Adaptive Implementation and the Watershed Approach: Perspectives from the U.S. EPA

Adaptive Implementation of TMDLs: Implementation and Application

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Adaptive Implementation

Definition:

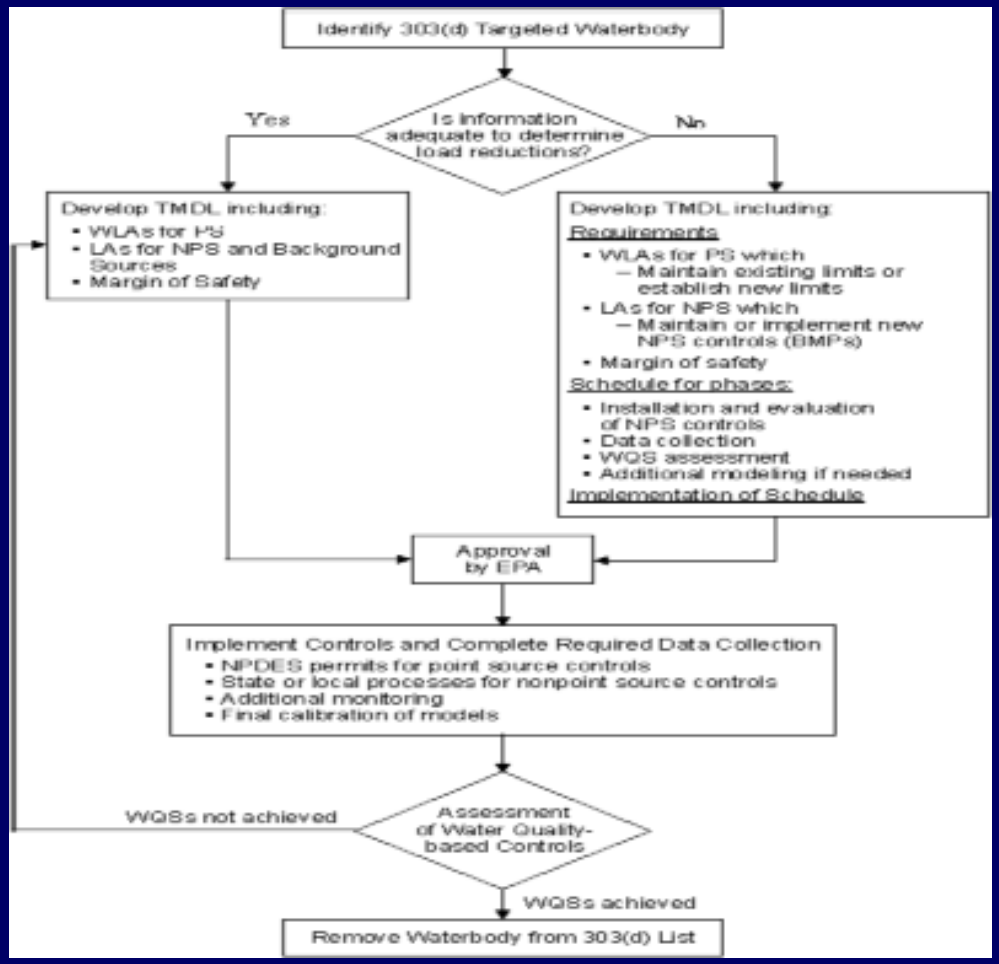
- Use available data and information to calculate WLAs and LAs with MOSs (reflecting uncertainty) to meet water quality standards.
- Initiate pollutant reductions, without any new data and assess their effectiveness.
- Adjust allocations as necessary to achieve WQS
- Establish schedule or timetable for:
    - Control implementation
    - Monitoring

Adaptive Implementation

Areas of uncertainty include:

- Environmental (e.g., WQ condition, loading and system response)
- Source control (e.g., options, effectiveness and probability of implementation)
- Financial (e.g., incremental costs vs. associated benefits)
- Regulatory (e.g., likelihood of litigation)

EPA Guidance (1991)



