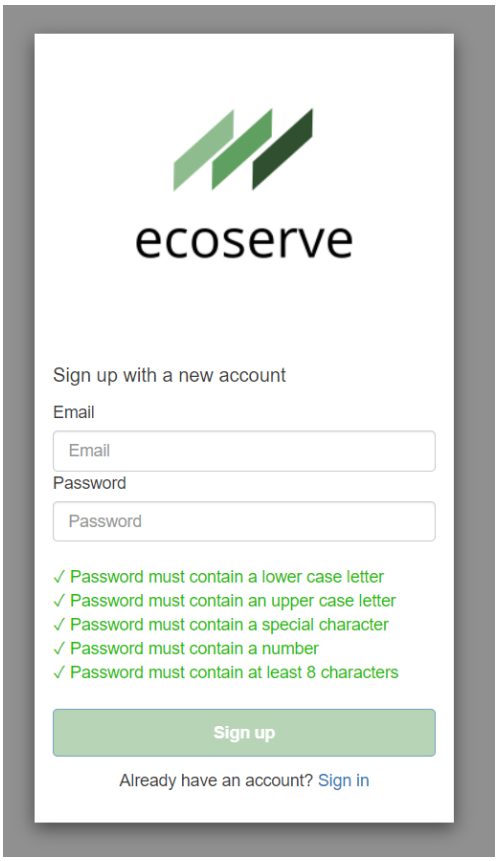
User Guide


INTEGRATIVE ECOSYSTEM SERVICE
ANALYSIS TOOL
Version 1.0
May 2020
https://ecoserve-app.com

Contents

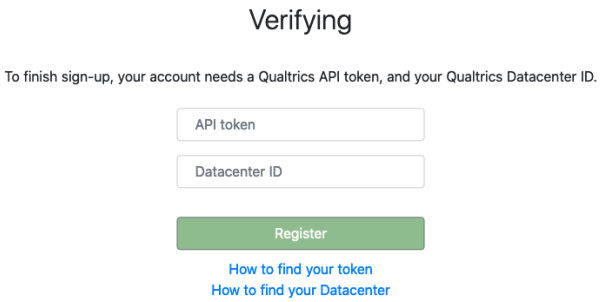
Create an account

Enter your email address and create a password to create an account and start using the Integrative Ecosystem Service Analysis Tool (IESAT). You will receive a verification via email from ecoserve-app.com to confirm that you would like to create an account.

