Portland Harbor CAG Presentation by The Lower Willamette Group

Preparation for CAG review of the Portland Harbor Superfund Site Feasibility Study

Bob Wyatt

Jim McKenna

Carl Stivers

June 9, 2010

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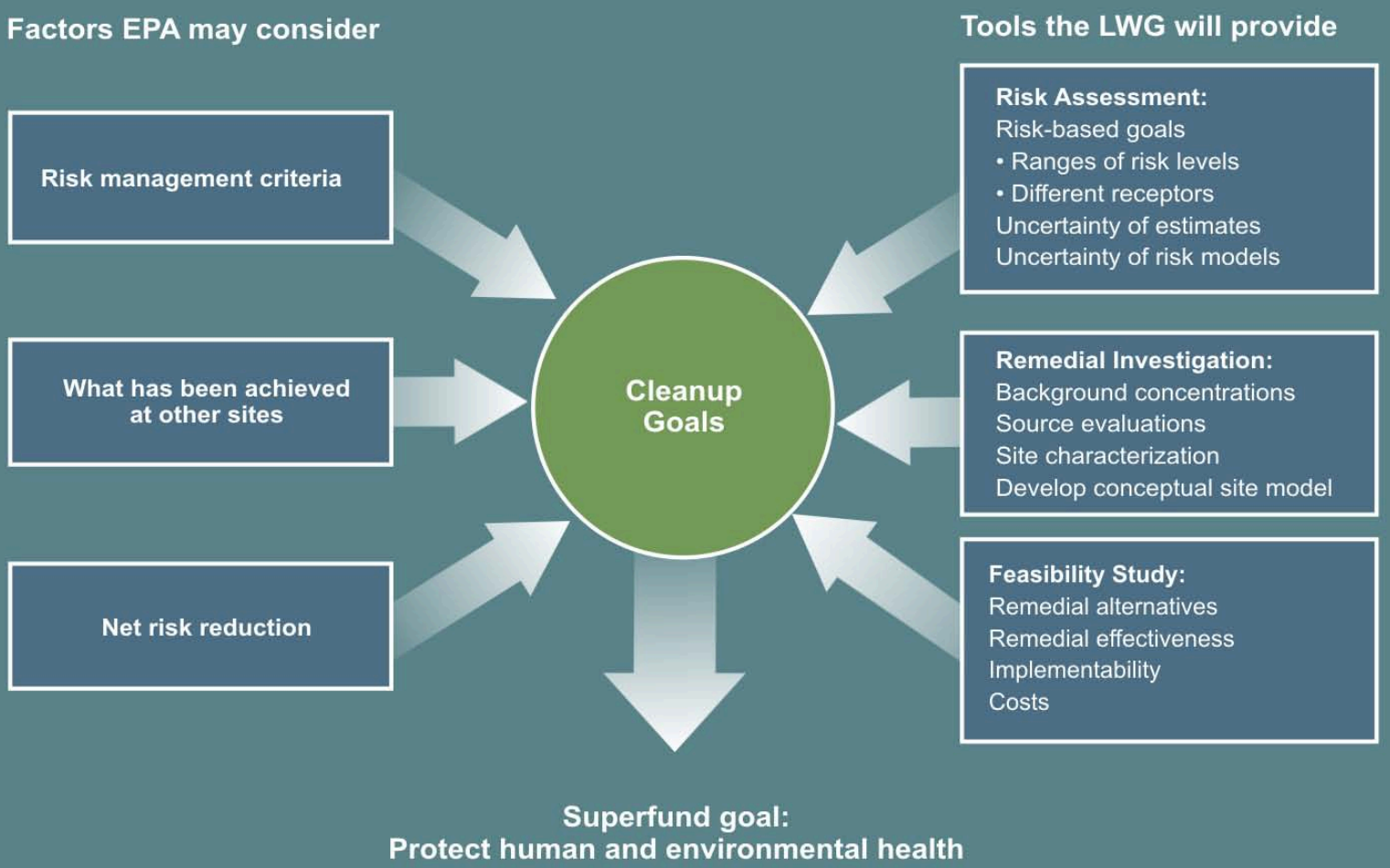
CAG Summer FS Presentations

- June – closer look at dredging and monitored natural recovery
- July – closer look at treatment and capping
- August – boat tour - how river sites may be evaluated in the FS

June 9 Presentation

- Brief review of what goes into EPA's cleanup decision
- Dredging – "It's not just about the equipment"
- Monitored Natural Recovery – "It's not doing nothing"

How Cleanup Goals are Achieved



Feasibility Study - Reminder

- The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions.
- Data collected in the RI influence the development of remedial alternatives in the FS.
- The ROD will utilize the FS remedial alternative analysis to establish the final remedy.

