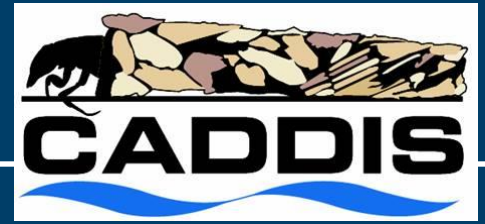


Using CADDIS for causal assessment in urban streams

Kate Schofield



What is CADDIS?



- Causal Analysis/Diagnosis Decision Information System
- Website that helps users conduct causal assessments of stream biological impairment
 - Strength of evidence based framework for stressor identification
 - Information on specific stressors, data analysis methods, etc.
 - Case studies
 - Tools for data analysis and literature evaluation

CADDIS: The Causal Analysis/Diagnosis Decision Information System

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Quick Finder

CADLit
CADStat
Case Studies

Causal Assessment Background
Getting Started with Data Analysis

ICD Application
Step-by-step Guide

The **Causal Analysis/Diagnosis Decision Information System, or CADDIS**, is a website developed to help scientists and engineers in the Regions, States, and Tribes conduct causal assessments in aquatic systems. It is organized into five volumes:

- **Volume 1: Stressor Identification** provides a step-by-step guide to identifying the causes of impairment in a particular system, based on the U.S. EPA's guidance on conducting a complete causal assessment, learning about causal assessment theory, start with this volume.
- **Volume 2: Sources, Stressors & Responses** provides information on identifying stressors, and biotic responses in stream ecosystems. If you are interested in reading specific summary information (e.g., for urbanization, physical alterations), start with this volume.
- **Volume 3: Examples & Applications** provides examples of completed causal assessments. If you are interested in reading completed causal assessment worksheets are completed, or examining example applications, start with this volume.
- **Volume 4: Data Analysis** provides guidance on the use of data in causal assessments. If you are interested in learning how to use data in your causal assessments, start with this volume.
- **Volume 5: Causal Databases** provides access to literature-based causal assessments. If you are interested in applying literature-based causal assessments, start with this volume.

Top Three Questions

1. What's new in the 2010 release of CADDIS?
2. How do I cite CADDIS?
3. Where can I view a site map for CADDIS?

CADDIS Navigation

- CADDIS Home
- Volume 1: Stressor Identification
- Volume 2: Sources, Stressors & Responses
- Volume 3: Examples & Applications
- Volume 4: Data Analysis
- Volume 5: Causal Databases

Recent Additions

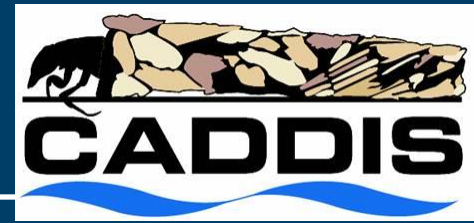
- Vol 1: Stressor Identification
- Vol 2: Sources, Stressors & Responses
- Vol 3: Examples & Applications
- Vol 4: Data Analysis
- Vol 5: Causal Databases

Basic Information
Recent Additions
Frequent Questions

Publications
Glossary
Related Links

Authors & Contributors
Site Map

Vol 2: Sources, Stressors & Responses



CADDIS Volume 2: Sources, Stressors & Responses

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Deciding which pathways to consider in a causal assessment—that is, listing candidate causes as described in Step 2 of the SI process—sets the framework for causal assessment. This section of CADDIS provides background information on commonly encountered sources, stressors, and responses for use in deciding which candidate causes to consider, as well as in developing cases for or against those candidate causes in the actual assessment.

Each stressor module is organized into five sections, or tabs:

- **Introduction** provides a summary overview of the stressor, including a checklist of evidence that suggests including a given stressor in your assessment (i.e., listing it as a candidate cause).
- **When to List** provides more detailed information on the sources, activities, site evidence, and biological responses that suggest inclusion as a candidate cause.
- **Ways to Measure** details different methods for quantifying the stressor.
- **Conceptual Diagrams** illustrates hypothesized causal linkages among the stressor, its sources, and associated biotic responses.
- **References** lists the references cited throughout the module.