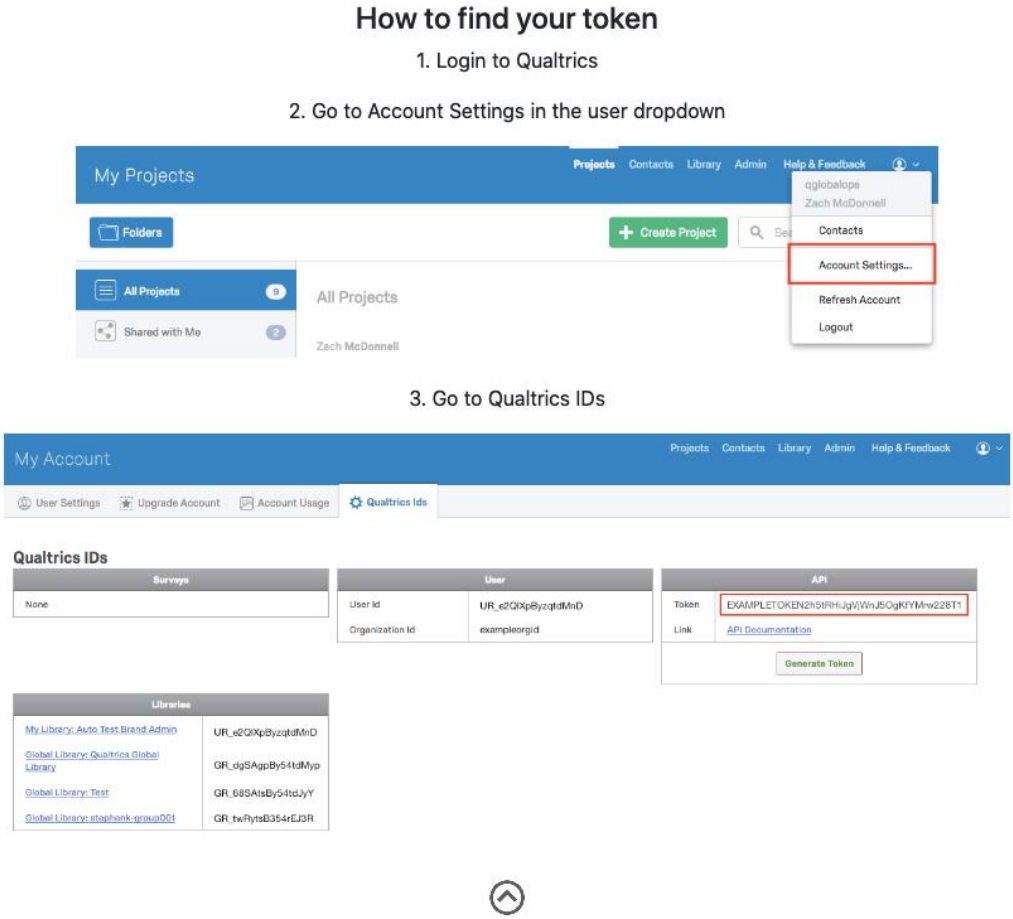


Connect to an existing Qualtrics account

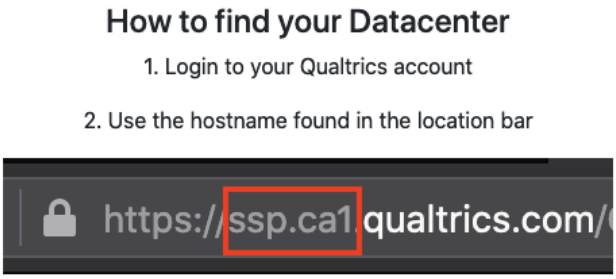
Once you have created an account you will be directed to link to an existing Qualtrics account. This requires your Qualtrics API token, and Datacenter ID.



Find your Qualtrics API token:



Find your Datacenter ID:



Create a compatible survey in Qualtrics

1. Login to your Qualtrics account and create a new survey project.

2. Format your survey to create intuitive visualizations using the IESAT:

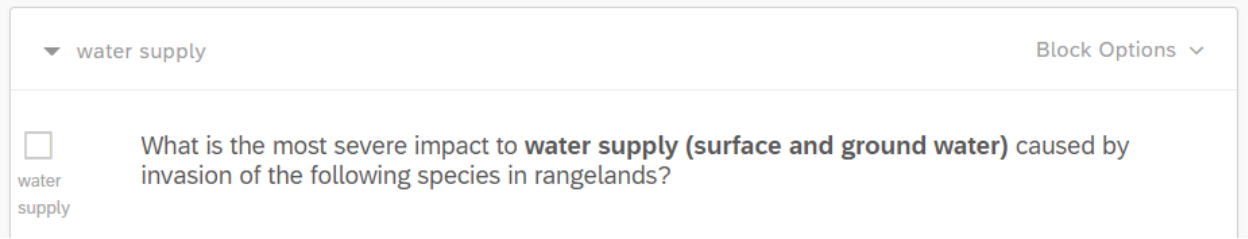
    2.1. Create a Qualtrics project title. This title will appear on the IESAT *create a project* dashboard under the *Pick a Qualtrics Survey* box.

3. Create your survey. Below guidelines apply to survey questions that will be included in the IESAT visualizations (flower diagrams and bar charts).

    Block/question formatting for visualizations:

    3.1. Use one question per block. Each block represents a single ecosystem service that is associated with multiple factors (i.e., statements in Qualtrics).

    3.2. Name your block and question corresponding to the ecosystem service. These must be given the same name. These names will be used when you create a visualization in IESAT (see *Recoding values example*).



