

Welcome to the Ecological Evidence Exchange (EcoEvidEx)!

Welcome to the test entry form for the Ecological Evidence Exchange (EcoEvidEx) initiative. The journal *Freshwater Science* is undertaking this initiative to enable and promote more rapid application of scientific data to environmental management. The research results reported in *Freshwater Science* papers provide evidence that can inform management decisions. However, this evidence often does not reach decision-makers in useful formats and time frames. The goal of the Ecological Evidence Exchange is to turn research results into evidence that is easily accessible and interpretable by environmental managers, to increase the likelihood that their decisions are informed by available, sound science.

This document is intended to help you work through the EcoEvidEx data entry form. It is organized into two main sections: (1) a step-by-step guide through the sections and fields of the data entry process; and (2) examples of evidence metadata extracted from a set of *Freshwater Science* citations.

For approximately the next month, we will be doing initial tests of evidence metadata collection. We ask you to enter metadata for one or more of your existing papers published in *Freshwater Science* or in another journal. After this trial period, we will revise the process based on your feedback. As you fill out the form, please keep track of your comments, ideas, and questions – we will ask for this feedback at the end of the form.

Metadata entered during this initial test phase will not be made publicly available at this stage; it will be used to help us better define and explain the fields required for a public database. Once the trial period is over, we will, with your permission, transfer your metadata to a publicly accessible database.

Below we walk through the EcoEvidEx data entry form, providing definitions for individual fields and field options and tips that may be useful as you work through the fields. We also present some example extractions, to show how information was entered for specific test papers.

1. The Ecological Evidence Exchange Data Entry Form

The information is organized by sections of the data entry form, then by fields or questions within each section. For most fields, we provide a brief description of the field, the field type (e.g., free text vs. drop-down list), and, for drop-down lists, the field options and their definitions.

Some general notes as you work through the form:

- You can enter papers published in any journal (i.e., not just those published in *Freshwater Science*) and by any author (i.e., not just those on which you are a lead or contributing author) using this form.
- This form is organized by different cause-effect pairs, or associations between two variables. We sometimes refer to these variables as “Variable 1 (Cause)” and “Variable 2 (Effect)”, to highlight the fact that research results typically demonstrate associations between two variables, rather than proving causality. You can also think of Variable 1 (Cause) and Variable 2 (Effect) as the independent and dependent variables, respectively. You may enter evidence for up to three cause-effect pairs using this form.

- If the paper you are entering contains evidence for more than three cause-effect pairs, select the cause-effect that you consider the most important findings of the paper. Do not exclude a cause-effect pair simply because the result was non-significant.
- Although this form may initially look long (with 17 sections), many of these sections comprise a single question or are only completed under certain circumstances. If you enter evidence for a single association (or cause-effect pair), you will work through 6 of the 17 sections. Once you select the cause-effect pairs of interest you want to enter, we estimate that working through the entire form (i.e., entering information for three cause-effect pairs) will take you less than 30 minutes.
- Required fields are denoted with a *. However, note that these fields are only required if you are entering metadata in the given section (e.g., if you choose to only enter metadata for a single cause-effect pair, you do not complete the “required” fields for cause-effect pairs 2 or 3).
- Note that different researchers may interpret the same study design, extent, or other parameter in slightly different ways—what matters is that you can logically explain why you arrived at your entry in the associated free-text fields.

Section 1: Ecological Evidence Exchange – TEST ENTRY

Name

Name (first and last) of person entering evidence

Email

Email address of person entering evidence

Citation DOI *

Digital object identifier (DOI) of citation reporting evidence, to provide a unique and unambiguous identifier for the publication. If the paper does not have a DOI, provide other unambiguous citation information (e.g., author(s), year, journal, volume, pages).

Section 2: CAUSE-EFFECT PAIR 1

This pair of variables represents one of the key relationships evaluated in the study. Prioritize relationships that have been statistically quantified via some measure of effect size.