Top Three Questions

1. What are sources, stressors & responses?
2. Is there additional literature-based information available for these sources, stressors & responses?
3. Can I view a site map of this volume?

CADDIS Navigation

[CADDIS Home](#)

Volume 1: [Stressor Identification](#)

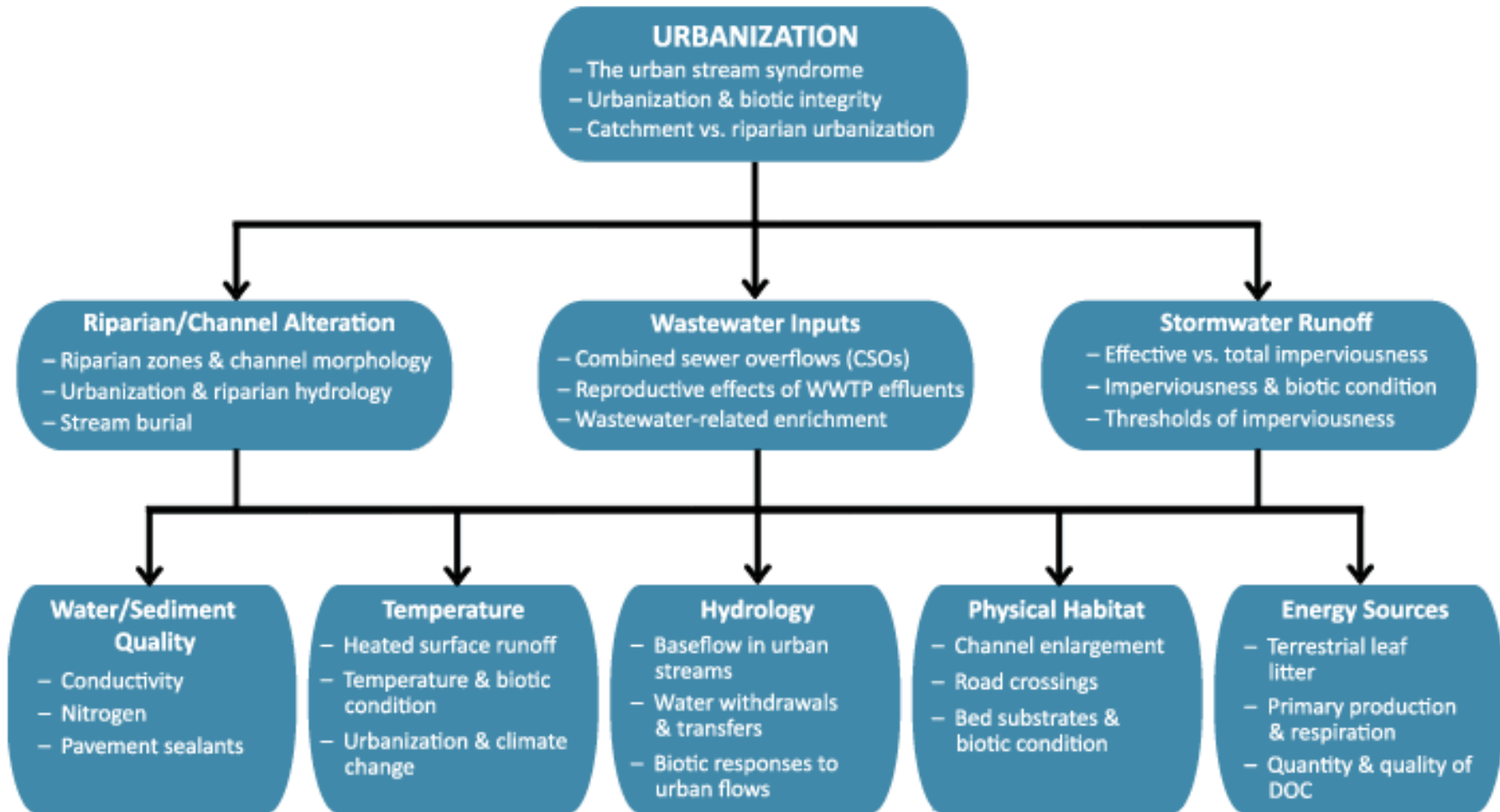
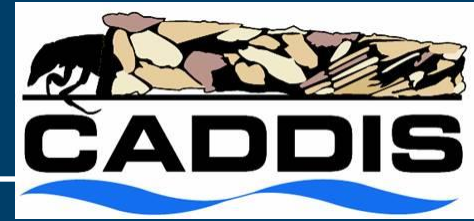
Volume 2: Sources, Stressors & Responses