    3.3. Select *side-by-side* question type with 1-2 columns and 1-100+ statements.

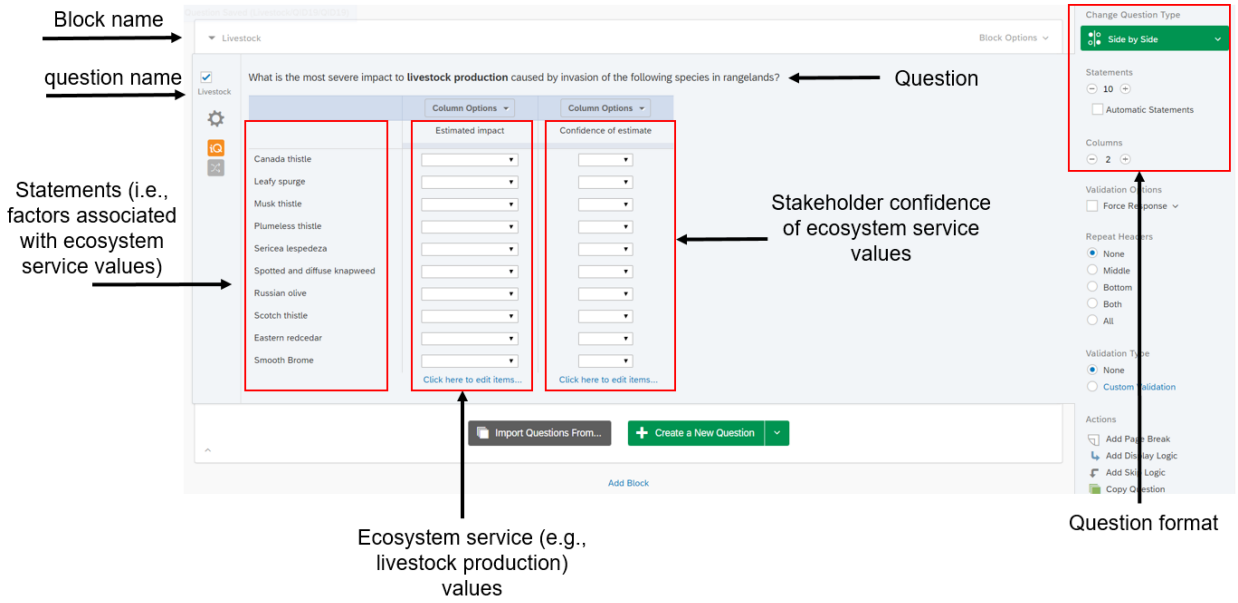
        3.3.1. Fill in your question.

        3.3.2. Fill in your statements. These are the factors associated with ecosystem service values. Statements can be locations, decisions, hazards, scenarios, etc., each associated with ecosystem services. Each statement will get a flower diagram showing all ecosystem service values selected by the user.

        3.3.3. In column one, specify a desired range of options representing potential ecosystem service values (e.g., low to high; 100% loss to 100% gain). We suggest using the *drop down list* option under *column options.*

3.3.4. In column two, specify a desired range of values representing a participant's confidence in their estimate of the ecosystem service value (column one). We recommend five categories for confidence: none, low, moderate, high, and extreme. This step is optional. Average confidence levels are shown in bar chart visualizations as bar color (see *About visualizations* section).

Example question format:



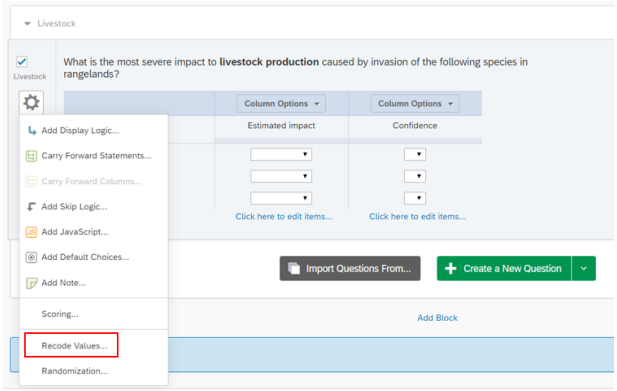
3.4. Recode values for the block (for additional information on how this translates to IESAT visualizations see *Recoding values example*):

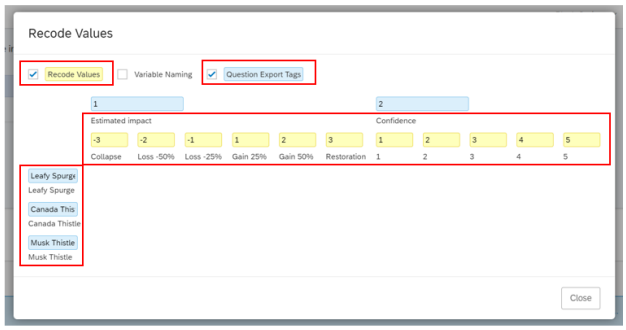
3.4.1. Select *advanced question options* (gear symbol below question name) → *Recode values...*

3.4.2. Check the *recode values* box and specify numerical values. These values will be used to plot aggregated survey results. For example, ecosystem service values ranging from none, low, medium, to high can be recoded as 0 through 3, or values ranging from -100% to 100% can be recoded as -100 through 100. These values will be used to determine axis minimum and maximum values for visualizations. To ensure functionality of confidence feature, recode the categories *none, low, moderate, high,* and *extreme* as -4, -2, 0, 2, and 4, respectively.

