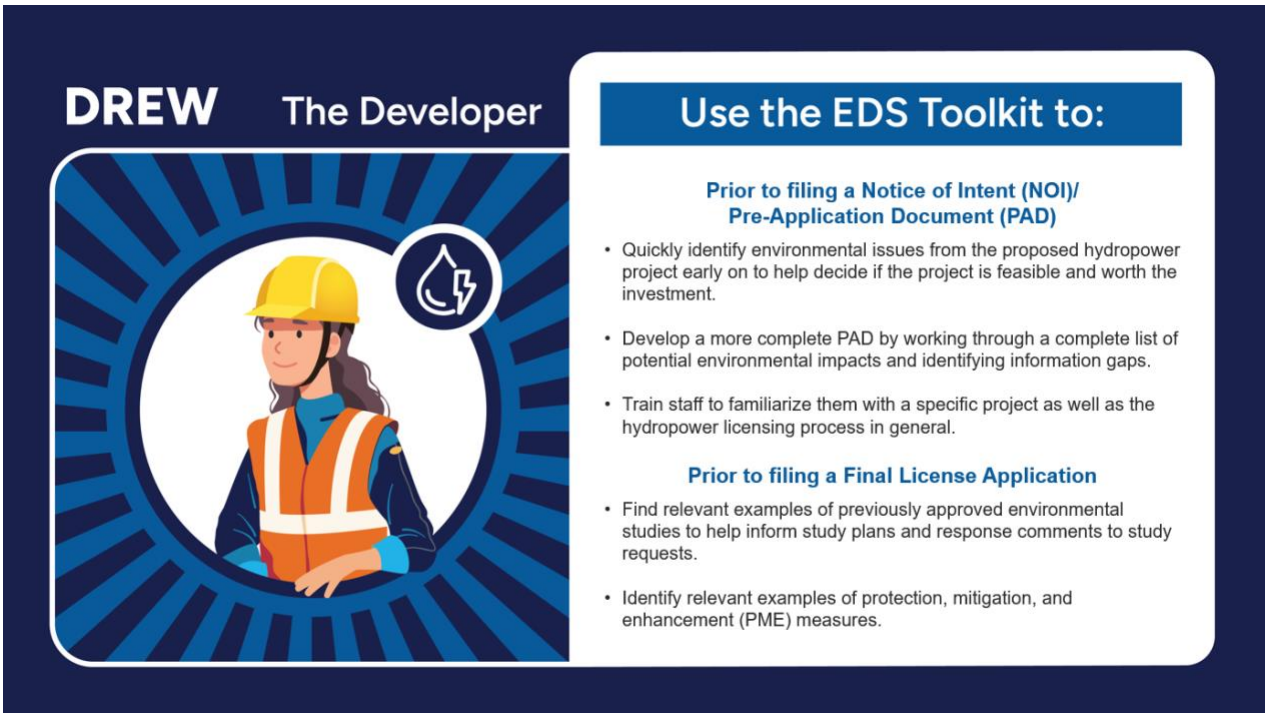


Figure 26. Examples of ways that a Developer might use the EDS Toolkit during hydropower licensing.