Volume 3: [Examples & Applications](#)

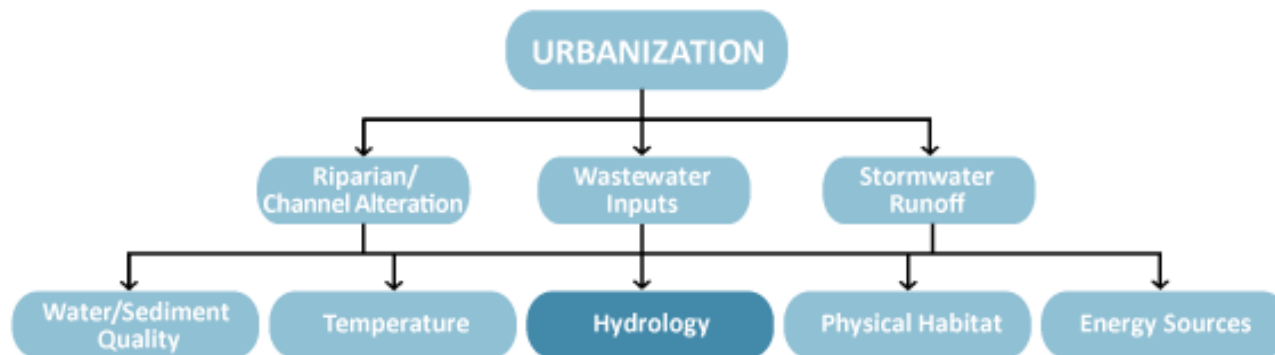
Volume 4: [Data Analysis](#)

Volume 5: [Causal Databases](#)

The Urbanization Module



**Click on any heading to see more detailed information about that pathway.
Click on subheadings to read more about highlighted topics under each heading.**



Flow alteration in urban streams

Alteration of natural hydrologic regimes is a consistent and pervasive effect of urbanization on stream ecosystems, as discharge patterns—the **amount and timing of water flow through streams**—change with urban development. Key aspects of urbanization affecting hydrology may include:

- **↓ infiltration and ↑ surface runoff** of precipitation associated with impervious (and effectively impervious) surfaces
- **↑ speed and efficiency of runoff delivery** to streams, via stormwater drainage infrastructure
- **↓ evapotranspiration** due to vegetation removal
- **↑ direct water discharges**, via wastewater and industrial effluents
- **↑ infiltration** due to irrigation and leakage from water supply and wastewater infrastructure
- **↑ water withdrawals and interbasin transfers**

Commonly reported effects of urbanization on stream flow regimes include (but are not limited to):