3.4.3. Check the *question export tags* box and specify question export tag names to reflect each statement. These names will appear as labels on the flower diagrams.

NOTE: Recode values for column names default to 1 and 2. <u>Do not change these values</u>.





3.5. Create new blocks and repeat above steps to add more ecosystem services. Note: statements and recoded values must be consistent among blocks. We recommend testing your first block with IESAT visualizations before creating additional blocks. After the first block (question) is completed additional blocks are easily created using the *copy block* feature under *block options*.

4. Review, publish, test, and distribute your survey. We strongly recommend taking your survey and testing the visualizations before distributing.

TIP: The next time you create a survey you can import properly formatted blocks/questions from other surveys using the *Import questions from…* feature. When this is done be sure to check the *Keep Questions Export Tags* box to reduce formatting time.

Create a project with the IESAT

1. Login to your account and select *create new project* under the *projects tab.*

2. Enter project title and description.

3. Create a new survey in Qualtrics or select an existing Qualtrics survey in the *pick a Qualtrics survey* box.

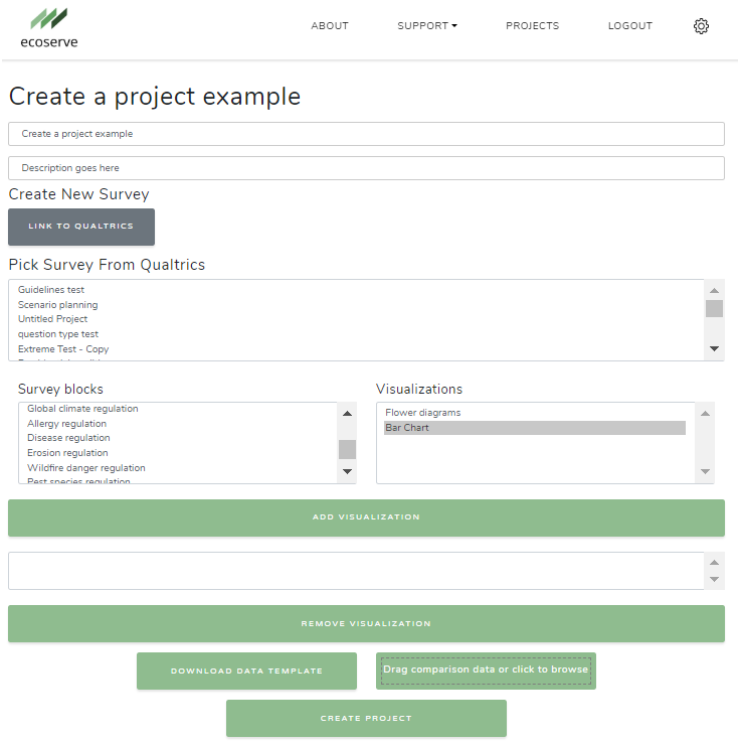
4. Specify what visualizations you would like:

    4.1. Select desired *survey blocks* (hold shift or ctrl to select multiple blocks).

    4.2. Select the corresponding graphics options (e.g., bar chart or flower diagram).

    4.3. Click *Add visualization*.

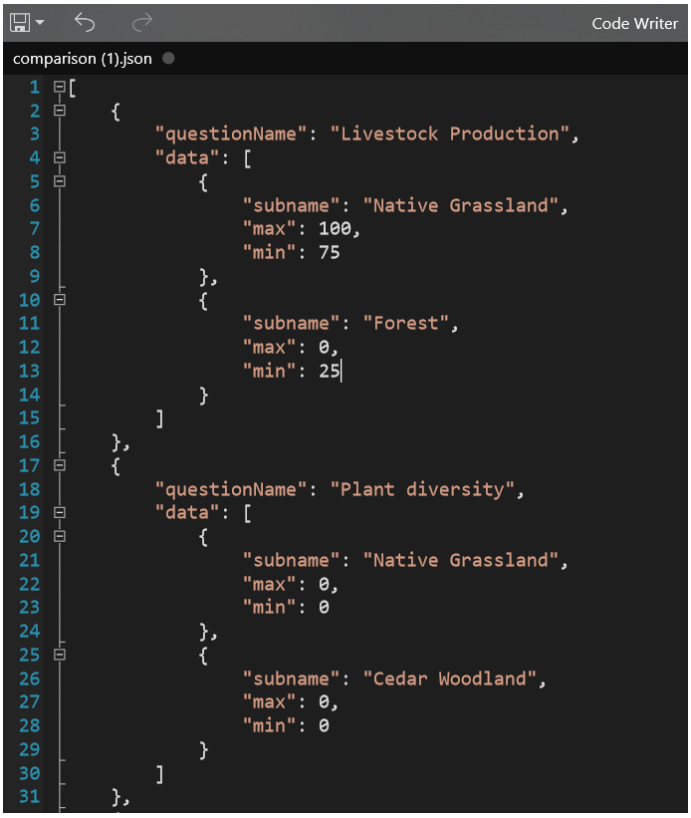
    4.4. Repeat as needed.



