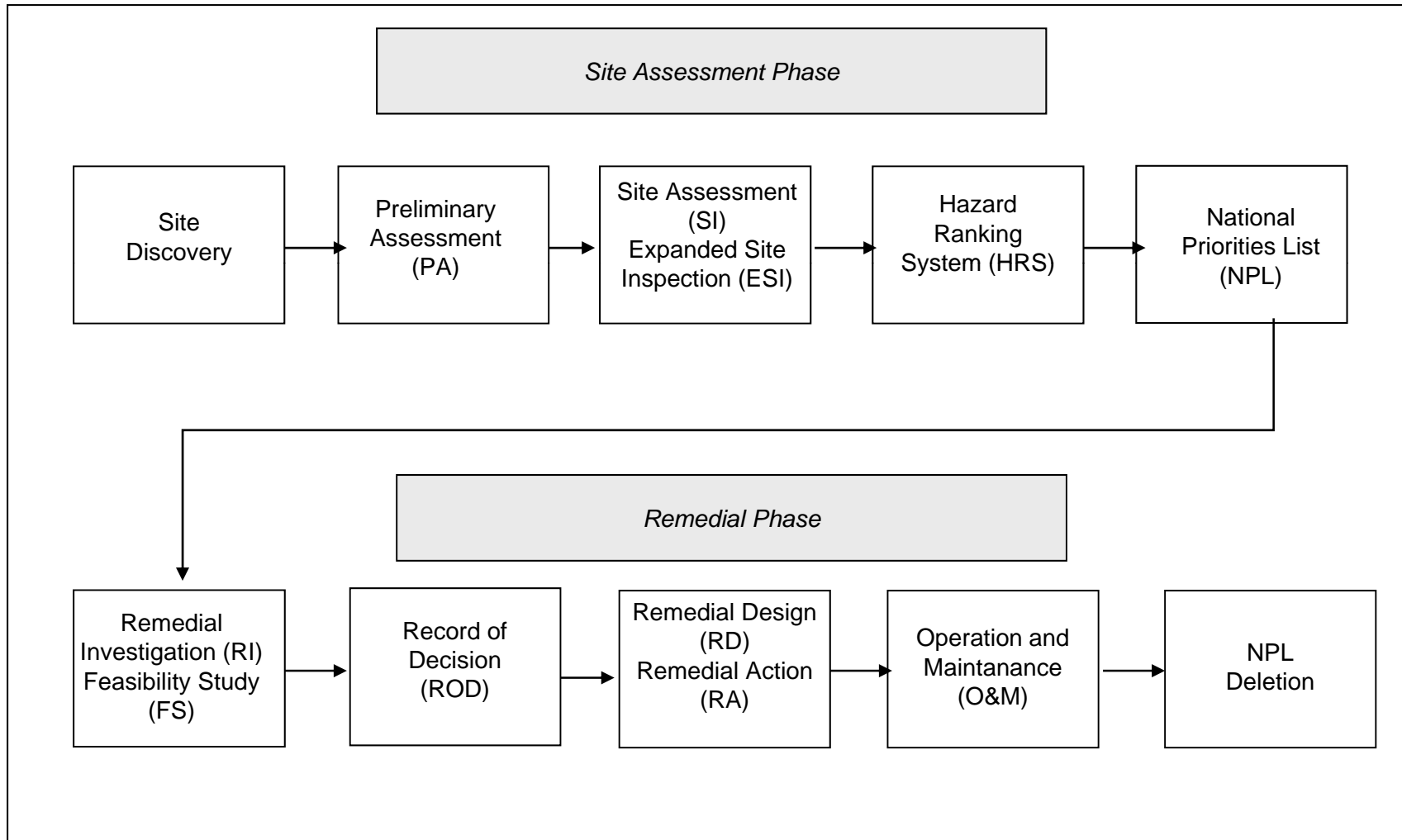


*How causal assessments fit into the
big picture*

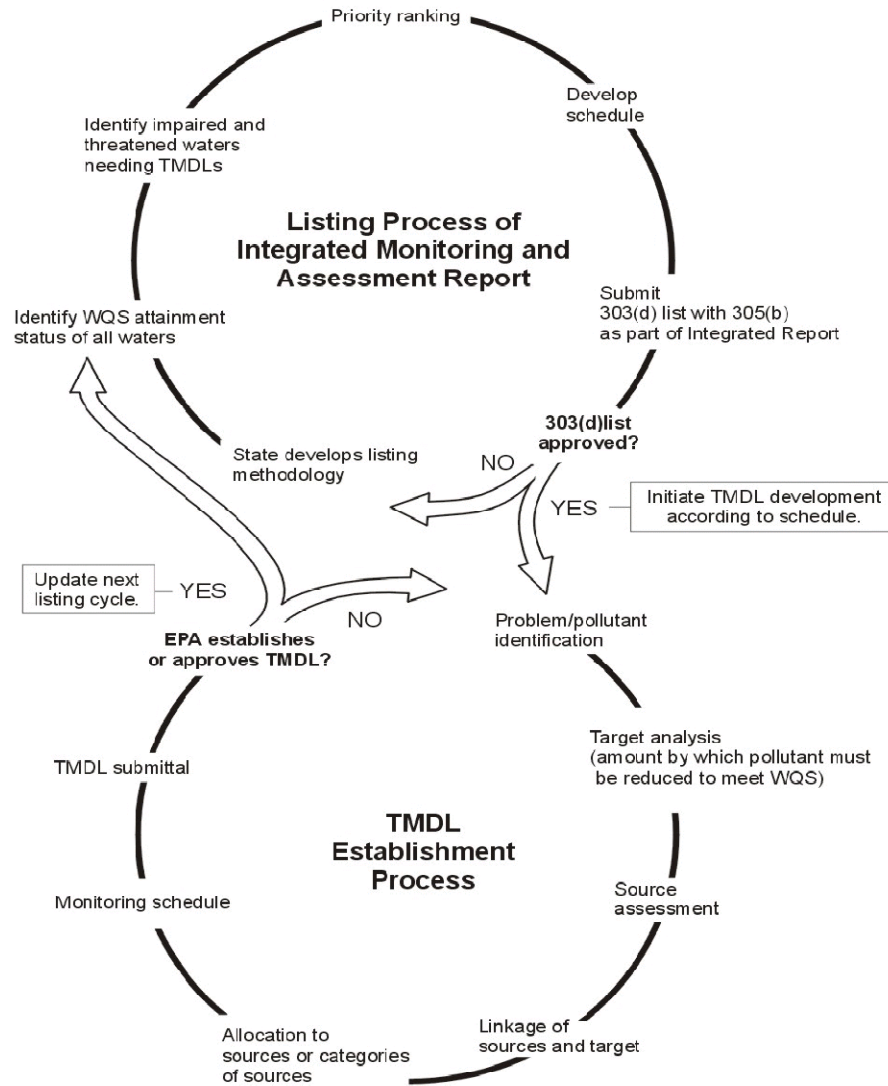
and

*The importance of connecting
