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THE CAUSAL ANALYSIS/DIAGNOSIS DECISION INFORMATION SYSTEM (CADDIS)

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LTG 2 Poster 02

Science Questions

LTG 2: Provide the tools to assess and diagnose the causes and pollutant source of impairment in aquatic systems.

How can causes of biological impairments be identified, so that the right pollutant(s) are addressed, the impairment is remediated and ecologists are restored?

Research Objectives

The Research: The Stressor Identification process—see LTG2 poster 01—has proven to be a powerful and effective way to determine the probable causes of undesirable biological conditions in aquatic systems. Accurately determining the cause is the key to improving the environment by:

- > developing a TMDL for the right pollutant,
- > selecting among best management practices, or
- > developing effective watershed management plans.

The Causal Analysis/Diagnosis Decision Information System (CADDIS) is a web-based decision support system that will help scientists in the regions, states and tribes find access, use, and share information to determine the causes of biological impairments in aquatic systems. It will help scientists make causal determinations more quickly, cheaply and defensibly.

The first phase of the project (CADDIS 1) is anticipated to be completed in January 2008 and will provide an online step-by-step guide to the Stressor Identification process. CADDIS 1 also provides downloadable examples, worksheets and supplemental advice and tips.

The second phase of the project (CADDIS 2) is anticipated to be completed in 2008, and will provide syntheses of diagnostic information for major, generic conceptual models, downloadable analytical tools, a database of field observational studies, and additional case examples.

A Cross-EPA Collaboration

The Causal Analysis Team

National Center for Environmental Assessment

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National Exposure Research Laboratory

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National Risk Management Research Laboratory

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Office of Water, Office of Science and Technology

William Swietlik, Evan Hornig, Robert Cantilli

Results

CADDIS 1: Step by Step Guide to Stressor Identification



What can ORD do to make it easier to identify causes of biological impairments?

Scientists need tools to bring together relevant knowledge on all of the factors—physical, chemical, and biological—that may be affecting the aquatic system of concern; they must be able to easily mobilize relevant data from scientific studies conducted in the laboratory or at similar sites; they must organize and fairly compare the evidence across all the candidate causes; and they must be able to clearly communicate the logic of their causal conclusion.

CADDIS provides a Step-by-Step Guide to Stressor Identification

U.S. Environmental Protection Agency
Causal Analysis/Diagnosis Decision Information System (CADDIS)
Step-by-Step Guide

Before the Causal Analysis Begins

What is the impetus for a causal analysis? Usually, a scientist reports the need to a manager. The manager then assigns the scientist to the task. The scientist then begins the process. The scientist then reports the results to the manager. The manager then reports the results to the public.

Figure 6-1 The Stressor Identification process within its broader management context.

CADDIS describes the Types of Evidence used for Stressor Identification

Causal Analysis/Diagnosis Decision Information System (CADDIS)
Step 3: Evaluate Data from the Case

Stressor-Response Relationships from the Field

Species Sensitivity Distributions using field data

Example: Turbidity

Species Sensitivity Distributions using field data

Source: Pat Shaw-Allen

CADDIS shows how the pieces fit together to support conclusions

CADDIS provides example analyses

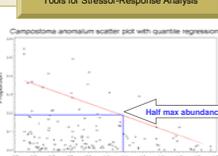
Example 1: Turbidity

Example 2: Temperature

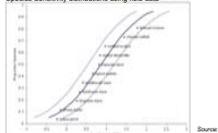
Future Directions

CADDIS 2: New Tools for Causal Analysis

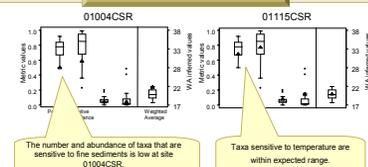
Tools for Stressor-Response Analysis



Species Sensitivity Distributions using field data



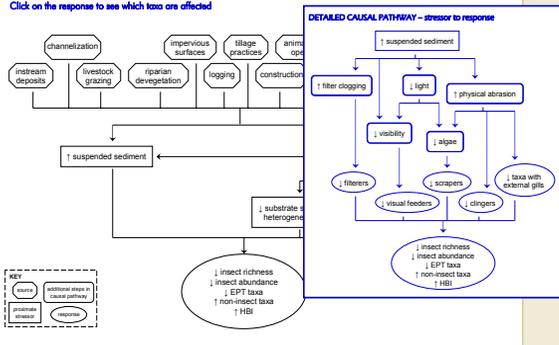
Stressor-Specific Tolerance Values



See Also LTG 2 Posters 06, 08, 09, and 10

Generic Conceptual Models

Click on a source to see how it leads to the stressor
Click on a stressor to see how it leads to the response
Click on the response to see which taxa are affected



Interactions with Customers



Participants of Writing Workshop on Case Studies Identifying the Causes of Biological Impairment in Streams, Davis WA, May 15-20, 2005

Christopher Balfanz, Charlie Moritz, Danielle Haake, Tom Wilton, Thomas Schmitt, Suzanne Meisel, Jeff Vercellone, Key Wittington, William Stephens, Matt Hicks, Jerry Diamond, Chad Wootton, Miss LeBlond, Jason Gerber, Bob Lowman, and Jeff Bailey

Peer Review Panel
Robert W. Pritchard, Freshwater Monitoring Unit Supervisor, Washington Department of Ecology, Olympia WA
Mark T. Rucinski, Principal Ecologist and NEPA Director, Vector, ESM Operations, Columbia MD
Mary D. Muldoon, Associate Professor of Ecological Engineering, University of Arkansas, Fayetteville AR
Richard B. Whitford, Ecotoxicology Unit, CA EP/Office of Environmental Health Hazard Assessment, Sacramento CA
Baron L. Gidycz, Professor, Ecological U.S. Geological Survey, Reston VA
Tara A. Schmalzer, Ecologist

"The CADDIS product for assessing environmental condition and identifying sources for ecological change is an impressive decision-making tool."

"The user examples, both generally and for individual conditions, are clearly helpful. Other good features include the summarizing of steps with redlines, inclusion of source worksheets that link to data and literature for elaboration."

"The site should become the depository for models, literature, data, etc. dealing with biological criteria."

"My overall impression is that CADDIS offers promise to be a useful tool enabling meaningful contribution of science to water quality decision-making."

How Research Contributes to Outcomes

- > CADDIS provides a new model for sharing scientific guidance, and generating results to inform the environmental decisions of the 21st century
- > By enabling effective transfer of scientific information, CADDIS helps foster a community of scientists with expertise in causal assessments.
- > It provides a focal point for the development of analytical tools, databases, and stressor-response relationships.
- > Together, the guidance, examples, databases and analytical tools, and most importantly, the community of scientists, are expected to have a major influence on causal analyses and environmental management.