Current EPA Policy

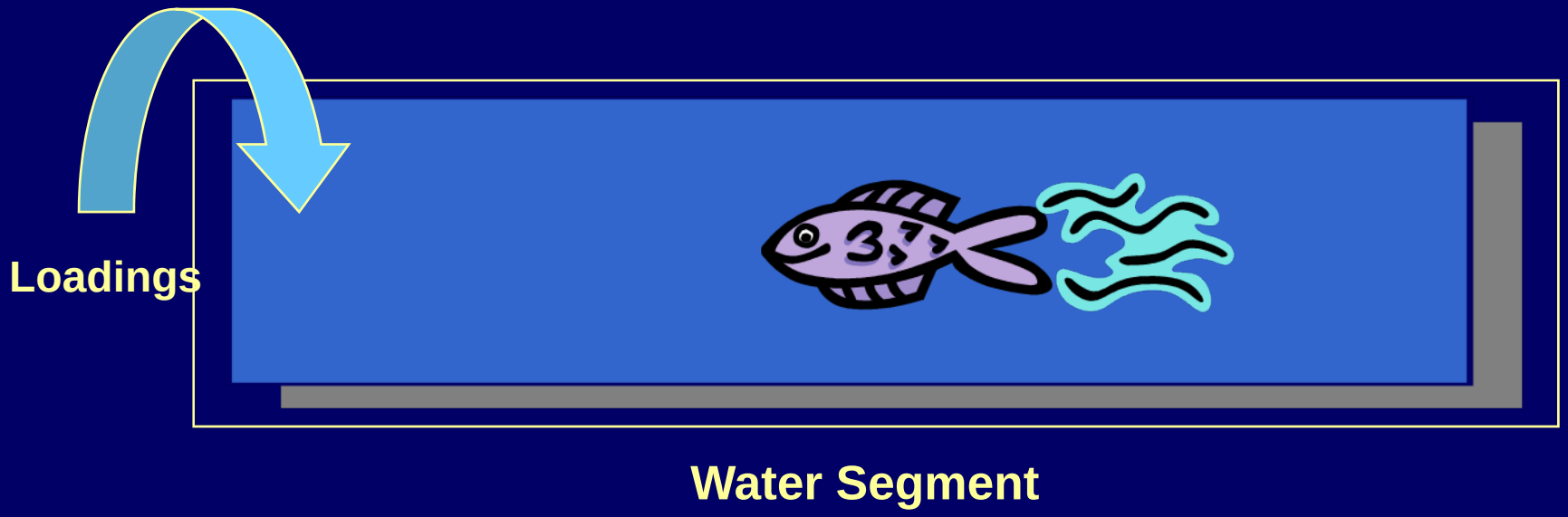
Even in the face of ***significant uncertainty***, for a TMDL to be approvable it must be formulated to attain all applicable WQS and contain the following elements:

- Waste load allocation
- Load allocation
- Margin of safety

TMDL = WLA + LA + MOS

EPA's Perspective on the Uncertainty Components

1. Characteristics of the segment
   - Scale/size of segment
   - Sampling locations and how representative they are
   - Complexity of system (i.e., land use, hydrodynamics)



Uncertainty Components (cont.)

2. Confidence in the linkages between designated use(s) and criteria
3. Quality and quantity of available data
4. Nature of criteria
   - Conservative vs. Highly reactive
   - Narrative vs. Numeric
5. Nature of the pollutant of concern
   - Knowledge of fate and transport
   - Source (i.e., point or non point)

EPA's View on the Decision Making Process

Uncertainty in AI could influence the regulatory decision making process in:

- Setting initial reduction targets
- Making waste load allocations, load allocations, and margin of safety
- Conducting follow-up monitoring
- Requiring certain levels of technology
- Justifying cost and benefits

Computing WLAs in the Face of Uncertainty

When computing a WLA in the AI process, how much flexibility is there in selecting an initial starting point?