different types of environmental
assessments*

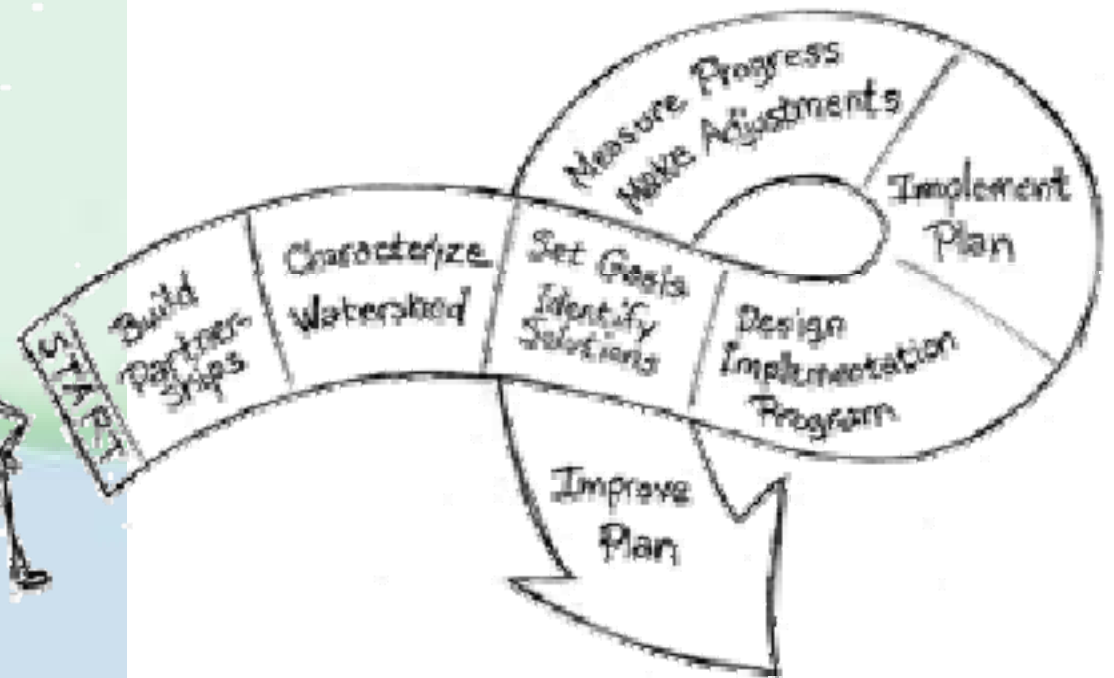
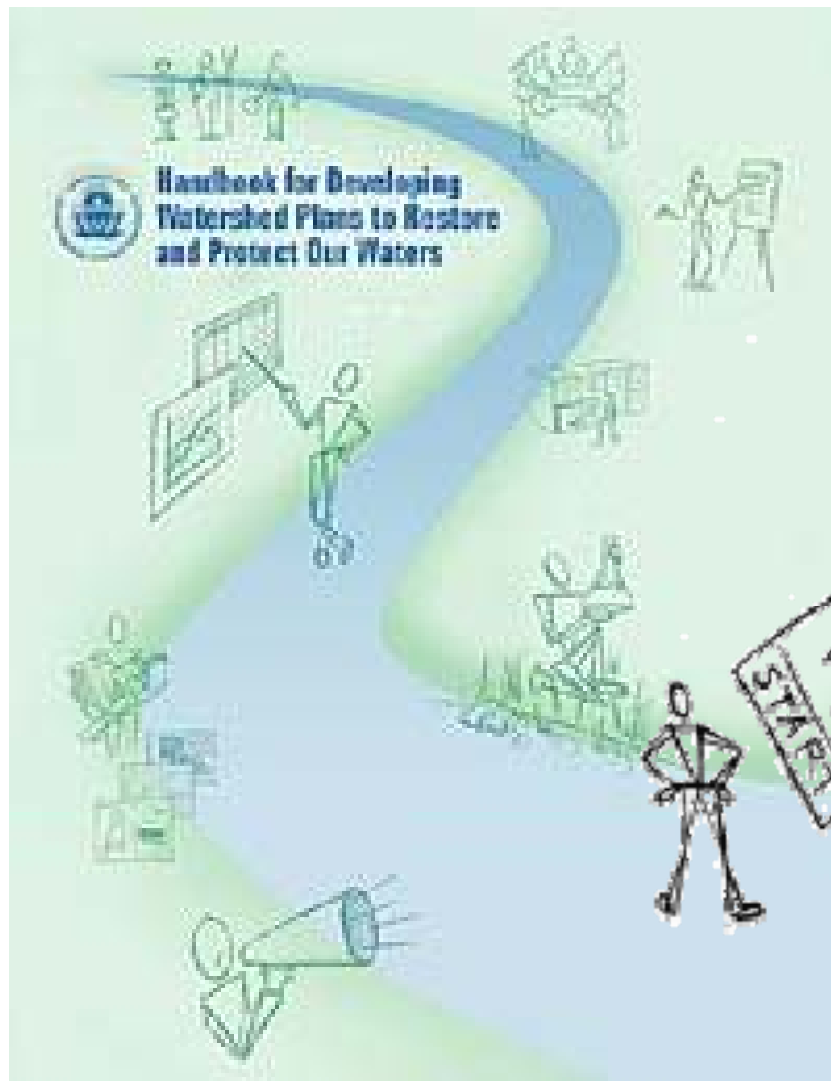
U.S. EPA CERCLA (Superfund)