Response Measure Type *

Brief description: Response measure used to evaluate the relationship between variable 1 (cause) and variable 2 (effect)

Field type: Drop-down list (14 options)

Options:

- ***F ratio/statistic***: statistic from ANOVA or regression, which evaluates significant differences between groups based on variation between means (numerator) and variation within samples (denominator)
- ***Mean difference***: absolute difference in mean response value of two groups
- ***Odds ratio***: odds that an outcome will occur given an exposure vs. given the absence of that exposure
- ***Not reported***: no reported measure of effect size

- **Ordination:** multivariate method of analysis and data reduction, in which variables are arranged in several dimensions based on similarity among samples
- **Other:** any response measure type not represented by the other drop-down options
- **Pearson correlation coefficient:** Pearson product-moment correlation
- **R-squared – multiple:** coefficient of determination from multiple regression analysis
- **R-squared – other:** coefficient of from regression other than multiple or simple linear (e.g., quantile regression)
- **R-squared – simple linear:** coefficient of determination from simple linear regression
- **Response ratio:** response value for treatment group divided by response value for control group
- **Slope coefficient (beta):** slope coefficient from regression analysis
- **Spearman correlation coefficient:** Spearman rank correlation coefficient
- **Standardized mean difference:** difference in mean response between groups divided by standard deviation of response among organisms

Notes:

- This field represents the type of effect size measure reported in the paper, for the cause-effect pair of interest.
- If no specific measure of effect size is reported (e.g., a paper reports variable means in different treatments, but does not calculate the difference between those means), select “not reported” from the drop-down list.

Response Measure Value

Brief description: Reported numeric value of the response measure

Field type: Free text (numeric)

Notes:

- This field represents the actual numeric value of the effect size measure reported in the paper, for the cause-effect pair of interest.

Response Measure Description

Brief description: Any response-measure relevant descriptions or explanatory notes

Field type: Free text

Notes:

- If the response measure needs further explanation to allow a new reader to understand your work, provide that here.
- If "ordination" or "other" was selected under Response Measure Type, provide clarification here (e.g., details on any statistic derived from the ordination such as correlations of environmental variables with PCA axes).

Variable 1 (Cause) Term *

Brief description: First (cause) term in the association evaluated by research results

Field type: Drop-down list (100 options)

Notes:

- For the long drop-down lists, enter the first letter of the term to jump to it; for terms starting with the letter "c", enter "d" and work your way up the list.
- Often you may feel that the term in the drop-down list does not exactly match your specific variable. This is expected, given the breadth of research we're trying to capture with a

limited number of terms. However, restricting the number of terms reduces the possibility of inadvertent misclassification.

- Make every attempt to pick the best existing term choice for your variable. Only if your variable is completely distinct from anything on the existing term list, choose “other” and provide your specific term description under Variable 1 (Cause) Term – Description.

Variable 1 (Cause) Term – Description

Brief description: Details on specific parameter measured for cause, and any additional cause-relevant explanatory notes.

Field type: Free text

Notes:

- This field provides understanding of your cause variable for a new reader, to help them assess whether the cause-effect pair is relevant to their question.
- If "other" was selected under Variable 1 (Cause) Term, provide clarification here.

Variable 1 (Cause) Term – Trajectory *

Brief description: Direction of change in first (cause) term

Field type: Drop-down list (4 options)

Options:

- **Change:** non-unidirectional change in cause variable, or categorical presence/absence of cause variable
- **Decrease:** decreasing trend or categorical decrease in cause variable
- **Increase:** increasing trend or categorical increase in cause variable
- **No change:** no indication of change in cause variable

Notes:

- This field tells a reader whether your cause variable is increasing, decreasing or staying the same across the study. It is unlikely that Variable 1 (Cause) Term – Trajectory will be “no change”; typically, a study is evaluating some change in the cause variable.
- For a categorical response (e.g., comparison between impacted and control sites), choose the cause trajectory in relation to the impacted site. For example, if an impacted site is downstream of a dam and flood peak volume has reduced relative to a control site, choose “decrease”; if an impacted site is experiencing flooding (i.e., increased flow volume), choose “increase”; if an experimental study tests the effect of lead exposure (relative to a non-exposure control), choose “increase”.
- Cause and effect trajectories may be determined from the direction of the response measure (e.g., positive vs. negative correlation coefficient or slope coefficient) and/or by presentation of actual data values in figures, tables, or text. For certain statistical analyses (e.g., an ANOVA), you may not be able to determine direction of the relationship from the test statistic, but direction will often be reported verbally or in figures.
- If the response measure you entered indicates a positive relationship between two continuous variables, both Variable 1 (Cause) Term – Trajectory and Variable 2 (Effect) Term – Trajectory likely will be “increase”; if you enter a negative relationship between two continuous variables, Variable 1 (Cause) Term – Trajectory will likely be “increase” while Variable 2 (Effect) Term – Trajectory will likely be “decrease”.