5. Add comparison data to the bar chart visualizations (optional)

    5.1. Select *download data template.*

    5.2. Open the file and enter minimum and maximum values under each *"subname"* section that you would like to add a comparison (see example below).



5.3. Save the file and upload it by dragging the file into the *drag comparison data or click to browse* box.

Adding comparison data allows users to compare ecosystem service values to a predetermined range of values in the bar chart visualization (see *About visualizations* section). This can be helpful in identifying discrepancies versus alignment between stakeholder perceptions and science informed values (e.g., from biophysical models) or can be used to compare aggregated survey values to other assessments, places, thresholds, or safe operating space.

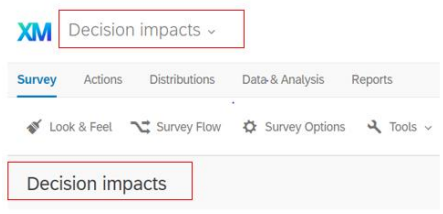
6. Create your project. Once your project is created visualizations will load in real-time as Qualtrics surveys are completed. From the visualization dashboard, you will be able to download visualizations and summarized data as well as share the visualization web page with participants (shared web page does not update as additional surveys are completed and does not have download features).

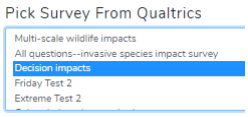
Recoding values example

Below is an example to show how components of the Qualtrics survey will appear on the IESAT.

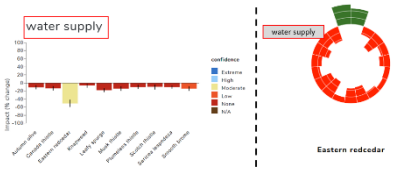
Qualtrics	IESAT: create a project	IESAT: visualizations

Survey title

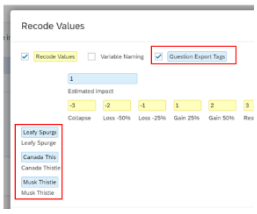


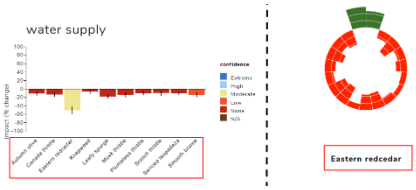


Block and question names

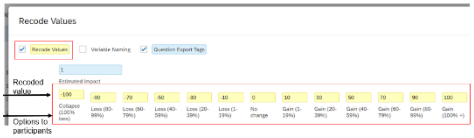


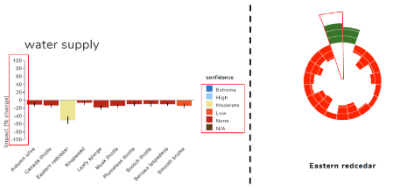
Recode values: statements/question export tags