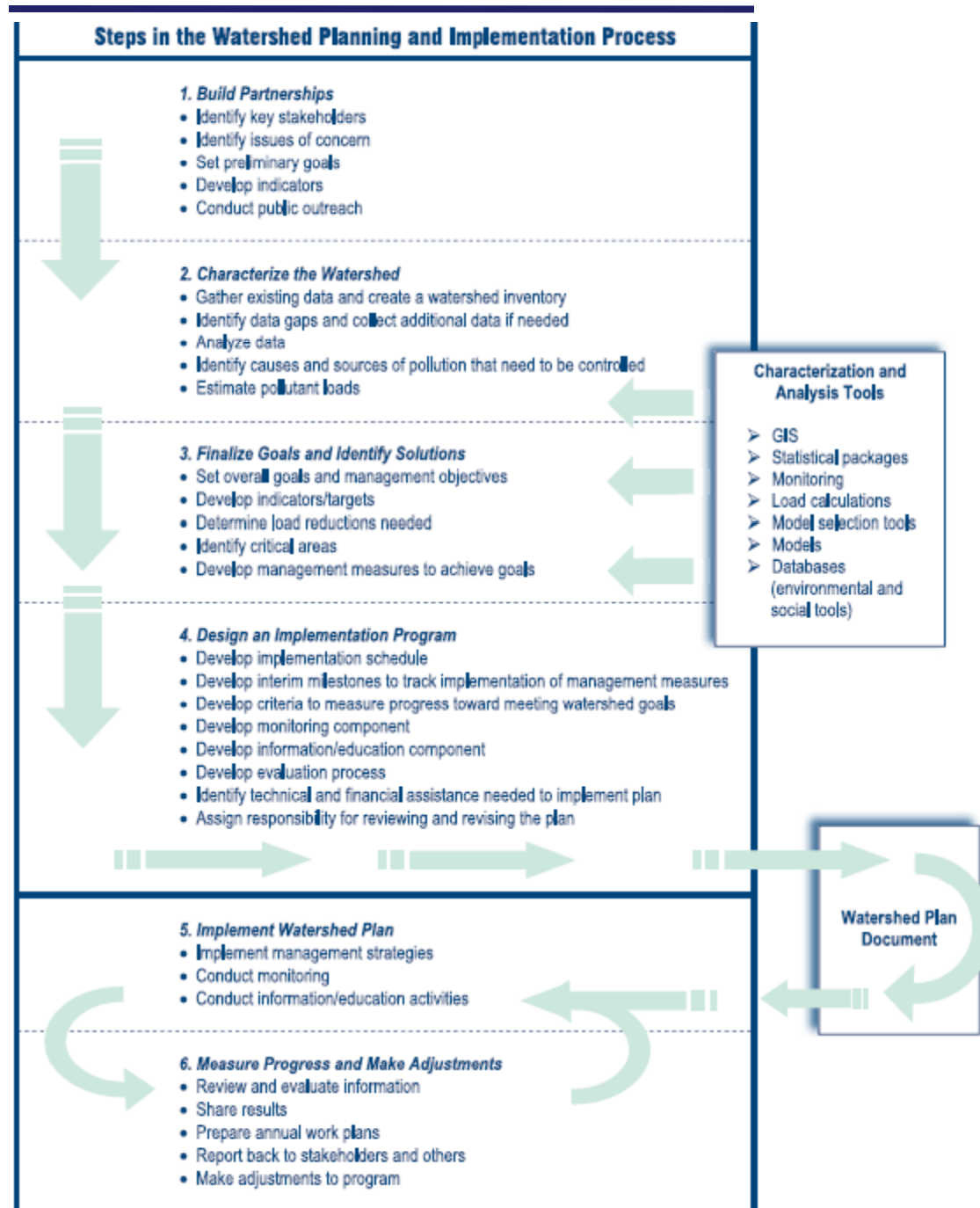
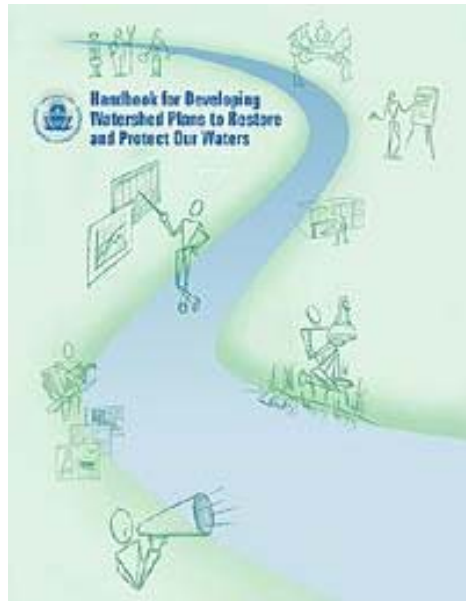