Variable 2 (Effect) Term *

Brief description: Second (effect) term in the association evaluated by research results.

Field type: Drop-down list (320 options)

Notes:

- For the long drop-down lists, enter the first letter of the term to jump to it; for terms starting with the letter "c", enter "d" and work your way up the list.
- Often you may feel that the term in the drop-down list does not exactly match your specific variable. This is expected, given the breadth of research we're trying to capture with a limited number of terms. However, restricting the number of terms reduces the possibility of inadvertent misclassification.
- Make every attempt to pick the best existing term choice for your variable. Only if your variable is completely distinct from anything on the existing term list, choose "other" and provide your specific term description under Variable 2 (Effect) Term - Description.

Variable 2 (Effect) Term - Description

Brief description: Details on specific parameter measured for effect, and any additional effect-relevant explanatory notes

Field type: Free text

Notes:

- This field provides understanding of your effect variable for a new reader, to help them assess whether the cause-effect pair is relevant to their question.
- If "other" was selected under Variable 2 (Effect) Term, provide clarification here.

Variable 2 (Effect) Term - Trajectory *

Brief description: Direction of change in second (effect) term

Field type: Drop-down list (4 options)

Options:

- **Change:** non-unidirectional change in effect variable, or categorical presence/absence of effect variable
- **Decrease:** decreasing trend or categorical decrease in effect variable
- **Increase:** increasing trend or categorical increase in effect variable
- **No change:** no indication of change in effect variable
-

Notes:

- This field tells a reader whether the effect variable is increasing, decreasing or staying the same across the study.
- The "no change" option is critical to evidence assessment, as it is reporting null results, where no effect was detected given a change in the cause variable. Evidence assessment requires that evidence against a hypothesis is reported along with evidence that supports it. Do not leave out a cause-effect pair simply because the result was non-significant.
- The "change" option may be particularly relevant for differences in community structure, as the result of a cause or treatment (i.e., there is no meaning to an "increase" or "decrease" in a community).
- Cause and effect trajectories may be determined from the direction of the response measure (e.g., positive vs. negative correlation coefficient or slope coefficient) and/or by presentation of actual data values in figures, tables, or text. For certain statistical analyses

(e.g., an ANOVA), you may not be able to determine direction of the relationship from the test statistic, but direction will often be reported verbally or in figures.

- If you enter a positive relationship between two continuous variables, both Variable 1 (Cause) Term – Trajectory and Variable 2 (Effect) Term – Trajectory likely will be “increase”; if you enter a negative relationship between two continuous variables, Variable 1 (Cause) Term – Trajectory will likely be “increase” while Variable 2 (Effect) Term – Trajectory will likely be “decrease”.

Evidence Documentation *

Brief description: Where the response measure value can be found in the reference

Field type: Free text

Notes:

- Enter the specific figure number, table number, and/or page and column in the text where the response measure value is presented. This will help a reader who wishes to check the original source.

Section 3: STUDY DESIGN FOR CAUSE-EFFECT PAIR 1

NOTE: brief descriptions of the study design fields are provided here. For more detailed explanations of certain fields (e.g., Study Design) and field options, please see the [study design help file](#).

Source Data *

Brief description: Source of data used to generate research results

Field type: Drop-down list (5 options)

Options:

- **Field:** data collected from field sites
- **Laboratory:** data collected from controlled experimental studies conducted in laboratory settings
- **Mesocosm:** data collected from controlled experimental studies in settings that mimic some amount of natural conditions and ecological complexity (e.g., artificial streams or ponds)
- **Model:** data resulting from model output
- **Other:** any source data not represented by the other drop-down options

Notes:

- If “other” is selected, specified source data under Design Description.

Study Type *

Brief description: General type of study used to generate research results.

Field type: Drop-down list (6 options)

Options:

- **Manipulation:** study experimentally altered conditions and documented effects
- **Meta-analysis:** study compiled and statistically analyzed results from other studies
- **Model:** study used a model to examine relationships or answer questions
- **Observation:** study reports original data from existing sites, with no experimental manipulation
- **Other:** any study type not represented by the other drop-down options

Notes:

- If “other” is selected, specify study type under Design Description.