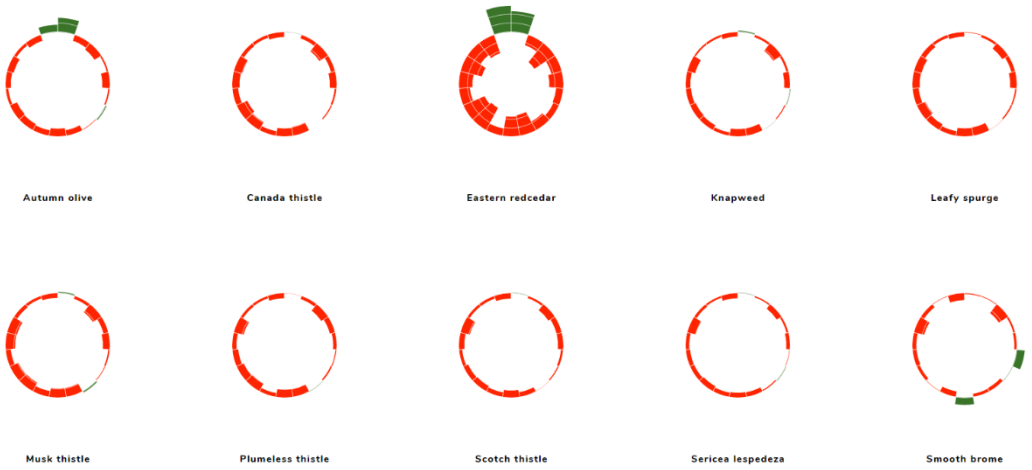
Recode values: recode values



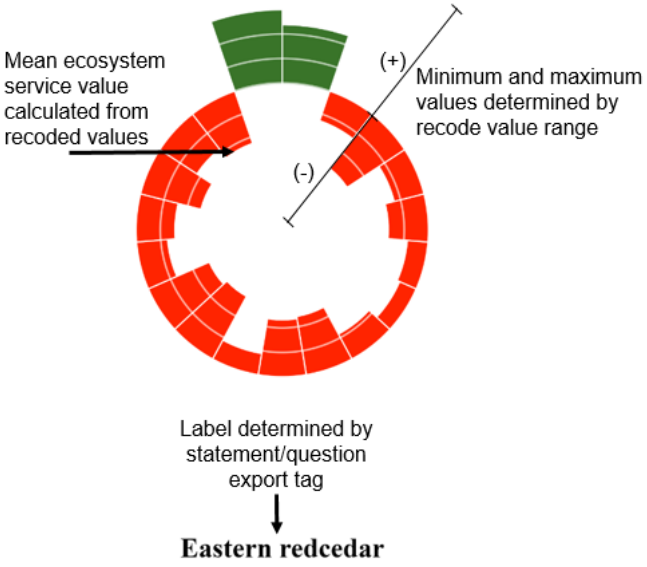


About the visualizations

1. *Flower diagrams*



Flower diagrams show mean ecosystem service values for a bundle of ecosystem services specified by the user. Each 'petal' represents a single ecosystem service. Ecosystem service names appear when the cursor hovers over the service. Flower diagrams are converted to tables when clicked on.