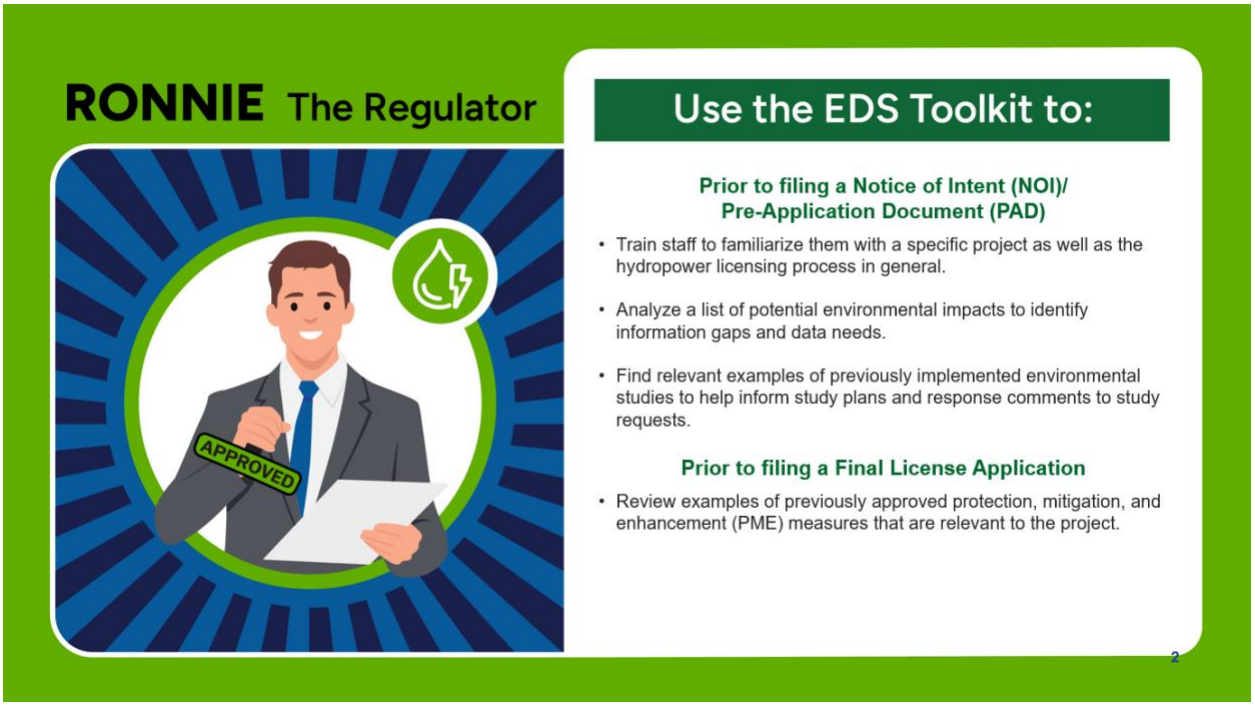


Figure 27. Examples of ways that Federal or State Agencies could use the EDS Toolkit.