Study Design *

Brief description: [Design of study used to generate relevant results](#)

Field type: Drop-down list (9 options)

Options:

- **After impact only:** compares measures sampled at impact locations to a standard of some kind, with no before impact or control/reference data
- **Before vs. after (no control):** compares measures sampled before and after some impact, with no control/reference data
- **BACI/BARI (Before After Control Impact/Before After Reference Impact):** compares measures sampled at two locations (control/reference site vs. impact site), before and after impact
- **BACIP (Before After Control Impact Paired):** compares measures taken at the same times (i.e., paired measures) at a control and impact location
- **Control/reference vs. treatment/impact (no before):** compares control/reference locations to treatment/impact locations, with no before data at impact locations
- **Gradient:** compares samples at multiple locations (spatial gradient), multiple times (temporal gradient), or multiple levels of a treatment (treatment gradient)
- **MBACI/MBARI (Multiple Before After Control Impact/Multiple Before After Reference Impact):** compares measures sampled at multiple control/reference locations and multiple impact locations
- **Other:** any study design not represented by the other drop-down options

Notes:

- If “gradient” is selected, specify whether the study represents a spatial, temporal, or treatment gradient under Design Description.
- If “other” is selected, specify study design under Design Description.

Number of Independent Sampling Units *

Brief description: Number of sampling units free of pseudoreplication

Field type: Free text (numeric)

Notes:

- This field represents the number of sites or independent experimental units evaluated in the study.
- In determining sample units, consider how your study may be used in a synthesis study. These studies will often try to reach conclusions across sets of studies at a large experimental scale—so sites, rivers, watersheds, or other units might be the unit of replication.
- If in doubt, be conservative.

Control vs. Impact Sampling Units

Brief description: Number and/or explanation of control/reference vs. impact/treatment sampling units.

Field type: Free text

Notes:

- This field should be completed only if a factorial design (i.e., BACI/BARI, BACIP, control/reference vs. treatment impact, MBACI/MBARI is selected under Study Design).

Replication *

Brief description: Description of replication across or within sampling units

Field type: Free text

Notes:

- Use caution when assessing if there is replication across or within sampling units. Many observational studies may have 1 replicate per site, or may be pseudoreplicated (e.g., multiple samples taken at different locations along the same river); other study types may have true replication (e.g., a treatment may have 2 or more replicates).
- If you feel that the authors used pseudoreplication to analyze a dataset, describe that here as an explanation for any discrepancy between what you have entered and values reported in the paper.

Sample Size Used in Analysis *

Brief description: Sample size for the analysis that generates the response measure value (e.g., number of data points in a regression)

Field type: Free text (numeric)

Notes:

- This may be the same as the number of independent sampling units. However, these values may differ based the number of times sites were sampled, how samples are treated in the analysis, or the type of analysis used. For example, if all 5 replicates taken at each of 3 different rivers included in a simple linear regression analysis, the sample size used in analysis is 15, whereas the number of independent sampling units is 3.
- A number or range of numbers should be entered in this field.
- If further explanation is needed, describe under Design Description.

Design Description

Brief description: Any design-relevant descriptions or explanatory notes

Field type: Free text

Notes:

- Enter any relevant information about study design that was not captured in other fields, or any information that will help readers understand the study design, in this field.
- If "other" was selected under Source Data, Study Type, or Study Design, provide clarification here.
- If "gradient" was selected, specify whether the study represents a spatial, temporal, or treatment gradient here.

Section 4: CONTEXT FOR CAUSE-EFFECT PAIR 1

Habitat *

Brief description: Habitat in which data were collected

Field type: Drop-down list (9 options)

Options:

- **Artificial:** any non-natural, human-created habitat (e.g., mesocosms, flumes)

- **Estuary:** aquatic habitat at the interface between freshwater and marine systems
- **Floodplain:** habitat adjacent to rivers or streams that is or was historically flooded during high flows
- **Lake/pond:** lentic (non-flowing) waterbody
- **Marine:** ocean habitat with saline water, including open water or benthic areas
- **Other:** any habitat not represented by the other drop-down options
- **Reservoir:** man-made lentic (non-flowing) water body, resulting from construction of dam
- **Stream/river:** lotic (flowing) waterbody
- **Wetland:** shallow waterbody with a diverse hydrophilic plant community

Notes:

- If “other” is selected, specify actual habitat type under Context Description.