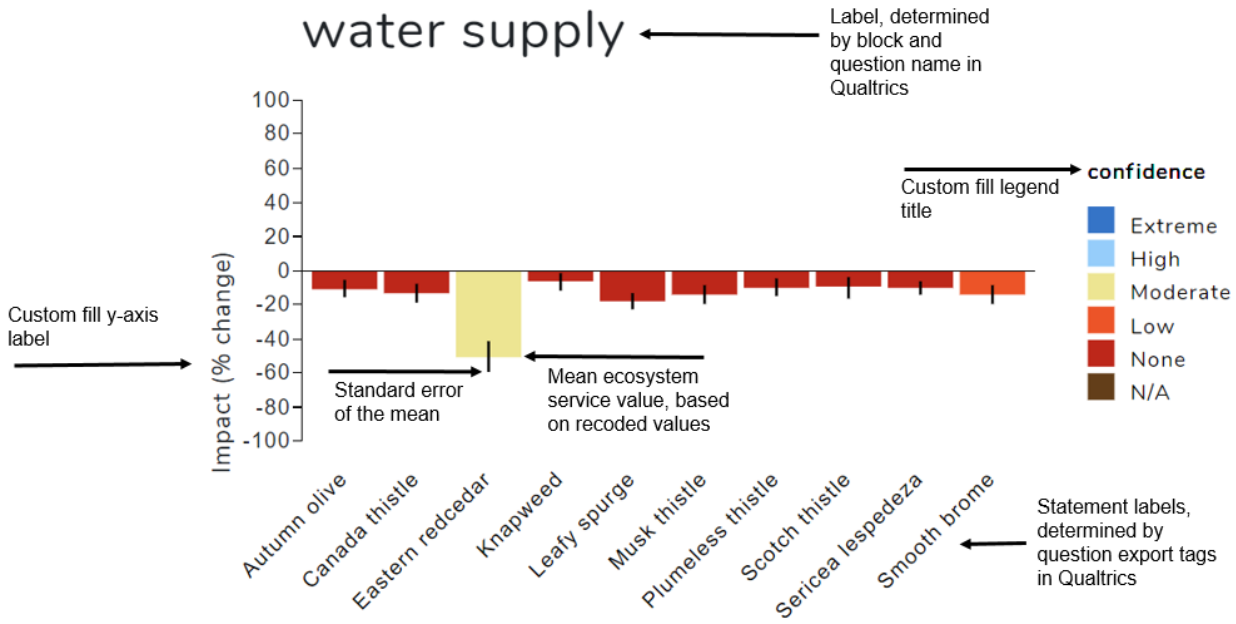
Comparison tables

Service	Impact	Confidence	Comparative Impact
aboveground carbon	Gain (20-39%)	Moderate	Much better
belowground carbon	Loss (40-59%)	Low	Much worse
biodiversity	Loss (80-99%)	Moderate	Much worse
climate reg.	Loss (40-59%)	Low	Much worse
cultural identity	Loss (40-59%)	Low	Much worse
erosion reg.	Loss (20-39%)	Low	Much worse
human health	Loss (20-39%)	Low	Much worse
insect pollination	Loss (40-59%)	Low	Much worse
land income	Loss (60-79%)	Moderate	Much worse
livestock	Loss (60-79%)	High	Much worse
pest outbreak reg.	Loss (20-39%)	Low	Much worse
rancher livelihoods	Loss (80-99%)	Moderate	Much worse
rangeland production	Loss (60-79%)	High	Much worse
recreation potential	Loss (40-59%)	Low	Much worse
school funding	Loss (40-59%)	Moderate	Much worse

Comparison tables summarize the flower diagram and illustrate participant confidence of estimated ecosystem service values. They also provide a categorical comparison of an individual statement's (e.g., species, decision, scenarios, hazards, etc.) ecosystem service value to the average value for all statements. For example, among ten invasive species Eastern redcedar rates as *much worse* for most ecosystem service impacts. Comparison categories are defined as follows:

Difference from the group mean: $\left\lvert \frac{statement\ value - group\ mean}{group\ mean} \right\rvert$	Category
IF value is ≤ 0.2	Similar
IF > 0.2 AND <0.4 AND statement value is > mean	Better
IF > 0.2 AND <0.4 AND statement value is < mean	Worse
IF > 0.4 AND statement value is > mean	Much better
IF > 0.4 AND statement value is < mean	Much worse

2. *Bar charts*



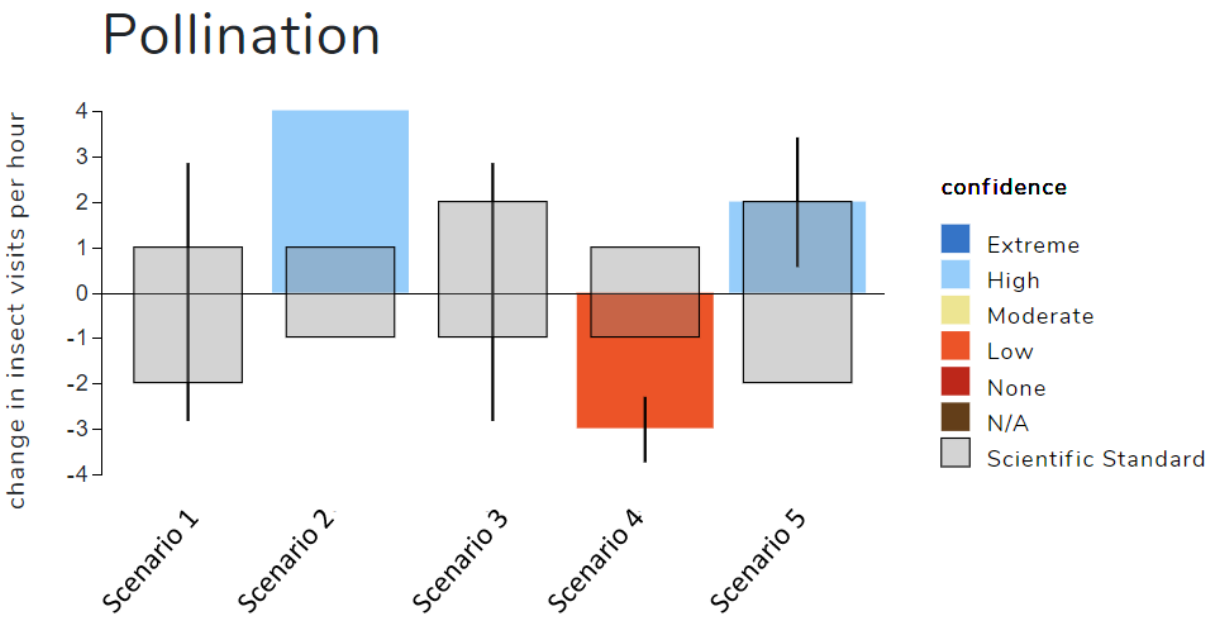
Bar charts compare statements (e.g., places, decisions, hazards, scenarios, etc.) based on individual ecosystem services. In this example, ten invasive species impacts to water supply are compared. Bar color corresponds to user's confidence of their estimated ecosystem service value.

