

# Draft EPA-USGS Technical Report: Protecting Aquatic Life from Effects of Hydrologic Alteration



Jonathan Kennen, Ph.D.  
USGS Water Availability  
and Use Science Program



Diana Eignor  
USEPA Office of Water,  
Office of Science and  
Technology



# What Is the Draft Technical Report?

---

- EPA and USGS jointly developed this draft report to serve as a source of scientific and technical information for states, tribes and territories about:
  - The natural flow regime and the potential effects of flow alteration on aquatic life;
  - Examples of CWA programs (such as 304(a) criteria) that states have already used to support the natural flow regime and maintain healthy aquatic biota; and
  - A flexible, non-prescriptive framework that state water managers might consider if they are interested in developing narrative or numeric targets for flow regime components that are protective of aquatic life.

# What the Draft Technical Report Is Not

---

The Report is Not:

- A law or regulation
- A set of binding legal requirements
- A substitute for applicable state statutes or regulations, which have primacy
- An expansion of federal authority over water rights
- A substitute for, or constraint on, state and Tribal discretion to act in accordance with existing state water rights
- A policy, guidance, or criteria document; it shows no advocacy; and it does not require States to do anything.

# Why Did EPA and USGS Develop the Draft Technical Report?

---

- To serve as a technical and informational resource for state water-resource managers who face real challenges today.
- Expected changes to historic hydrologic conditions as a result of climate change further complicate water-resource management challenges.

# The Draft Technical Report Has Three Main Sections

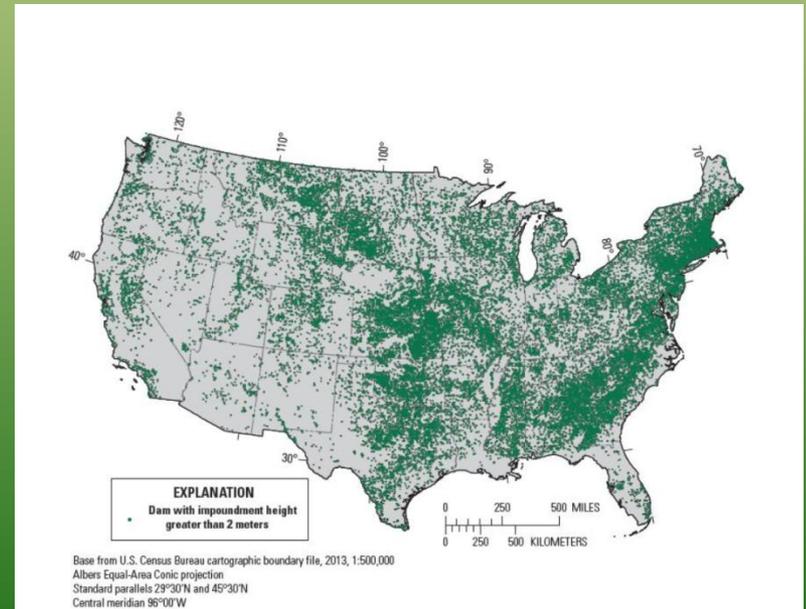
---

1. Environmental Flow (or EWater) support in the literature.
2. Overview of applicable CWA programs (such as 304(a) criteria), with state and Tribe examples.
3. Technical Non-Prescriptive Framework for Quantifying Flow Targets to Protect Aquatic Life.

# Natural Flow Regime

The first main section (pages 15-39) describes the scientific principles of the natural flow regime, presents a general conceptual model of the effects of flow alteration on aquatic life, and provides a literature review of the following sources of flow alteration:

- Dams & Impoundments
- Diversions
- Groundwater withdrawals
- Effluents and artificial inputs
- Land-cover alteration
- Climate change
- Physical, chemical, and geomorphological effects