Climate *

Brief description: Climate in which data were collected

Field type: Drop-down list (6 options)

Options:

- **Arid/dry:** Group B of the Koppen climate classification system; includes dry and semi-arid Desert and Steppe regions with hot or cold climates where actual precipitation is less than potential evapotranspiration
- **Cold (continental):** Group D of the Koppen climate classification system; mostly occurs in interiors of continents and on upper east coasts, normally north of 40°N, where average temperature is above 10 °C (50 °F) in warmest month and below -3 °C (27 °F) in coldest month
- **Temperate:** Group C of the Koppen climate classification system; includes Mediterranean, Humid Subtropical, Oceanic, and Highland climates where the coldest month averages between 0 °C (32 °F) and 18 °C (64.4 °F) and at least one month averages above 10 °C (50 °F)
- **Tropical:** Group A of the Koppen climate classification system; includes Tropical Rainforest, Tropical Monsoon, and Tropical Wet or Dry Savanna regions where all 12 months of the year have average temperatures of 18 °C (64.4 °F) or higher
- **Polar:** Group E of the Koppen climate classification system; includes Tundra and Ice Cap regions where every month of the year has an average temperature below 10 °C (50 °F)
- **Multiple:** study area encompasses multiple climate classes

Notes:

- Climate options are based on the Koppen climate classification system (<https://tinyurl.com/qxgekbr>). Weatherbase (www.weatherbase.com) provides the Koppen climate classification for cities across the globe. Search for your study location in the search bar at the top of the page and click on ‘Climate Summary’ under Weather.
- If “multiple” is selected, specify which climate classes are included under Context Description.

Country *

Brief description: Country in which data were collected

Field type: Drop-down list (230 options)

Notes:

- If “multiple” is selected, specify countries under Context Description.

Spatial Extent *

Brief description: Spatial scale across which data were collected

Field type: Drop-down list (6 options)

- **Reach/section:** data collected at one or more reaches or sections within a single waterbody
- **Drainage basin:** data collected at multiple waterbodies within a single drainage basin
- **Regional:** data collected at multiple waterbodies across multiple drainage basins
- **Continental:** data collected at multiple waterbodies across large geographic areas (e.g., countries or continents)
- **Global:** data collected at multiple waterbodies across multiple countries or continents
- **Other:** data collected at any spatial extent not represented by the existing drop-down options

Notes:

- Statewide or provincewide data are considered “regional”.
- There are not necessarily clear distinctions between some of these options (e.g., what one person might consider a drainage basin-scale paper, another might consider a regional-scale paper).
- If “other” is selected, specify spatial extent under Context Description.

Temporal Extent *

Brief description: Temporal scale across which data were collected.

Field type: Drop-down list (7 options)

Options:

- **Snapshot:** data collected at one point in time at each site
- **Days:** data collected over multiple days, but less than two weeks
- **Weeks:** data collected over multiple weeks, but less than two months
- **Months:** data collected over multiple months, but less than two years
- **Years:** data collected over multiple years, but less than two decades
- **Decades:** data collected over multiple decades
- **Other:** data collected over any temporal extent not represented by the existing drop-down options

Notes:

- Temporal extent refers to the temporal scale at which data were collected at each site, not the temporal scale over which all data were collected. For example, if a study sampled 10 sites, once per site, over a 2-month period, the temporal extent of the study would be considered “snapshot” rather than “months”.
- If “other” is selected, specify the temporal extent under Context Description.

Context Description

Brief description: Any context-relevant descriptions or explanatory notes

Field type: Free text

Notes:

- If "other" or "multiple" was selected under Habitat, Climate, Country, Spatial Extent, or Temporal Extent, provide clarification here.

Section 5: ENTER CAUSE-EFFECT PAIR 2?

Do you have another cause-effect pair to enter?

- Select “yes” if you want to enter evidence metadata for another association. This will bring you to the Cause-Effect Pair 2 section (Section 6).
- Select “no” if you do not want to enter evidence metadata for another association. This will bring you the User Feedback section (Section 17).

Section 6: CAUSE-EFFECT PAIR 2

This section matches the section previously completely for cause-effect pair 1; see Section 2: CAUSE-EFFECT PAIR 1 for information on the specific fields and field options.

Section 7: STUDY DESIGN DIFFERENCES (PAIR 2 VS. PAIR 1)

Do the study design variables differ between cause-effect pair 2 and cause-effect pair 1?