Confidence values

Confidence is calculated from the mean of recoded confidence values (4, 2, 0, -2, -4; extreme to none, respectively). These values are then binned into the closest confidence category. For example, a recoded value of 4 represents extreme confidence, thus a confidence value of 3.0 is considered extreme, while values <3.0 and ≥1.0 are considered high.

Comparison data

By adding comparisons (shown as grey transparent boxes) users can compare survey based assessments to published literature, other assessments, thresholds, safe operating space, etc. This feature is intended to facilitate learning among the user and participants. For example, a discussion with stakeholders about discrepancies between their results and the literature can be used to better integrate knowledge sources. Below is an example for illustrative purposes only.



Re-send participants their survey

Allowing participants to retake the assessment survey before and after an event allows the user to assess learning outcomes and may be of interest to some users. Qualtrics has built in tools to re-send participants their survey once the initial survey has been completed. In the re-sent survey, answers from the initial survey are pre-populated. There are several ways this can be done. We recommend using the *Building a Retake Link* method. The following link provides instructions https://www.qualtrics.com/support/survey-platform/data-and-analysis-module/retake-survey-link/#BuildingARetakeLink

In order to best utilize this within the IESAT, when following the Qualtrics instructions to create the resend link action:

1. Add Condition – Set the condition to only perform the action if the email question is not blank
2. Append "?Q_R=" to the URL, not "&Q_R_DEL=1". This tells Qualtrics to save both initial and retake surveys. The IESAT visualizations will reflect the most recent responses from participants that have retaken the survey. The IESAT uses participants email addresses to detect when a survey is a retake.

TIP: Create a template survey with the *Retake survey* action. This will allow users to use the *Copy project* feature to quickly create a new project with the built in send retake link action.

Survey orientation and consent

The IESAT is a data visualizations tool (https://ecoserve-app.com). It is the user's responsibility to ensure that participants are provided with appropriate information before participants decide whether to consent to participate in research. This includes but is not limited to providing potential participants with an overview of the scope of work, objectives, data use and storage, confidentiality, the voluntary nature of participation, survey instructions, as well as other items that may be required by an Institutional Review Board (IRB). We have found that providing sufficient background materials increases stakeholder interest in the engagement process.

Security

All account and survey data used by the IESAT is encrypted in-transit and at-rest. The IESAT uses Transport Layer Security (TLS) encryption (i.e., HTTPS) for all transmitted data. All accounts are password protected and authorized with OAuth 2.0, the industry standard for authorization. This ensures that only you have access to your projects. Account information is stored on Amazon Web Services' (AWS) secure servers.

The IESAT uses MongoDB's secure servers to store encrypted data from Qualtrics surveys. This includes all data associated with visualizations and email addresses if included in the survey. Email addresses allow detection of survey retakes so that visualizations only show data that are from the most recent survey. Therefore, survey data stored by the IESAT does not include personal identifiers unless emails are collected in the survey. Data that is not associated with visualizations is not stored. When projects are deleted in the IESAT, all associated data is immediately removed. Similarly, when surveys or survey data is removed from Qualtrics it is immediately removed from the IESAT.

Disclaimer

It is the user's responsibility to ensure that they are in compliance with ethics, rules, and regulations for work involving human subjects. All research involving human subjects requires an independent review and approval by an Institutional Review Board (IRB). It is the user's responsibility to contact their institution's review board (IRB) and identify the necessary procedures. The IESAT is a data visualization tool, users are responsible for the content of the data. All data presented on the IESAT is in a de-identified, aggregate form, the user is responsible for taking necessary measures to ensure that participant's responses remain anonymous.