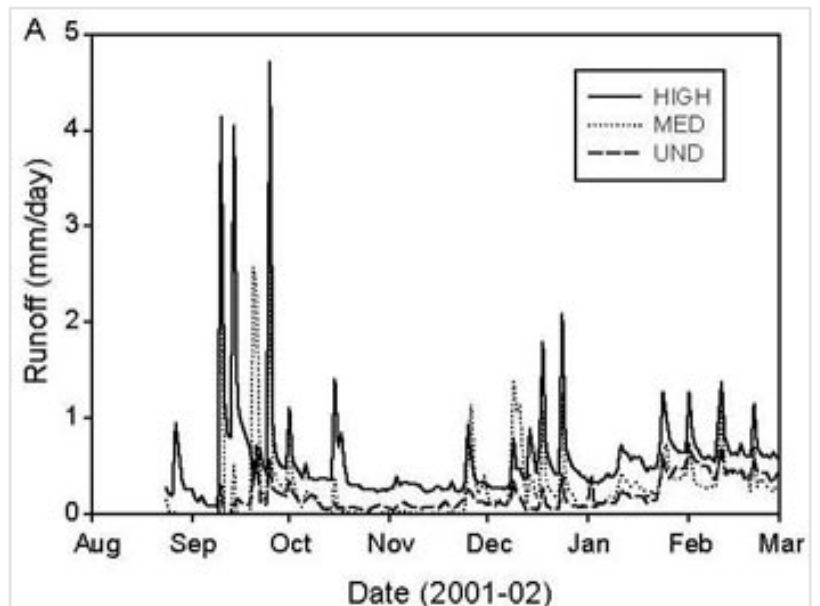
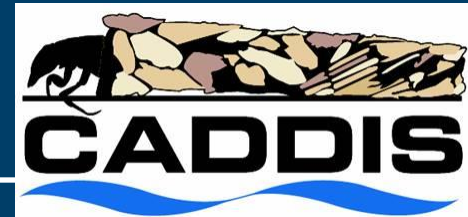


Figure 33. Stream runoff during a dry period (Aug 2001–Feb 2002) at three study catchments: UND = undeveloped, MED = medium density residential (1.6 houses ha⁻¹, 6% impervious), HIGH = high density residential (2.8 houses ha⁻¹, 11% impervious).

From Burns D et al. 2005. *Effects of suburban development on runoff generation in the Croton River basin, New York, USA. Journal of Hydrology* 311:266–281. Reprinted with permission from Elsevier.

Vol 3: Examples & Applications



CADDIS Volume 3: Examples & Applications

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Top Three Questions

1. Where are examples of completed case studies?
2. How do I determine if a stressor co-occurs with the effect?
3. Where can I get a site map for this volume?

CADDIS Navigation

[CADDIS Home](#)

[Volume 1: Stressor Identification](#)

[Volume 2: Sources, Stressors & Responses](#)

[Volume 3: Examples & Applications](#)

[Volume 4: Data Analysis](#)

[Volume 5: Causal Databases](#)

Quick Finder

[Assemble Data from Case](#)
[Assemble Data from Elsewhere](#)
[Causal Pathway](#)
[Consistency of Evidence](#)
[Define the Case](#)

[Evidence of Exposure or Mechanism](#)
[Explanation of Evidence](#)
[Identify Probable Cause](#)
[List Candidate Causes](#)

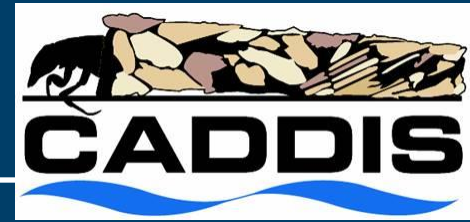
[Mechanistically Plausible Cause](#)
[Spatial Co-occurrence with Regional Reference Sites](#)
[Stressor-Response from Field](#)

[Stressor-Response from Lab](#)
[Summary of Scores from Case](#)
[Summary of Scores from Elsewhere](#)
[Verified Prediction with PECBO](#)
[Verified Prediction with Traits](#)

This volume provides examples that illustrate different aspects of a causal analysis.