- Select “yes” if Source Data, Study Type, Study Design, Number of Independent Sampling Units, Control vs. Impact Sampling Units, Replication, Sample Size Used in Analysis, and/or Design Description differ between cause-effect pair 2 and the values you previously entered for cause-effect pair 1. This will bring you to the Study Design for Cause-Effect Pair 2 section (Section 8), where you can enter study design metadata for cause-effect pair 2 into a blank set of fields. Note that you will need to re-enter all information, even if certain fields remain the same across cause-effect pairs.
- Select “no” if all the study design variables you entered for cause-effect pair 1 also apply to cause-effect pair 2. This will replicate the design information previously entered for cause-effect pair 1 and bring you to the Context Differences (Pair 2 vs. Pair 1) section (Section 9).

Section 8: STUDY DESIGN FOR CAUSE-EFFECT PAIR 2

This section matches the section previously completely for cause-effect pair 1; see Section 3: STUDY DESIGN FOR CAUSE-EFFECT PAIR 1 for information on the specific fields and field options. Enter the study design variables for cause-effect pair 2 (you will need to re-enter all variables, even those that do not differ from your previously entered cause-effect pairs).

Section 9: CONTEXT DIFFERENCES (PAIR 2 VS. PAIR 1)

Do the context variables differ between cause-effect pair 2 and cause-effect pair 1?

- Select “yes” if Habitat, Climate, Country, Spatial Extent, Temporal Extent, and/or Context Description differ between cause-effect pair 2 and the values you previously entered for cause-effect pair 1. This will bring you to the Context for Cause-Effect Pair 2 section (Section 10), where you can enter context metadata for cause-effect pair 2 into a blank set of fields. Note that you will need to re-enter all information, even if certain fields remain the same across cause-effect pairs.
- Select “no” if all the context variables you entered for cause-effect pair 1 also apply to cause-effect pair 2. This will replicate the context information previously entered for cause-effect pair 1 and bring you to the Enter Cause-Effect Pair 3 section (Section 11).

Section 10: CONTEXT FOR CAUSE-EFFECT PAIR 2

This section matches the section previously completely for cause-effect pair 1; see Section 4: CONTEXT FOR CAUSE-EFFECT PAIR 1 for information on the specific fields and field options. Enter the context variables for cause-effect pair 2 (you will need to re-enter all variables, even those that do not differ from your previously entered cause-effect pairs).

Section 11: ENTER CAUSE-EFFECT PAIR 3?

Do you have another cause-effect pair to enter?

- Select “yes” if you want to enter evidence metadata for another association. This will bring you to the Cause-Effect Pair 3 section (Section 12).
- Select “no” if you do not want to enter evidence metadata for another association. This will bring you the User Feedback section (Section 17).

Section 12: CAUSE-EFFECT PAIR 3

This section matches the section previously completely for cause-effect pair 1; see Section 2: CAUSE-EFFECT PAIR 1 for information on the specific fields and field options.

Section 13: STUDY DESIGN DIFFERENCES (PAIR 3 VS. PAIRS 1 AND/OR 2)

Do the study design variables differ between cause-effect pair 3 and cause-effect pairs 1 and/or 2?

- Select “yes” if Source Data, Study Type, Study Design, Number of Independent Sampling Units, Control vs. Impact Sampling Units, Replication, Sample Size Used in Analysis, and/or Design Description differ between cause-effect pair 3 and the values you previously entered for cause-effect pairs 1 and/or 2. This will bring you to the Study Design for Cause-Effect Pair 3 section (Section 14), where you can enter study design metadata for cause-effect pair 3 into a blank set of fields. Note that you will need to re-enter all information, even if certain fields remain the same across cause-effect pairs.
- Select “no” if all the study design variables you entered for cause-effect pairs 1 and/or 2 also apply to cause-effect pair 3. This will replicate the study design information previously entered for cause-effect pairs 1 and/or 2 and bring you to the Context Differences (Pair 3 vs. Pairs 1 and/or 2) section (Section 15).

Section 14: STUDY DESIGN FOR CAUSE-EFFECT PAIR 3

This section matches the section previously completely for cause-effect pair 1; see Section 3: STUDY DESIGN FOR CAUSE-EFFECT PAIR 1 for information on the specific fields and field options. Enter the study design variables for cause-effect pair 3 (you will need to re-enter all variables, even those that do not differ from your previously entered cause-effect pairs).

Section 15: CONTEXT DIFFERENCES (PAIR 3 VS. PAIRS 1 AND/OR 2)

Do the context variables differ between cause-effect pair 3 and cause-effect pairs 1 and/or 2?