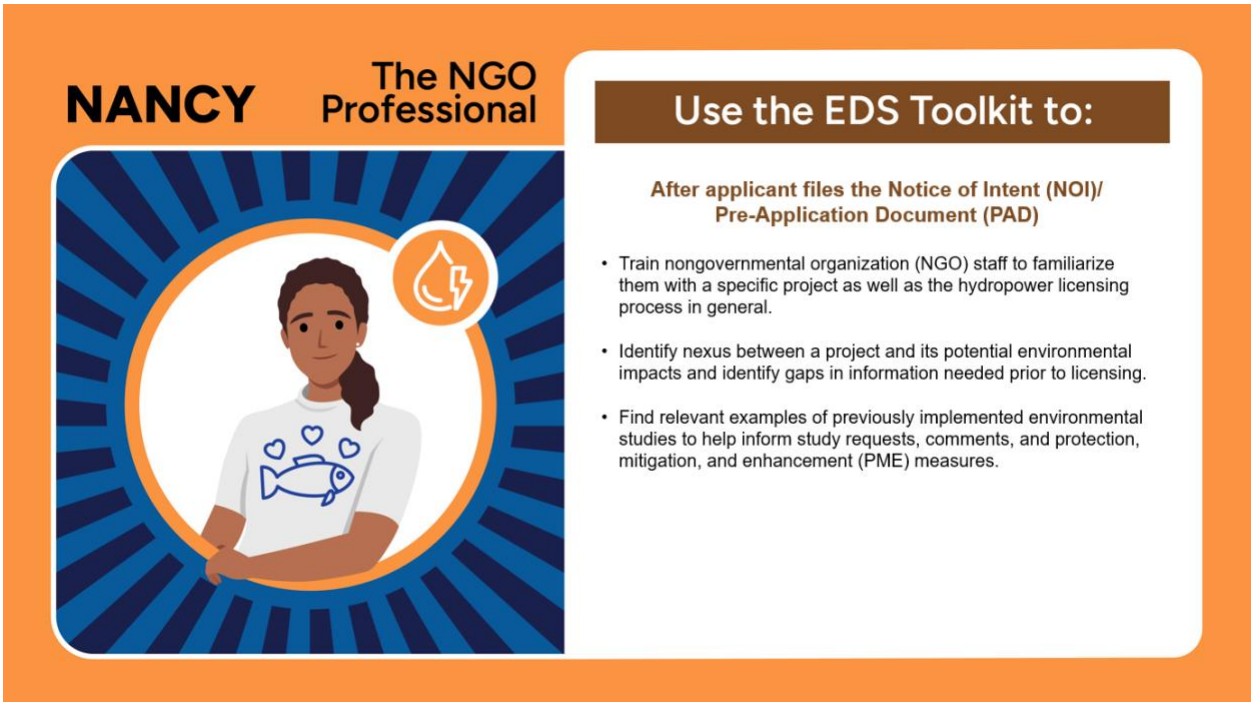


Figure 28. Examples of ways that an environmental non-governmental organization (NGO) might use the EDS Toolkit during hydropower licensing.