Feasibility Study Reminder- continued

- Feasibility Study Process evaluates and compares various remedial options
- <u>Feasibility Study Process DOES NOT:</u>
  - Determine who cleans up what
  - Fully design remedies (*e.g.*, dredge or cap boundaries)
    - (The public will have review of the proposed plan before EPA selects the remedy)
  - Select specific technologies (*e.g.*, bucket vs. hydraulic dredge)
  - Select contractors
  - Select specific disposal sites

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Dredging

Dredging Definition

- Dredging is an excavation operation carried out fully or partially underwater, in shallow seas or fresh water areas, with the purpose of removing bottom sediments and placing or disposing of them elsewhere

- Primary purpose today: discuss removal of contaminated sediment from the aquatic environment

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Types of Dredging Equipment

- Two broad categories that have many specialized sub-categories
  - Mechanical
  - Hydraulic
- Selection of equipment must consider a variety of project-specific details
  - Site access
  - Dredge volumes
  - Presence of debris and rock
  - Nature of contamination and cleanup requirements
  - And more…

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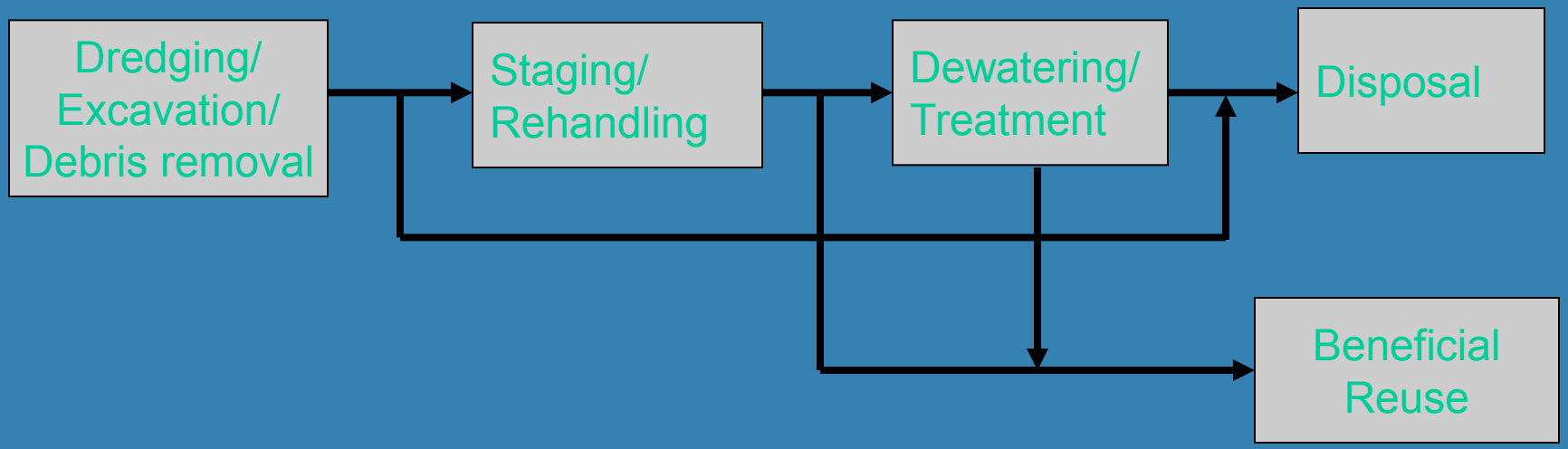
Process Linkages & Management
Dredging Process Train – Landside Transport