- Select “yes” if Habitat, Climate, Country, Spatial Extent, Temporal Extent, and/or Context Description differ between cause-effect pair 3 and the values you previously entered for cause-effect pairs 1 and/or 2. This will bring you to the Context for Cause-Effect Pair 3 section (Section 16), where you can enter context metadata for cause-effect pair 3 into a blank set of fields. Note that you will need to re-enter all information, even if certain fields remain the same across cause-effect pairs.
- Select “no” if all the context variables you entered for cause-effect pairs 1 and/or 2 also apply to cause-effect pair 3. This will replicate the context information previously entered for cause-effect pairs 1 and/or 2 and bring you to the User Feedback section (Section 17).

Section 16: CONTEXT FOR CAUSE-EFFECT PAIR 3

This section matches the section previously completely for cause-effect pair 1; see Section 4: CONTEXT FOR CAUSE-EFFECT PAIR 1 for information on the specific fields and field options. Enter the context variables for cause-effect pair 3 (you will need to re-enter all variables, even those that do not differ from your previously entered cause-effect pairs).

Section 17: USER FEEDBACK

Was this form easy to complete?

Strongly agree, agree, neutral, disagree, strongly disagree

How could the Ecological Evidence Exchange initiative be improved?

For example, are there any fields, field options, or cause-effect terms that should be added or modified?
Are there changes or additions to the help document that would be useful?

2. Example Ecological Evidence Exchange extractions

In this section, we present four example extractions for the Ecological Evidence Exchange initiative. Each example extraction includes the citation, a table that lists entries for each of the evidence metadata fields, and a marked-up copy of the citation pdf, showing where this information was found in the paper.

[Hitt NP and DB Chambers. 2014. Temporal changes in taxonomic and functional diversity of fish assemblages downstream from mountaintop mining. *Freshwater Science* 33\(3\):915-926. DOI: \[10.1086/676997\]\(#\).](#)

SECTION	FIELD	EXTRACTED EVIDENCE METADATA
1: Intro	Name	John Smith
	Email	johnsmith@com.net
	Citation DOI	10.1086/676997
2: Cause-Effect Pair 1	Response Measure Type	Mean difference
	Response Measure Value	2.3
	Response Measure Description	Difference in species richness between control and impact sites across all samples
	Variable 1 (Cause) Term	Effluent - mining
	Variable 1 (Cause) Term - Description	Increased metal concentrations in rivers due to mountain top mining
	Variable 1 (Cause) Term - Trajectory	Increase
	Variable 2 (Effect) Term	Fish richness
	Variable 2 (Effect) Term - Description	Reduction in fish taxonomic richness
	Variable 2 (Effect) Term - Trajectory	Decrease
Evidence Documentation	Table 3; text p. 919	
3: Study Design for Cause-Effect Pair 1	Source Data	Field
	Study Type	Observation
	Study Design	Control/references vs. treatment/impact (no before)
	Number of Independent Sampling Units	4
	Control vs. Impact Sampling Units	2 reference sites, 2 impact sites
	Replication	4 sampling events at reference sites, 6 sampling events at impact sites
	Sample Size Used in Analysis	4 sampling events at reference sites, 6 sampling events at impact sites
	Design Description	Sampled 2 exposure (mining) and 2 reference sites in total; 2 sites (1 reference, 1 exposure) sampled over >10-year period for long-term trends; 2 sites (1 reference, 1 exposure) sampled twice each in May and Sept to examine seasonal effects; blocknetted sites, collected fish by electrofishing
4: Context for	Habitat	Stream/river
	Climate	Temperate

Cause-Effect Pair 1	Country	United States
	Spatial Extent	Drainage basin
	Temporal Extent	Years
	Context Description	Mud River watershed, West Virginia
5: Enter Cause-Effect Pair 2?	-	No

[Richmond EK, EJ Rosi-Marshall, SS Lee, RM Thompson, and MR Grace. 2016. Antidepressants in stream ecosystems: influence of selective serotonin reuptake inhibitors \(SSRIs\) on algal production and insect emergence. *Freshwater Science* 35\(3\):845-855. DOI: 10.1086/687841.](#)