# CWA Program Descriptions

---

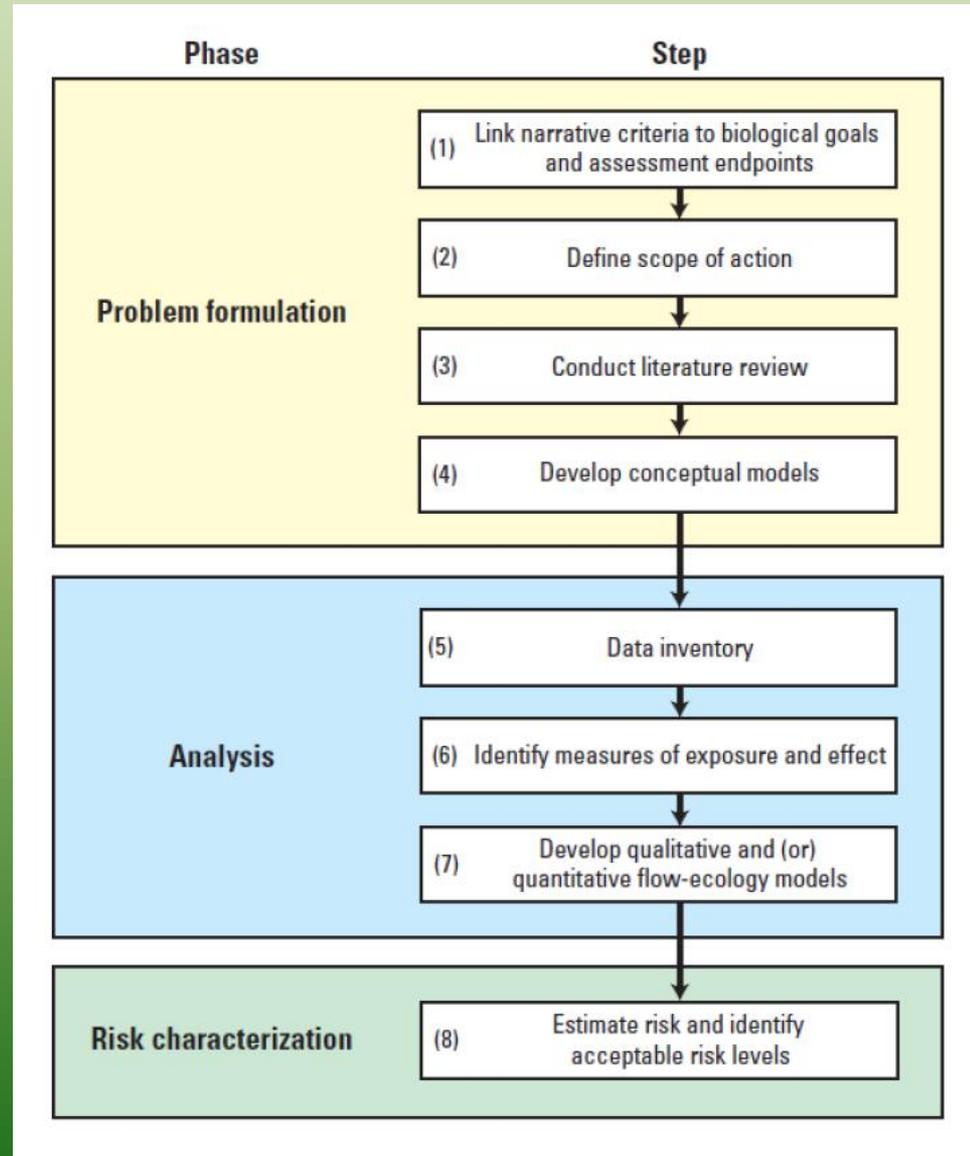
The second main section (pages 39-64) discusses CWA programs that states have already used (citing examples) to address the effect of flow regime change on aquatic life. They include:

- Water quality standards (WQS) (Section 5.1),
- Monitoring and assessment of water bodies (Section 5.2),
- Other components of the CWA that could be used to address flow (Sections 5.3 – 5.6)