Transportation: ⟶

Pros and Cons of Dredging

Pros

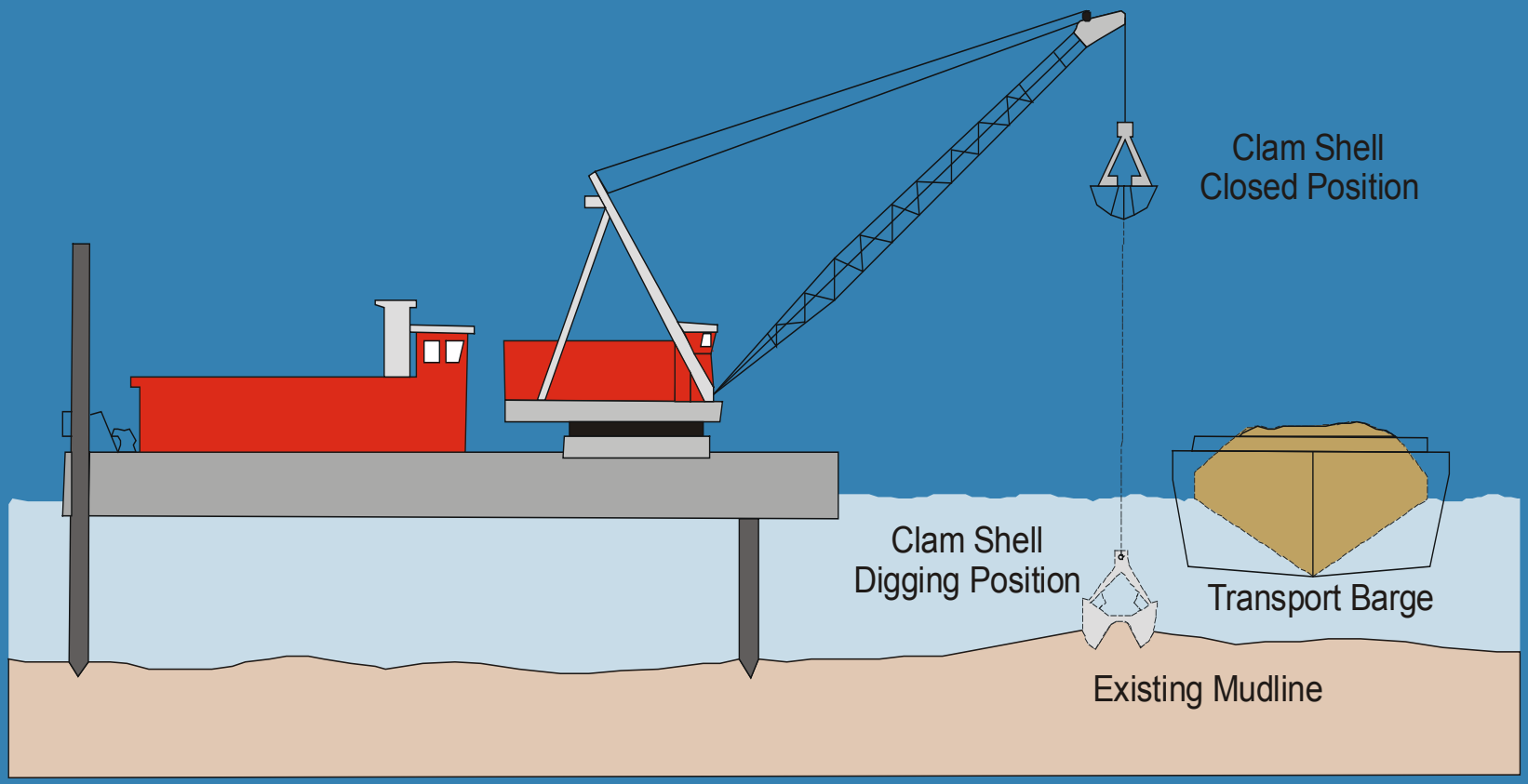
- May result in least uncertainty about long-term effectiveness of cleanup (e.g., contaminated sediment is removed)
- Often provides flexibility for future uses (e.g., improved navigation)
- Quicker long-term risk reduction than natural recovery in areas of high chemical levels
- Allows for more treatment options

Cons

- Often causes short-term exacerbation of risk and loss of chemicals (e.g., resuspension)
- Leaves “residual” chemicals
- Greater logistical considerations, community impacts (e.g., increased truck traffic)
- Often most costly option