US EPA TMDL Program

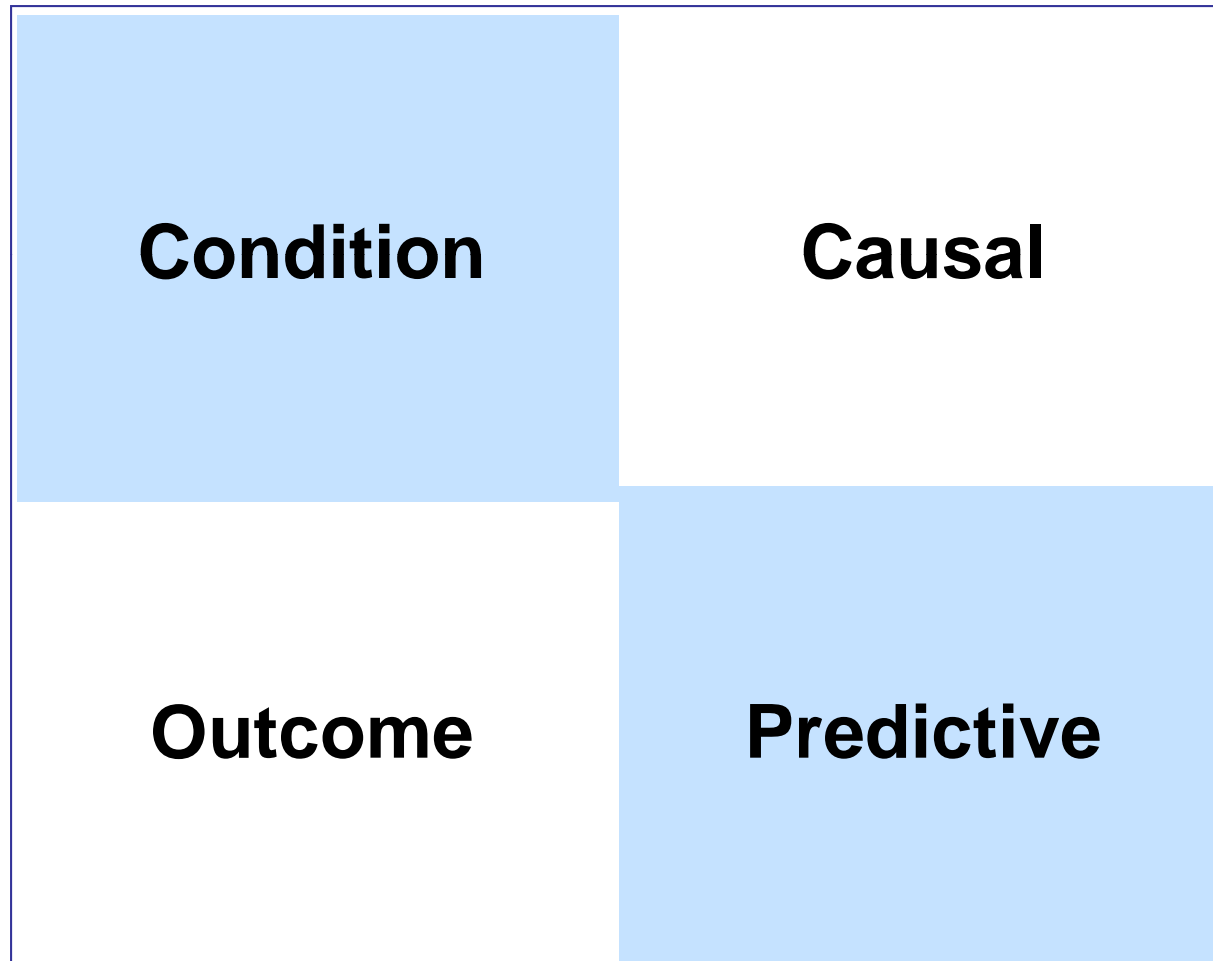


U. S. EPA 319 Restoration Program

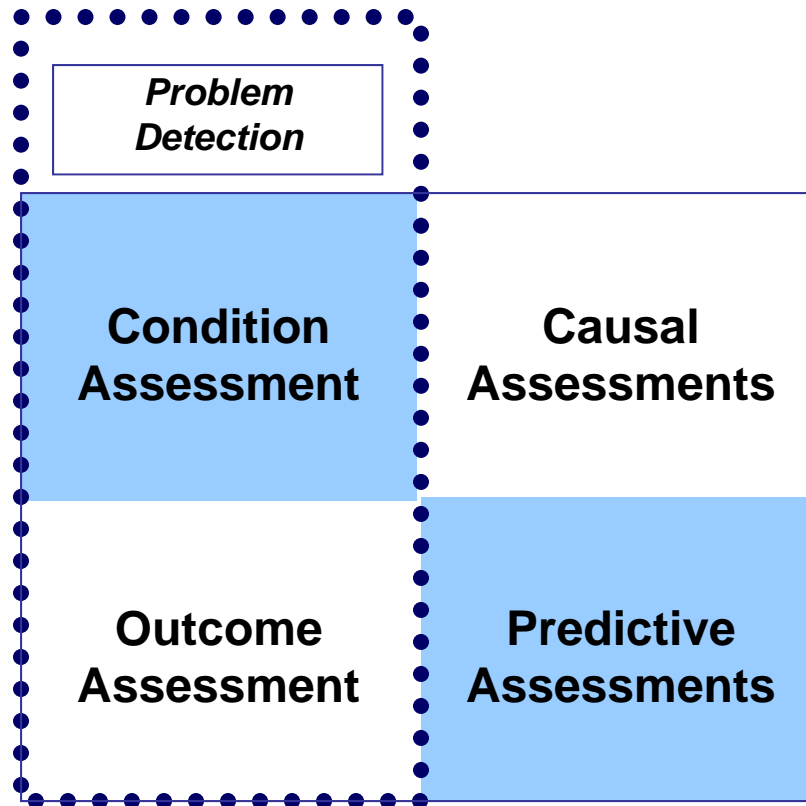




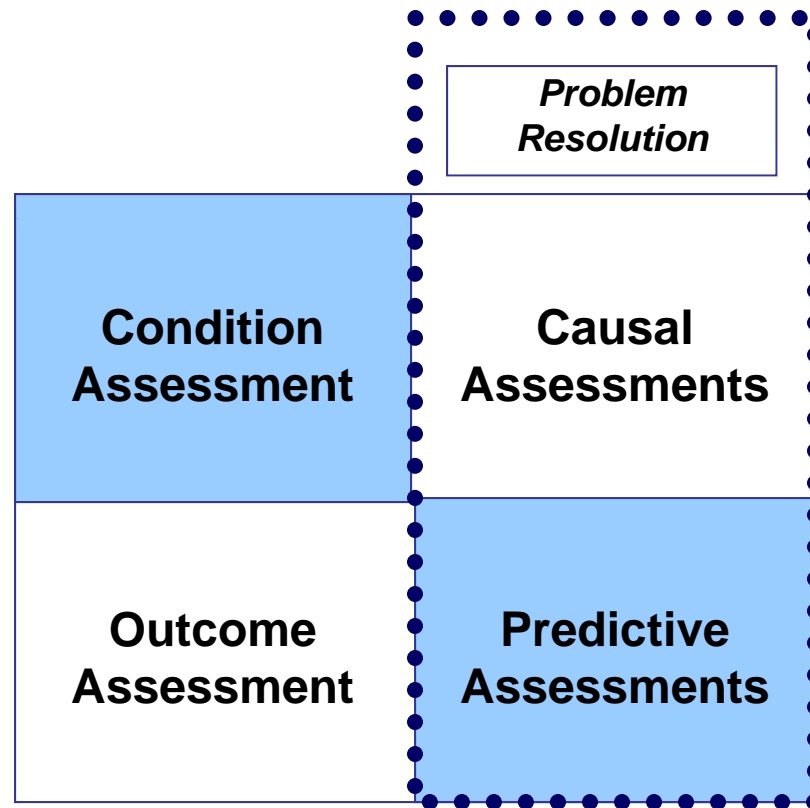
4 types of assessment



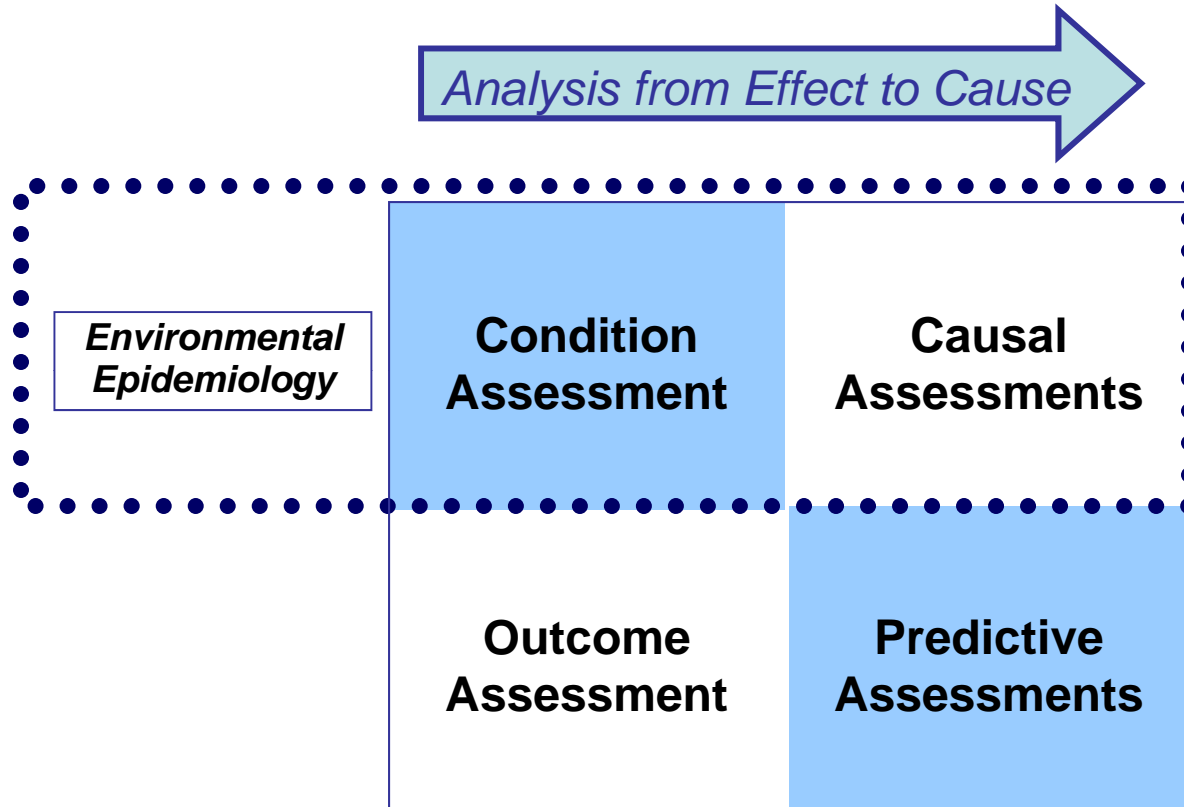
Problem Detection



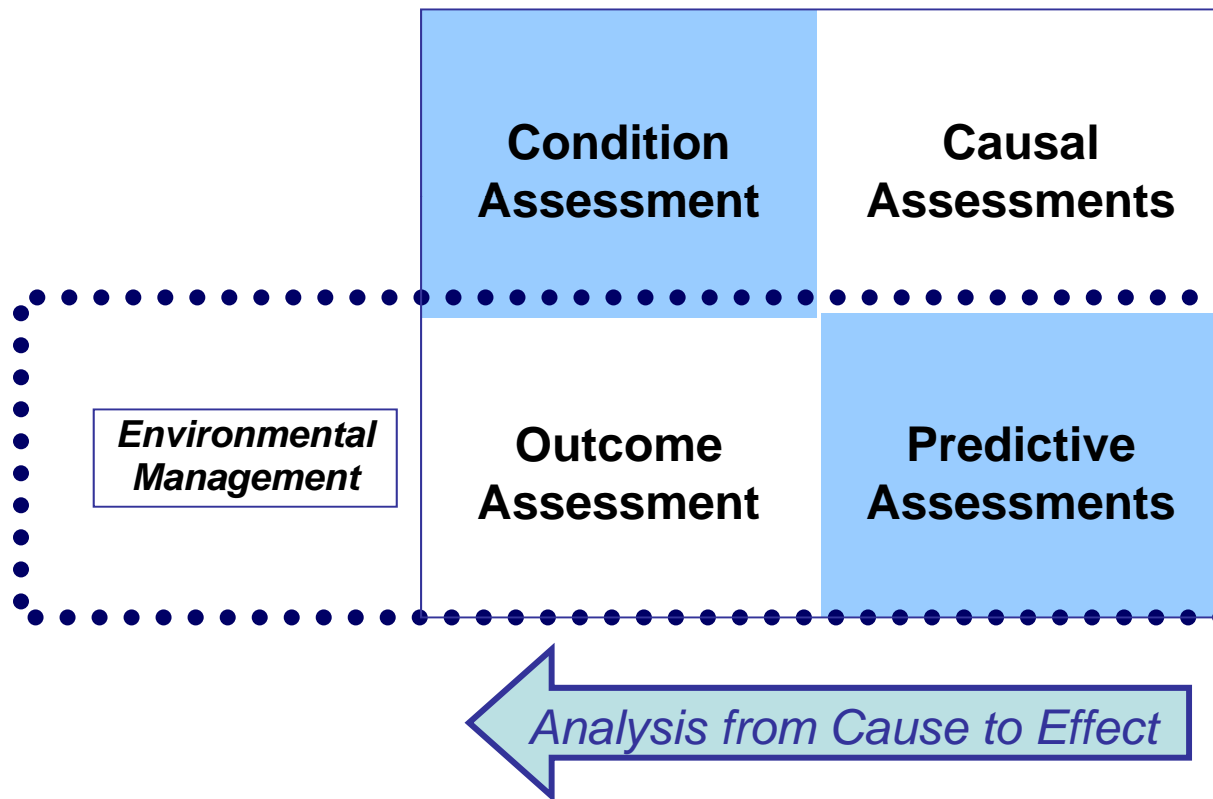
Problem Resolution



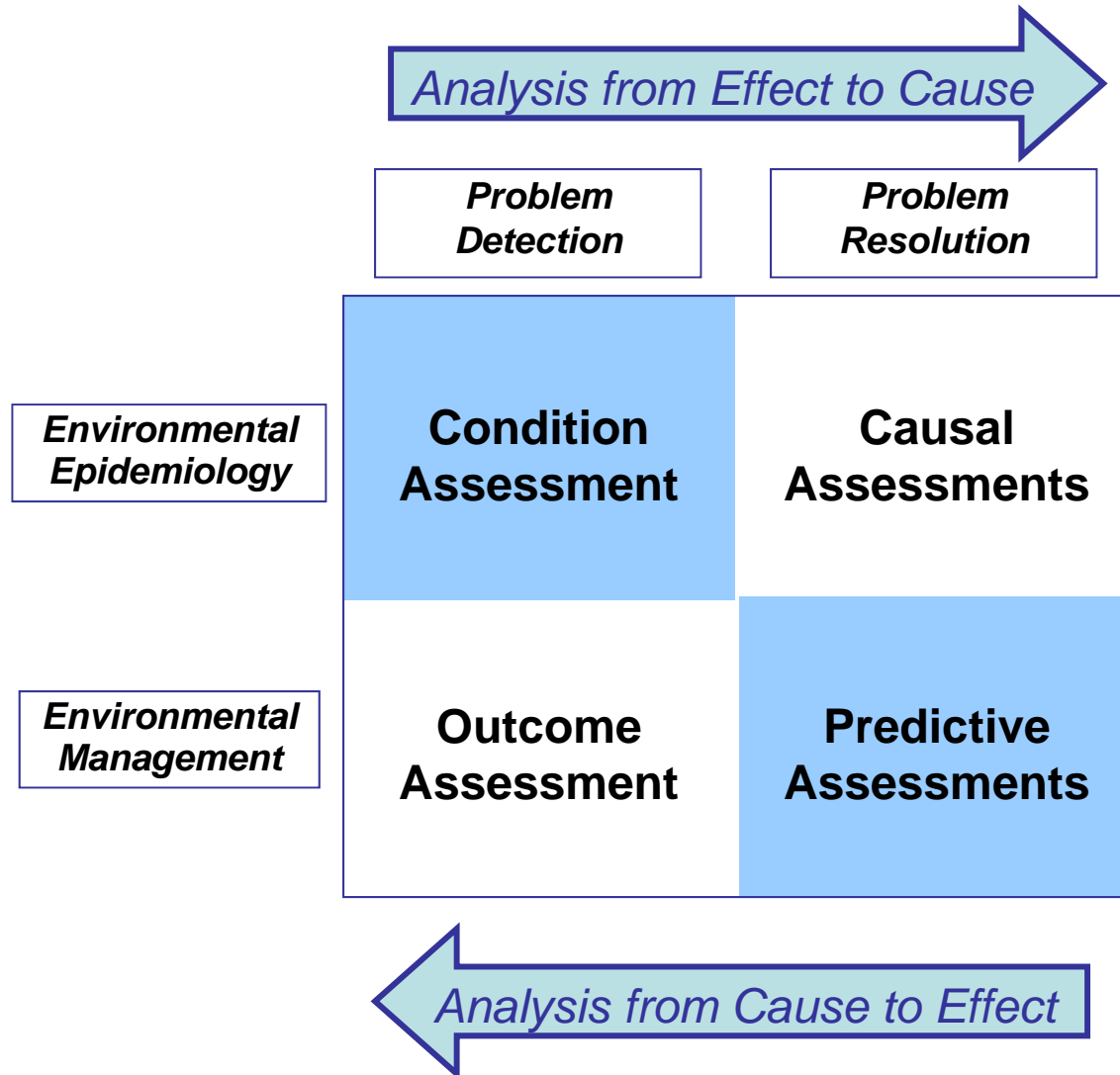
Environmental Epidemiology



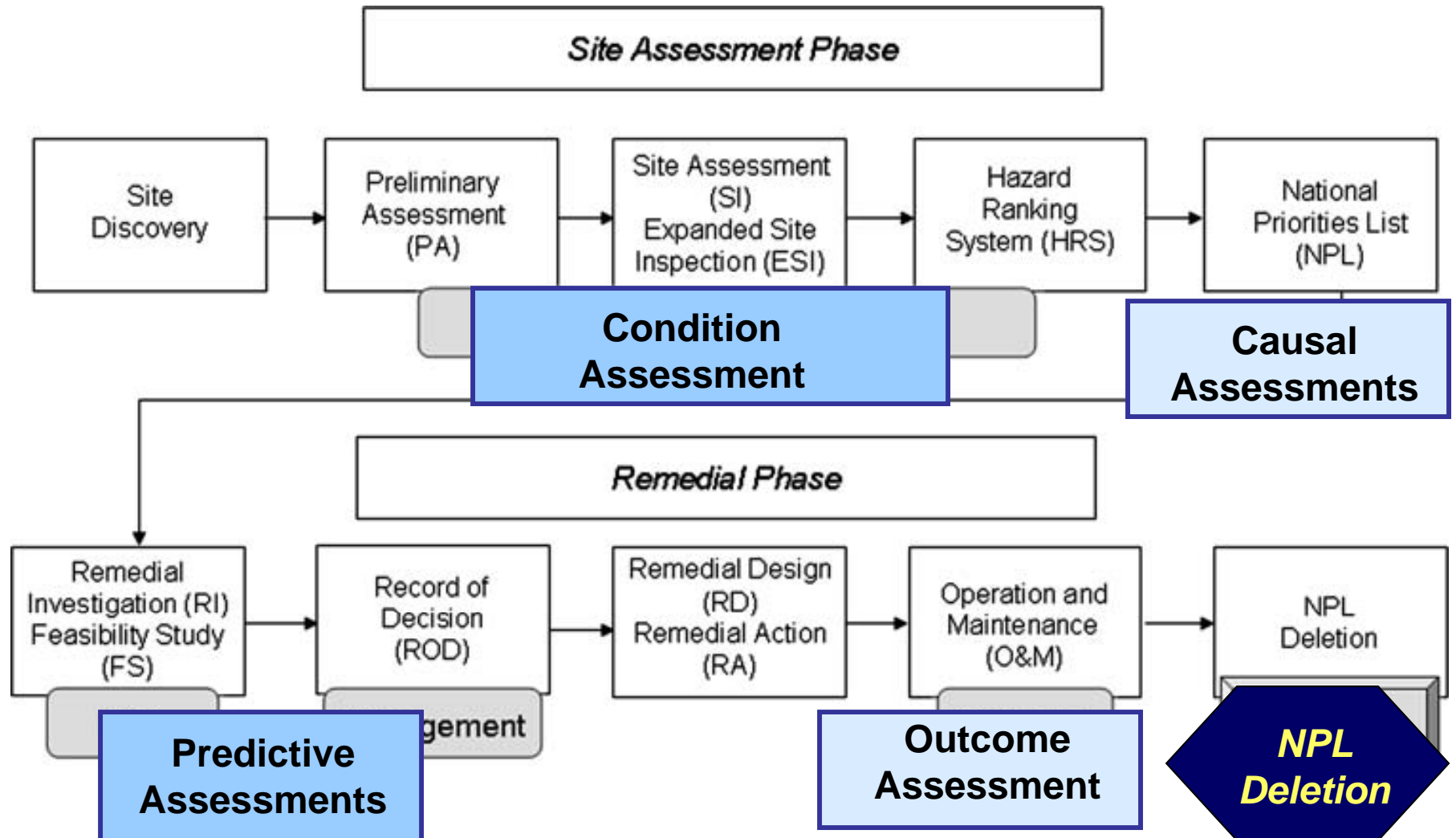
Environmental Management



Environmental Assessment Framework



CERCLA Programs



Problem Detection

Chemical: Lower Fox River and Green Bay: 40 tons (36 metric tons) of PCBs in the lower Fox River and Green Bay (USEPA 1989).