# Non-Prescriptive Framework

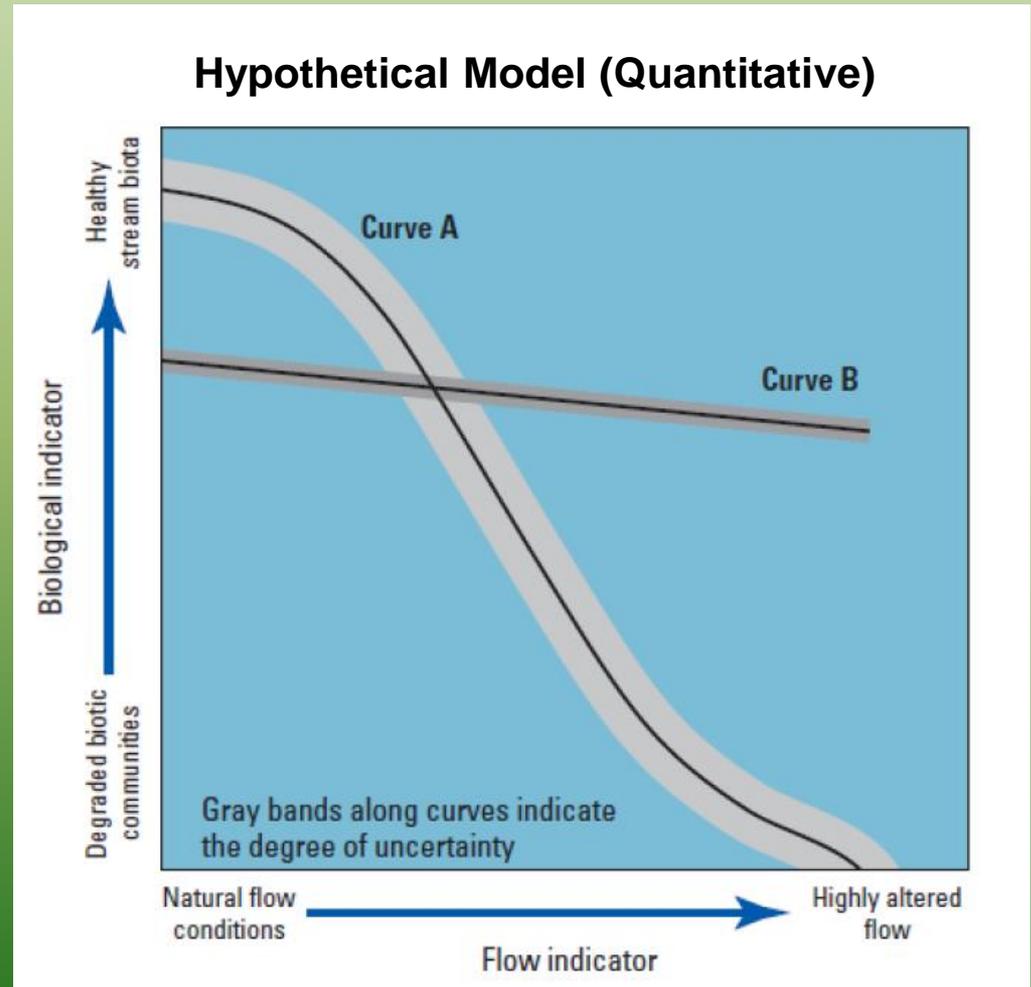
The third main section (pages 65-91) discusses a non-prescriptive framework for quantifying flow targets to protect aquatic life and includes three primary phases:

1. Problem Formulation Phase
2. Analysis Phase and
3. Risk Characterization Phase



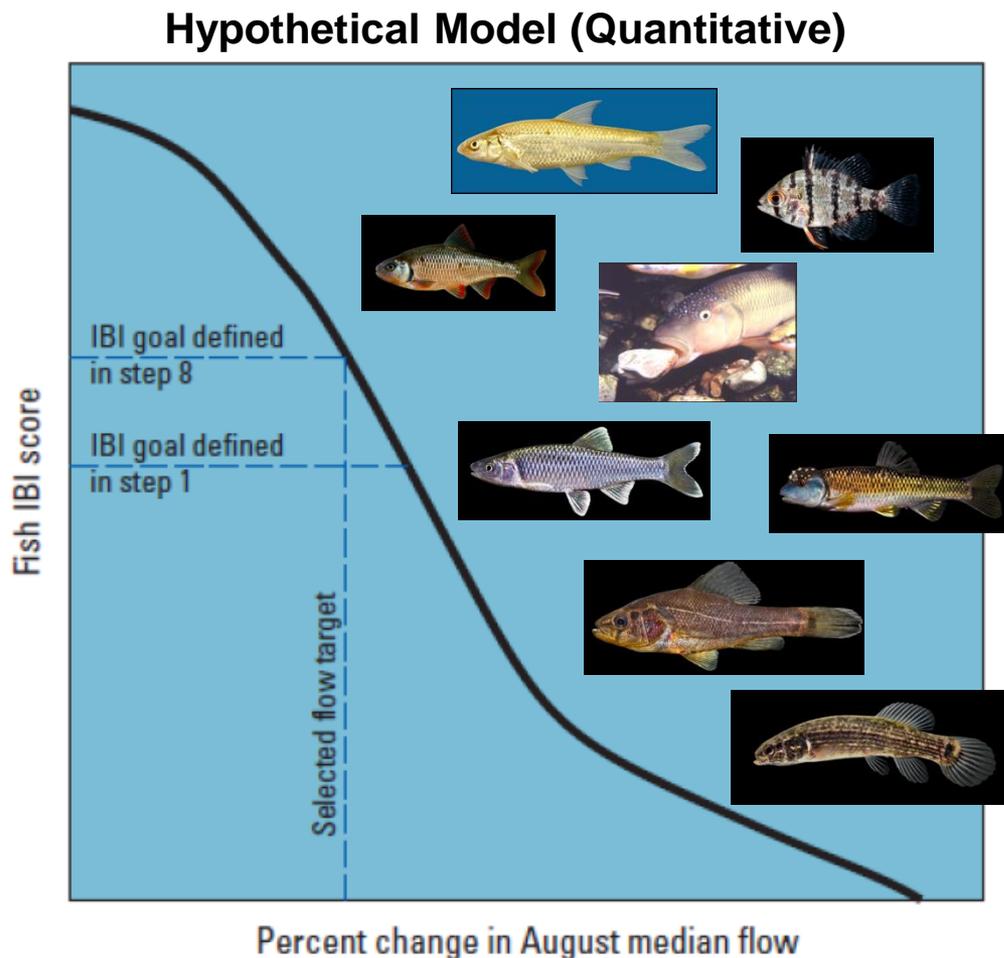
# Step 7-Develop Qualitative or Quantitative Flow-Ecology Models

- A flow-ecology model is a specific type of stressor-response model.
- Describes the relation between a flow indicator and a biological indicator.
- Two hypothetical response curves are shown, linear and non-linear, developed using statistical methods.
- Used to predict the value of a biological indicator under a variety of flow conditions such as the percent change in fish diversity as a function of the percent change in annual peak flow magnitude.



# Example: Flow-Target Framework Using a Quantitative Flow-Ecology Model

- Example – fish response curve generated through regression modeling.
- This response curve depicts the relation between altered August median flow and fish-community condition (IBI, Index of Biotic Integrity).
- Follows framework steps in which endpoints are selected, data is aggregated, and models are developed for differing stream classes.
- Appropriate targets are then defined by stakeholders.