USEPA. 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*

Mechanical Dredge



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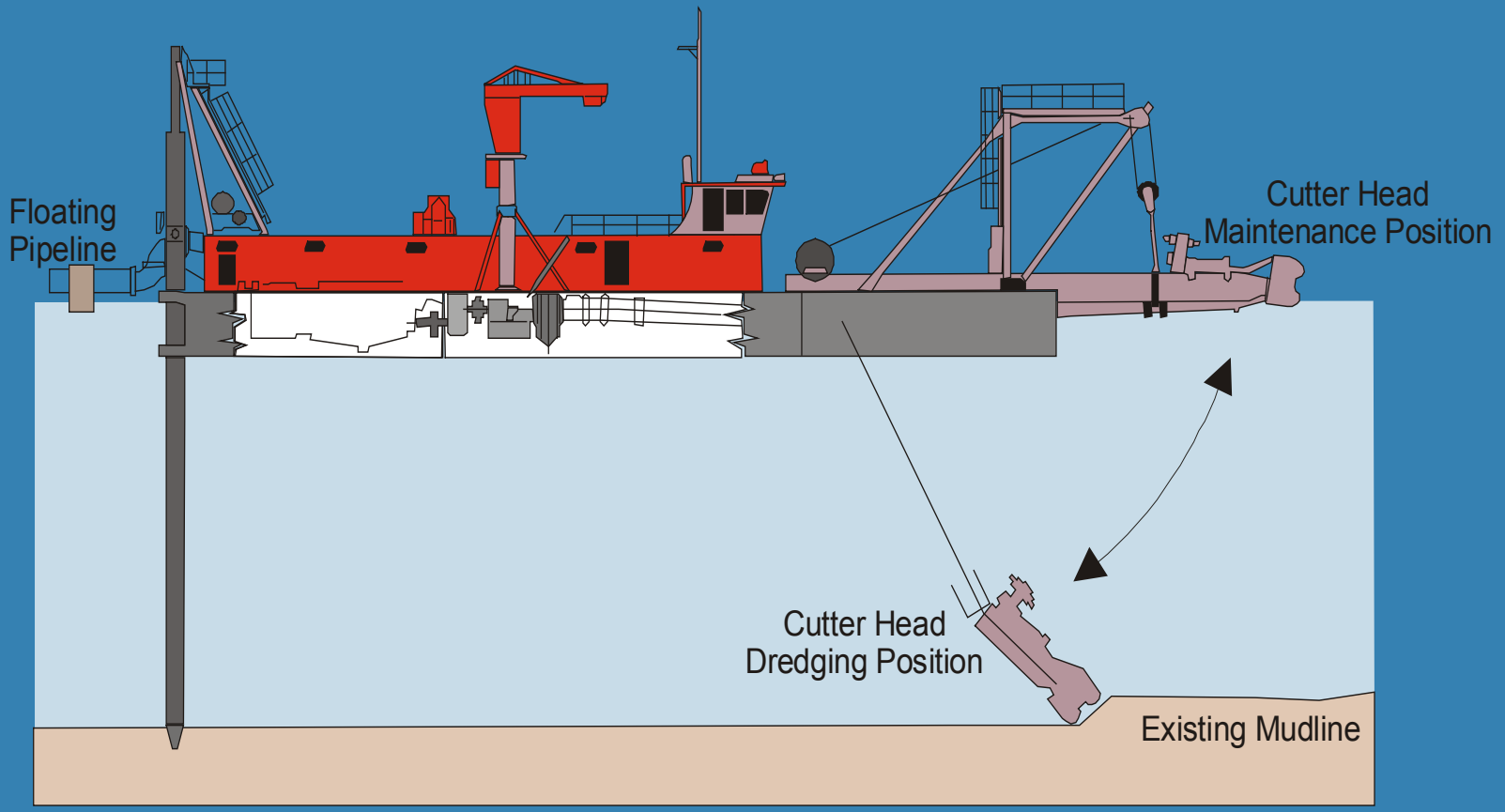
Hydraulic Dredge



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Comparative Advantages of Mechanical Versus Hydraulic Dredges

Mechanical Dredge

- Advantages
  - Can manage debris
  - Less water to manage than hydraulic dredge
  - The same derrick can use different dredge buckets to dig a wide variety of soil types
  - Work in more confined areas (e.g., near docks)

Hydraulic Dredge

- Advantages
  - High production rate
  - Can operate in shallow water
  - Suction dredges may provide improved residuals control under some conditions
  - Risk of spillage during transport can be reduced

Comparative Disadvantages of Mechanical Versus Hydraulic Dredges

Mechanical Dredge

- Disadvantages
  - Typically lower production rate compared to hydraulic
  - Typical barge setups require deeper water than hydraulic