Biological: Deformities observed in piscivorous birds. Assessment put the site on the National Priority List.

Condition Assessment

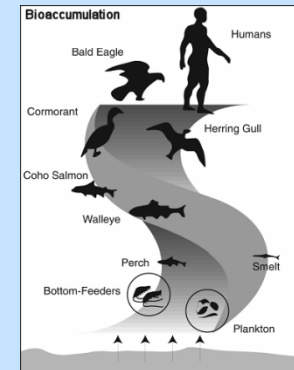


Problem Resolution

Causal Assessment

Cause: PCBs

Source: Paper mills manufactured carbon-free-copy paper from the 1950s through the 1970s (USFWS 1999).



Problem Resolution

40 year monitoring program



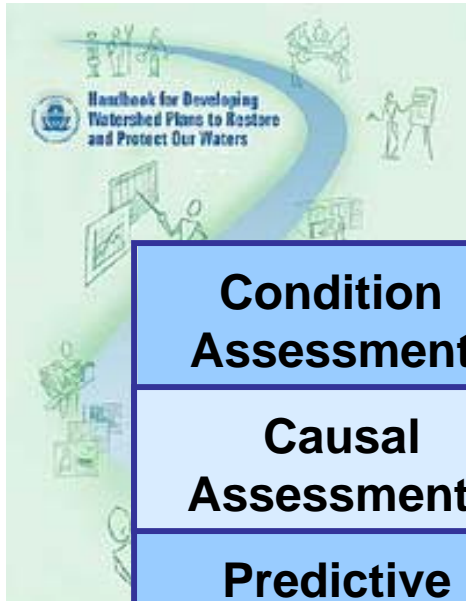
Risk: PCB clean up levels at 1 ppm (WDNR 2003; WDNR and USEPA 2006).

Management: Remediation implementation plan recommended a combination of dredging, capping, and other procedures. (WDNR and USEPA 2006).

**Superfund
Fox River,
Wisconsin**

Outcome Assessment

Predictive Assessment



Condition Assessment

Causal Assessments

Predictive Assessments

Steps in the Watershed Planning and Implementation Process

1. Build Partnerships

- Identify key stakeholders
- Identify issues of concern
- Set preliminary goals
- Develop indicators
- Conduct public outreach

2. Characterize the Watershed

- Gather existing data and create a watershed inventory
- Identify data gaps and collect additional data if needed
- Analyze data
- Identify causes and sources of pollution that need to be controlled
- Estimate pollutant loads

3. Finalize Goals and Identify Solutions

- Set overall goals and management objectives
- Develop indicators/targets
- Determine load reductions needed
- Identify critical areas
- Develop management measures to achieve goals

4. Design an Implementation Program

- Develop implementation schedule
- Develop interim milestones to track implementation of management measures
- Develop criteria to measure progress toward meeting watershed goals
- Develop monitoring component
- Develop information/education component
- Develop evaluation process
- Identify technical and financial assistance needed to implement plan
- Assign responsibility for reviewing and revising the plan

5. Implement Watershed Plan

- Implement management strategies
- Conduct monitoring
- Conduct information/education activities

6. Measure Progress and Make Adjustments

- Review and evaluate information
- Share results
- Prepare annual work plans
- Report back to stakeholders and others
- Make adjustments to program