# Conclusions

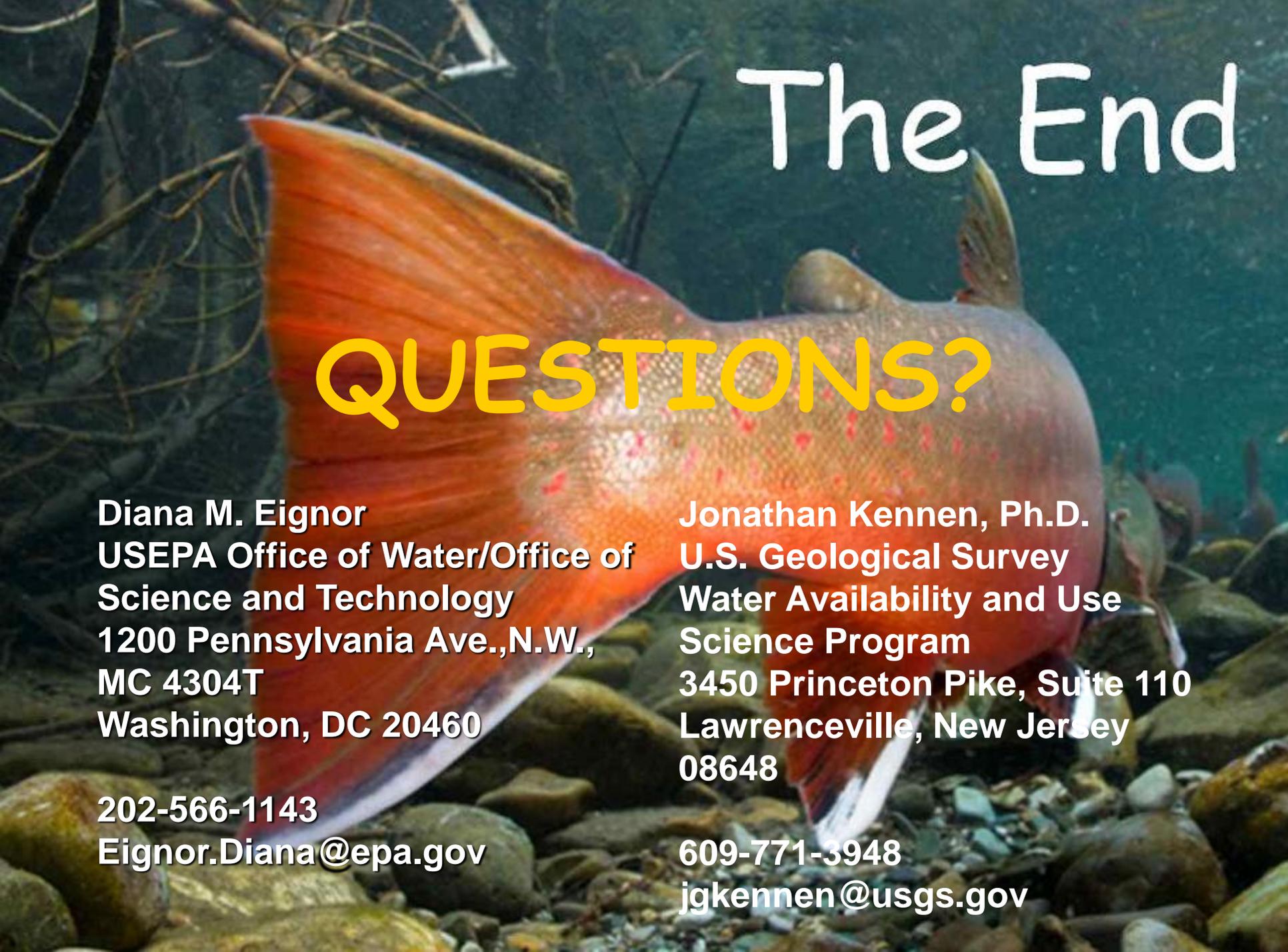
---

- Flow regime plays a central role in supporting healthy aquatic ecosystems.
- Alterations to the natural flow regime can contribute to the degradation of biological communities.
- Flow alteration can prevent water bodies from supporting aquatic life designated uses as defined by state water quality standards and existing CWA statutes.
- This technical report serves as a source of technical information for states, tribes, and territories that may want to proactively protect aquatic life from the adverse effects of flow alteration.

# WSWC Concerns

---

- 1) Wanted consultation with appropriate state agencies before the report went out.
- 2) Concerned the report supersedes state water law or expands federal authority.
- 3) Wanted report to recognize that some forms of flow alteration provide benefits.
- 4) Concerned that the report omits significant distinctions in the CWA Case Law appendix.



# The End

## QUESTIONS?

**Diana M. Eignor**  
**USEPA Office of Water/Office of**  
**Science and Technology**  
**1200 Pennsylvania Ave.,N.W.,**  
**MC 4304T**  
**Washington, DC 20460**

**202-566-1143**  
**Eignor.Diana@epa.gov**

**Jonathan Kennen, Ph.D.**  
**U.S. Geological Survey**  
**Water Availability and Use**  
**Science Program**  
**3450 Princeton Pike, Suite 110**  
**Lawrenceville, New Jersey**  
**08648**

**609-771-3948**  
**jgkennen@usgs.gov**