SECTION	FIELD	EXTRACTED EVIDENCE METADATA
1: Intro	Name	John Smith
	Email	johnsmith@com.net
	Citation DOI	10.1086/687841
2: Cause-Effect Pair 1	Response Measure Type	Mean difference
	Response Measure Value	-57%
	Response Measure Description	57% lower GPP in fluoxetine treatment than control (ANOVA p=0.051)
	Variable 1 (Cause) Term	Water quality - pharmaceuticals and personal care products
	Variable 1 (Cause) Term - Description	Exposure to 20 ug/L fluoxetine
	Variable 1 (Cause) Term - Trajectory	Increase
	Variable 2 (Effect) Term	Ecosystem function - gross/net primary production
	Variable 2 (Effect) Term - Description	Biofilm gross primary production (measured by light/dark incubations on day 14 of 2-week experiment, normalized to biomass)
	Variable 2 (Effect) Term - Trajectory	Decrease
3: Study Design for Cause-Effect Pair 1	Evidence Documentation	Figure 1A, page 849 of text
	Source Data	Mesocosm
	Study Type	Manipulation
	Study Design	Control/reference vs. treatment/impact
	Number of Independent Sampling Units	2
	Control vs. Impact Sampling Units	4 control, 4 fluoxetine treatment
	Replication	4 per group
	Sample Size Used in Analysis	8
4: Context for Cause-Effect Pair 1	Design Description	-
	Habitat	Artificial
	Climate	Temperate
	Country	United States
	Spatial Extent	Reach/section
	Temporal Extent	Weeks
5: Enter Cause-Effect Pair 2?	Context Description	-
		No

[Gibson CA, BJ Koch, ZG Compson, BA Hungate, and JC Marks. 2018. Ecosystem responses to restored flow in a travertine river. Freshwater Science 37\(1\):169-177. DOI: 10.1086/696614.](#)

SECTION	FIELD	EXTRACTED EVIDENCE METADATA
1: Intro	Name	John Smith
	Email	johnsmith@com.net
	Citation DOI	10.1086/696614
2: Cause-Effect Pair 1	Response Measure Type	Mean difference
	Response Measure Value	1.98
	Response Measure Description	Increase of 1.98 g O ₂ m ⁻² d ⁻¹ at sites below dam after flow restoration (p=0.023)
	Variable 1 (Cause) Term	Hydrology - surface flow (other)
	Variable 1 (Cause) Term - Description	Baseflow restoration due to removal of dam that diverted most of stream baseflow from 1909-2005
	Variable 1 (Cause) Term - Trajectory	Increase
	Variable 2 (Effect) Term	Ecosystem function - gross/net primary production
	Variable 2 (Effect) Term - Description	g O ₂ m ⁻² d ⁻¹ at sites above and below dam, before and after flow was restored
	Variable 2 (Effect) Term - Trajectory	Increase
Evidence Documentation	Figure 3B, page 173 in text	
3: Study Design for Cause-Effect Pair 1	Source Data	Field
	Study Type	Manipulation
	Study Design	Before vs. after (no control)
	Number of Independent Sampling Units	4
	Control vs. Impact Sampling Units	-
	Replication	6 site-days
	Sample Size Used in Analysis	5-6 before, 6 after
	Design Description	-
4: Context for Cause-Effect Pair 1	Habitat	Stream/river
	Climate	Arid/dry
	Country	United States
	Spatial Extent	Drainage basin
	Temporal Extent	Years
	Context Description	-
5: Enter Cause-Effect Pair 2?	-	Yes
6: Cause-Effect Pair 2	Response Measure Type	Mean difference
	Response Measure Value	-0.86
	Response Measure Description	Decrease of 0.86 g O ₂ m ⁻² d ⁻¹ at sites below dam after flow restoration (p=0.273)
	Variable 1 (Cause) Term	Hydrology - surface flow (other)

	Variable 1 (Cause) Term - Description	Baseflow restoration due to removal of dam that diverted most of stream baseflow from 1909-2005
	Variable 1 (Cause) Term - Trajectory	Increase
	Variable 2 (Effect) Term	Ecosystem function - community respiration
	Variable 2 (Effect) Term - Description	$g\ O_2\ m^{-2}\ d^{-1}$ at sites above and below dam, before and after flow was restored
	Variable 2 (Effect) Term - Trajectory	Decrease
	Evidence Documentation	Figure 3C, page 173 in text
7: Study Design Differences (Pair 2 vs. Pair 1)	-	No
9: Context Differences (Pair 2 vs. Pair 1)	-	No
11: Enter Cause-Effect Pair 3?	-	No