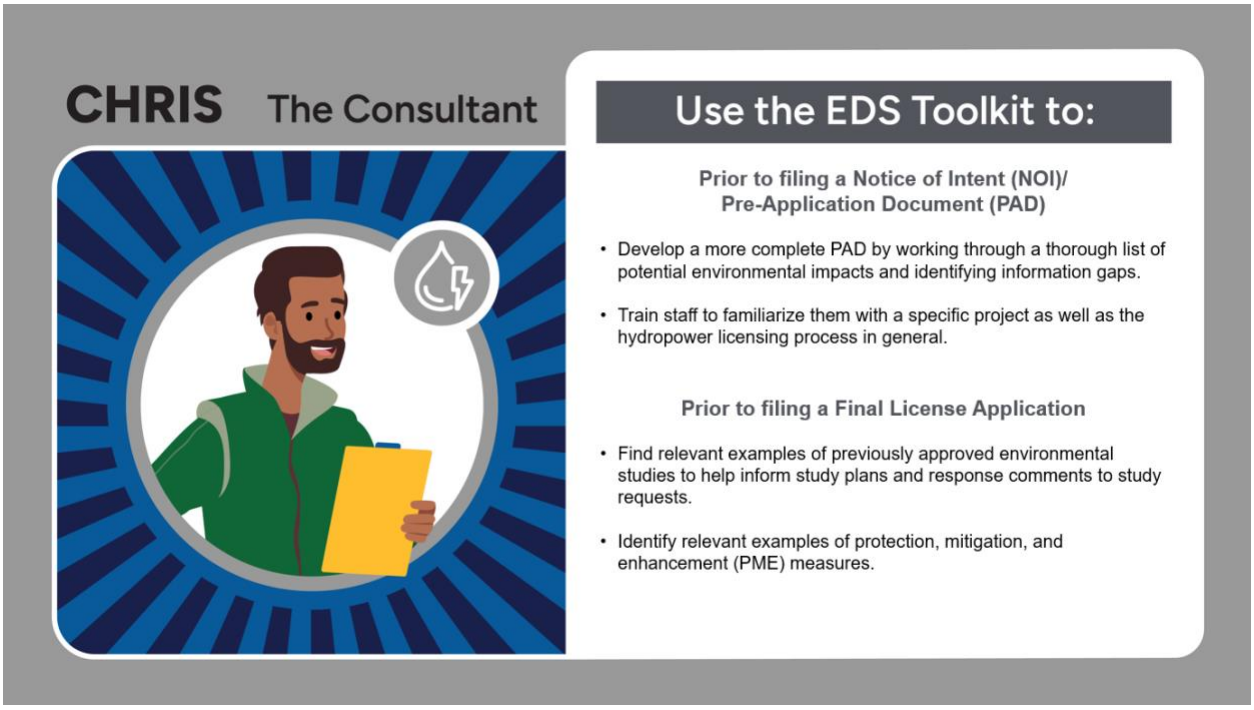


Figure 29. Examples of ways that a Consultant might use the EDS Toolkit during hydropower licensing.

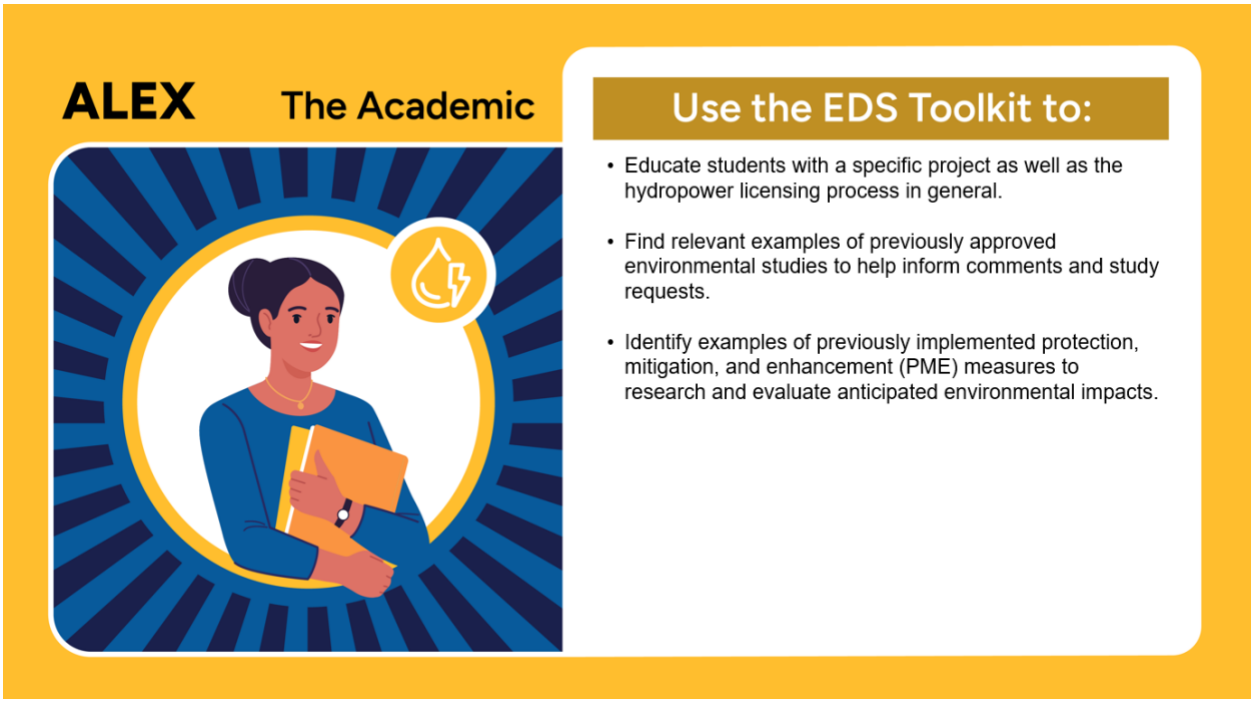


Figure 30. Examples of ways that a Researcher might use the EDS Toolkit during hydropower licensing.

Questions or Suggestions?

Please use the "Contact Us" button on the EDS Toolkit's "Help" page to ask questions or provide feedback about the EDS Toolkit. We look forward to hearing from you!