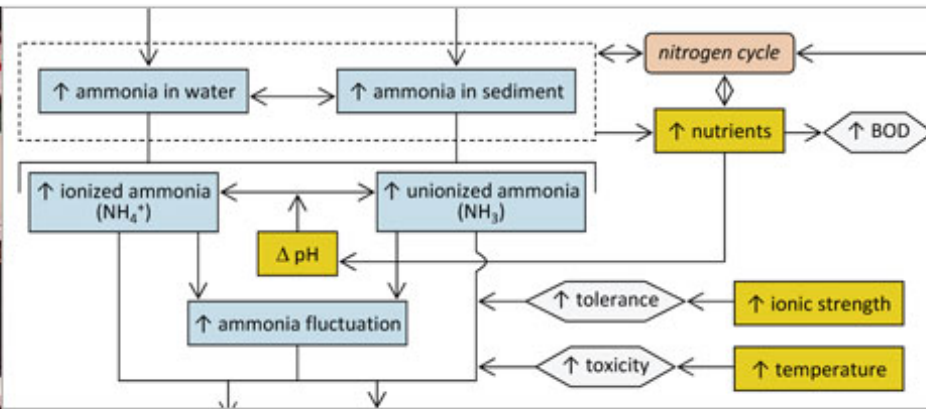
- The [Analytical Examples](#) section provides examples illustrating the use of different data analyses to inform particular types of evidence. If you are interested in seeing how data analysis techniques can be applied in causal assessment, start with this section.
- The [Worksheets](#) section provides examples from the Little Scioto River in Ohio, one of the first Stressor Identification-based causal analyses conducted. These examples are presented as "worksheets" that one might complete as one conducts a causal analysis, so this section is a good place to start if you are planning on

Vol 5: Causal Databases



CADDIS Volume 5: Causal Databases

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Top Three Questions

1. How do I access the ICD application?
2. How do I access CADLit?
3. Can I view a site map of this volume?

CADDIS Navigation

[CADDIS Home](#)

[Volume 1: Stressor Identification](#)

[Volume 2: Sources, Stressors & Responses](#)

[Volume 3: Examples & Applications](#)

[Volume 4: Data Analysis](#)

[Volume 5: Causal Databases](#)

Quick Finder

[CADLit Advanced Search](#)
[CADLit Keyword Search](#)

[CADLit User Guide](#)
[ICD Application](#)

[ICD Quick Start Instructions](#)
[ICD User Guide](#)

[Viewing ICDs](#)
[Editing ICDs](#)

This section of CADDIS provides two tools (at right) to help users access and apply literature-based evidence in their causal assessments. These tools are designed for users interested in finding and compiling scientific literature (peer-reviewed and other) to support or weaken the cases for particular causal pathways.

A key part of causal assessment is taking what has been learned about causal pathways in other systems and using that knowledge to inform the current assessment. In the Stressor Identification process, this application of previous research typically occurs in [Step 2: List Candidate Causes](#) and [Step 4: Evaluate Data from](#)

- The **Interactive Conceptual Diagram (ICD) application** uses conceptual diagrams as an organizing framework to provide supporting literature for linkages among different sources, stressors, and responses. Users can view literature linked to existing diagrams by clicking on diagram shapes, as well as create and populate their own diagrams with supporting literature.
- The **CADDIS Literature Resource (CADLit)** contains information on stressor-response associations reported in the peer-reviewed scientific literature. Currently, the stressors

Keyword Search



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1 - 20 of 271

	Author	Year	Title	Database Details
<input type="checkbox"/>	Anderson NH	1992	Influence of disturbance on insect communities in Pacific Northwest streams	View
<input type="checkbox"/>	Brown AV, Lyttle MM, Brown KB	1998	Impacts of gravel mining on gravel bed streams	View
<input type="checkbox"/>	Culp JM, Wrona FJ, Davies RW	1986	Response of stream benthos and drift to fine sediment deposition versus transport	View
<input type="checkbox"/>	Griffith MB, Kaufmann PR, Herlihy AT, Hill BH	2001	Analysis of macroinvertebrate assemblages in relation to environmental gradients in Rocky Mountain streams	View
<input type="checkbox"/>	Gurtz, ME; Wallace, JB	1984	Substrate-mediated response of stream invertebrates to disturbance	View
<input type="checkbox"/>	Lieb, DA; Carline, RF	2000	Effects of urban runoff from a detention pond on water quality, temperature and caged Gammarus minus (Say) (Amphipoda) in a headwater stream	View

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SUSE4: Making urban stream rehabilitation a co-evolutionary process

May 31 (Wed) to June 3 (Sat), 2017

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