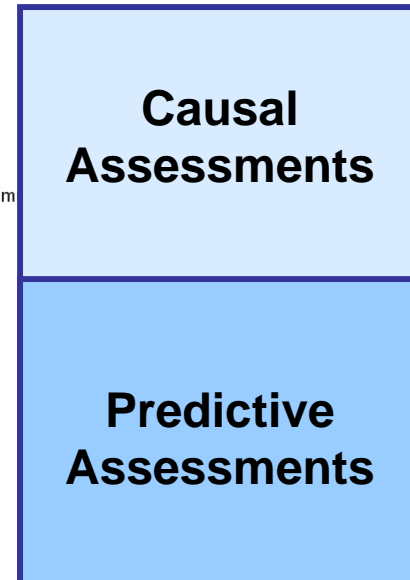
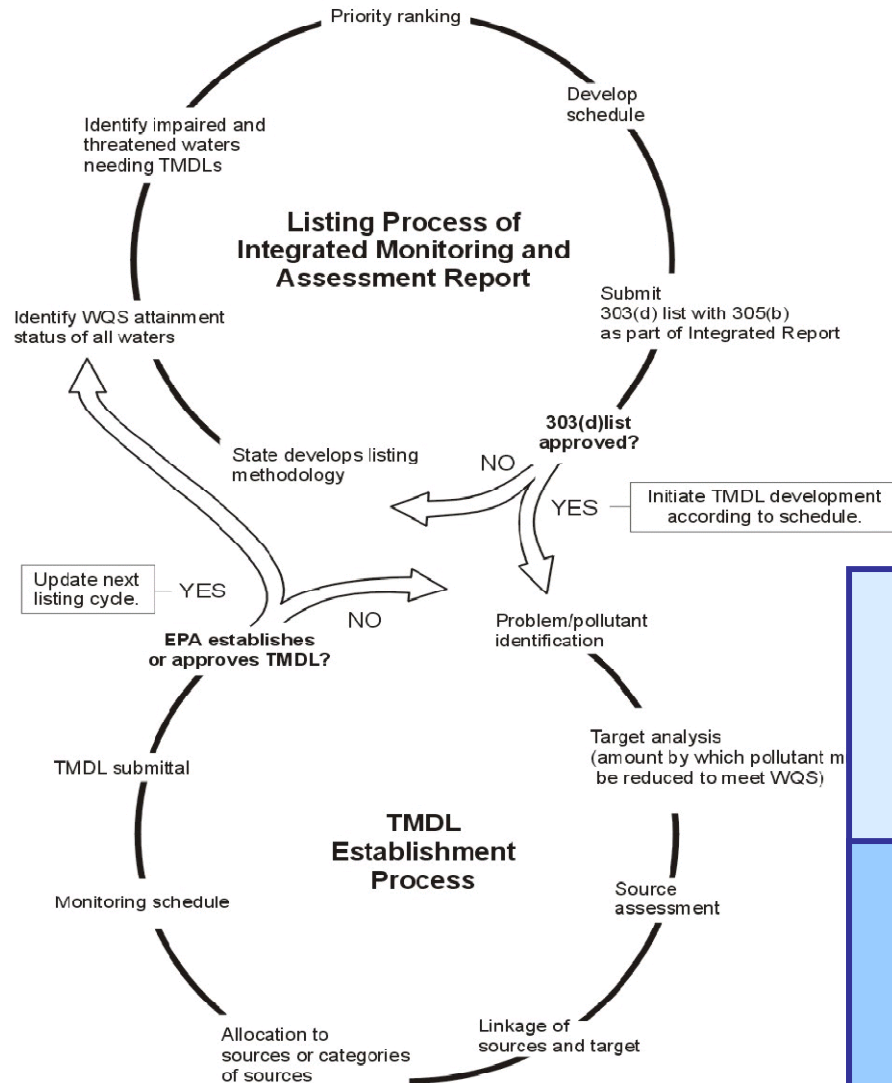
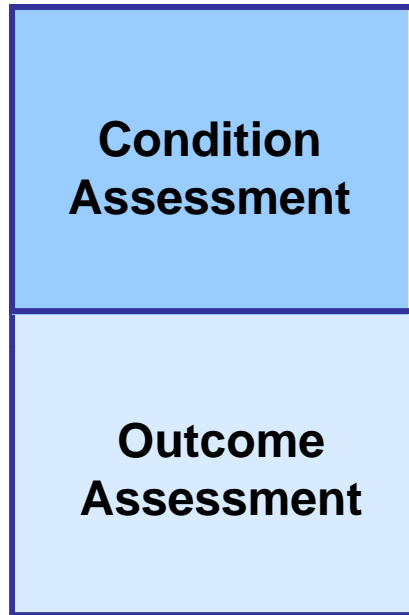
Characterization and Analysis Tools

- ✓ GIS
- ✓ Statistical packages
- ✓ Monitoring
- ✓ Load calculations
- ✓ Model selection tools
- ✓ Models
- ✓ Databases (environmental and social tools)

Watershed Plan Document

Outcome Assessment

US EPA TMDL Program



Problem Detection

Problem Resolution

Condition Assessment

Causal Assessment

***Environmental
Epidemiology***



Cause

Source

***Problem
Resolution***

Risk

***Environmental
Management***

Outcome

Management

Outcome Assessment

Predictive Assessment

Problem Detection

Problem Resolution

Condition Assessment

Dissolved Oxygen	Mean 4mg/L 24 hr	Min Range several days 0.0 to 3.0mg/L
Index	Fish	Habitat
Warm Water Criteria	40	60
Pre- Remediation	28.0	51.0

Causal Assessment

Cause: Deoxygenated water due to algal and bacterial respiration and lack of re-aeration by mixing and turbulence.

Sources: channel modification and nutrient loading from

- municipal point sources,
- combined sewer overflows,
- septic systems, and
- urban runoff.

Index	Fish	Habitat
Warm Water Criteria	40	60
Pre- Remediation	28.0	51.0
Post- Remediation	44	79.5



Risk: reducing nutrients was unlikely to improve aquatic life because dams altered flow, aeration and benthic habitat, and they were a physical barrier to fish migration

Management: return to a free-flowing river while preserving the historic character of the area.

Outcome Assessment

Predictive Assessment



Problem Detection

Problem Resolution



Causal Assessment

Problem Resolution

Hurricane Approaching

Risk

Management

Outcome

Outcome Assessment

Predictive Assessment

Environmental Management

Recap

- Four types of assessments: condition, causal, predictive, and outcome.
- Knowing the type will help ensure that the right types of logic are used
- Integrated assessments are needed to resolve a problem