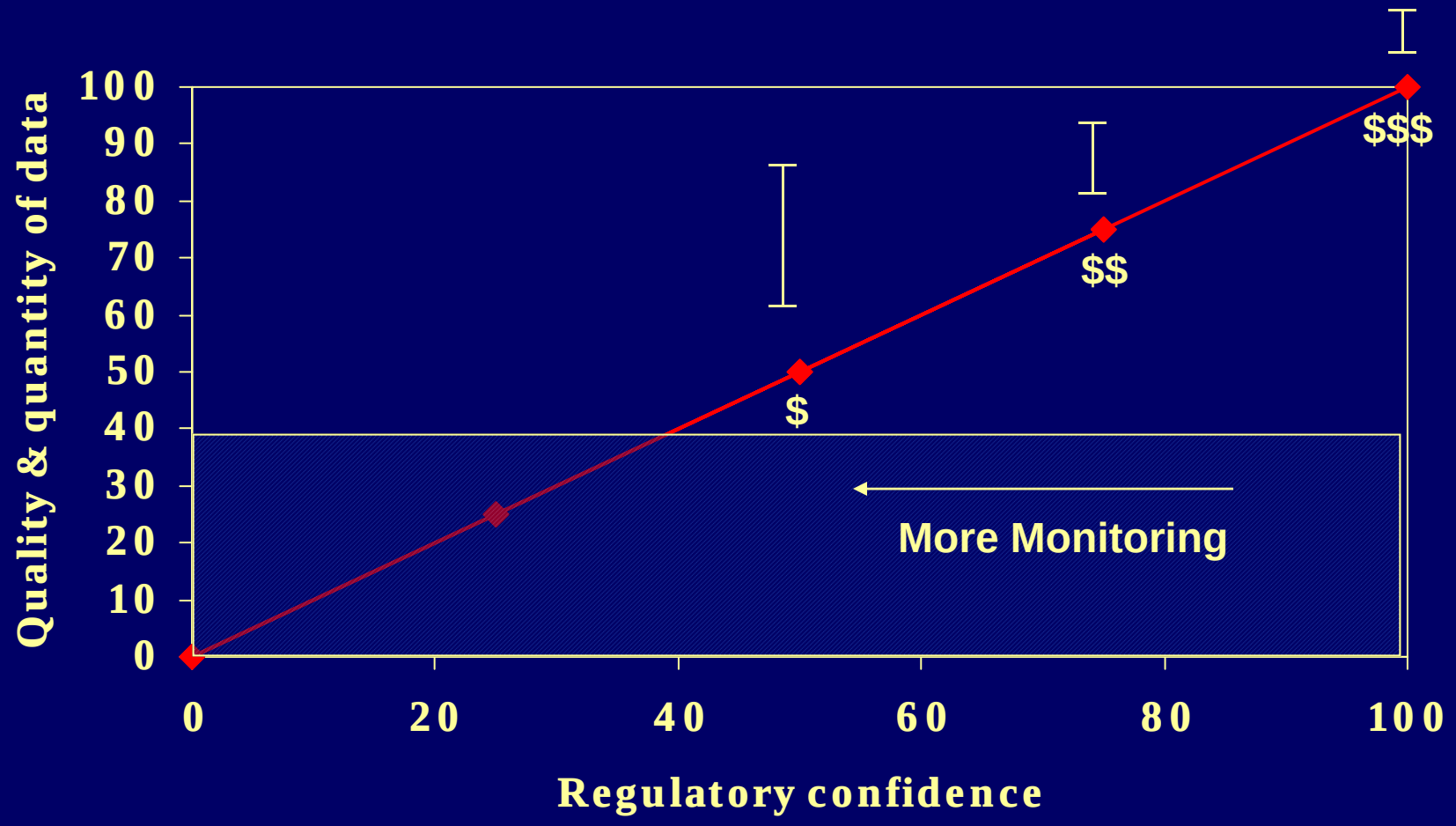
10 lbs/day

?

7 lbs/day

Do we pick a conservative allocation (7 lbs/day) or liberal allocation (10 lbs/day)?

EPA's Conceptual Diagram of AI Process



The Data "Black Hole"

In the shaded zone, States/EPA would lack adequate data and information to:

- Make a listing determination
- Develop TMDL or alternative (i.e., 4b)
- Write a "flexible" NPDES permit

Escape from the "Black Hole"

- Level at which there is adequate data and information to:
  - Make a listing determination
  - Develop a TMDL or alternative
  - Implement a control strategy
- These decisions reflect the degree of uncertainty
- The threshold may be specified in the State's methodology

EPA's Regulatory Concerns

- The validity of the listing decision
- The assurance that the water quality standard will be attained
- Potential challenges to permit issuance
- Process for TMDL revision
- Can EPA require monitoring?