Hydraulic Dredge

- Disadvantages
  - Generates substantial water volume, large water handling areas
  - Cannot manage large debris
  - Typically higher mobilization cost due to piping and water treatment
  - Less available equipment and experienced operators

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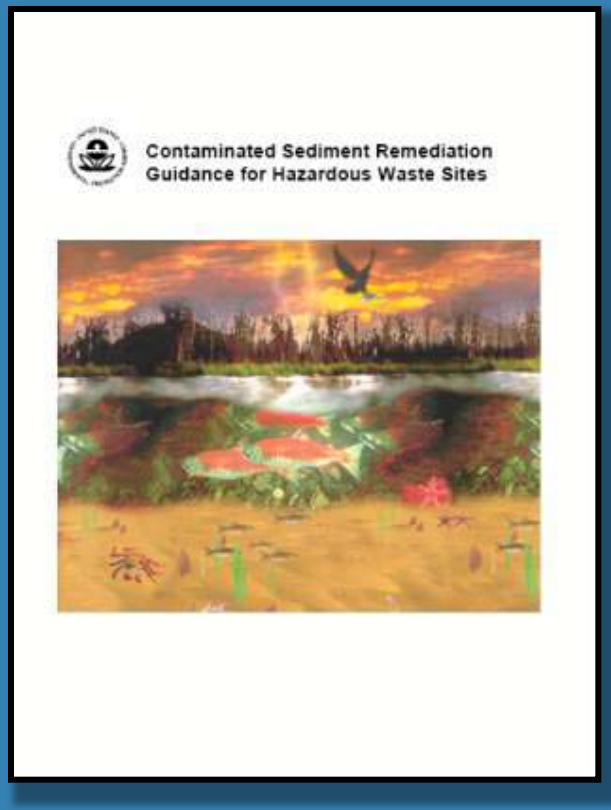
Cost Considerations for Dredging

- Cost is highly dependent on project specific considerations
  - Site access, size of job, availability of labor/equipment, offloading constraints, disposal facilities, and more…
- Costs of Mechanical vs. Hydraulic
  - Mechanical often lower cost for
    - smaller, confined, or precise projects
    - where upland handling and transport needed
  - Hydraulic often lower cost for
    - very large projects
    - where discharged directly to final disposal location
  - "Typical" unit costs vary widely, depending on project specifics

Monitored Natural Recovery (MNR)

What is Monitored Natural Recovery?

- "Monitored Natural Recovery (MNR) is a remedy for contaminated sediment that typically uses ongoing, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment."
- A key part of MNR is long-term monitoring to confirm expectations and identify contingency actions, as needed
- Mostly used in combination with active remedies (capping, dredging, treatment)



USEPA. 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*

MNR ≠ Do Nothing

- MNR requires a detailed understanding of hydrodynamics, sediment transport and chemical fate and transport. MNR is often supported by predictive modeling
- Source control is necessary to achieve natural recovery and to avoid recontamination under any cleanup approach
- Monitoring is the key component
- Monitoring typically goes on for many years and costs are considerable over time

USEPA. 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*

MNR ≠ Do Nothing - continued

- "Institutional controls" are usually used to minimize risks to people during recovery period
- Guidance: "There should not be a presumption that removal of contaminated sediments from a water body will be necessarily more effective or permanent than capping or MNR. Likewise, without sufficient evaluation there should not be a presumption that capping or MNR will be effective or permanent."

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Pros and Cons of MNR

Pros

Avoids short-term exacerbation of risk or loss of chemicals

- Avoids construction impacts (e.g., truck traffic)
- Does not disrupt biological communities
- Can be less costly, depending on monitoring program

Cons

- Leaves chemicals in place
- Potential for chemical movement to new areas
- Can be slow to reduce risk as compared to active remedies
- Relies on institutional controls while recovery takes place

USEPA. 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*

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Monitor and Contingency Approach

- Establish good baseline data prior to and immediately after active remedies constructed
- Obtain regular updates on the course of MNR
- Use updates to refine predictions of future MNR
- Contingency process in case MNR off course
  - Additional data evaluation
  - Changes to regular monitoring program
  - Additional immediate monitoring and evaluations
  - Contingency actions –
    - thin capping
    - more aggressive actions if needed

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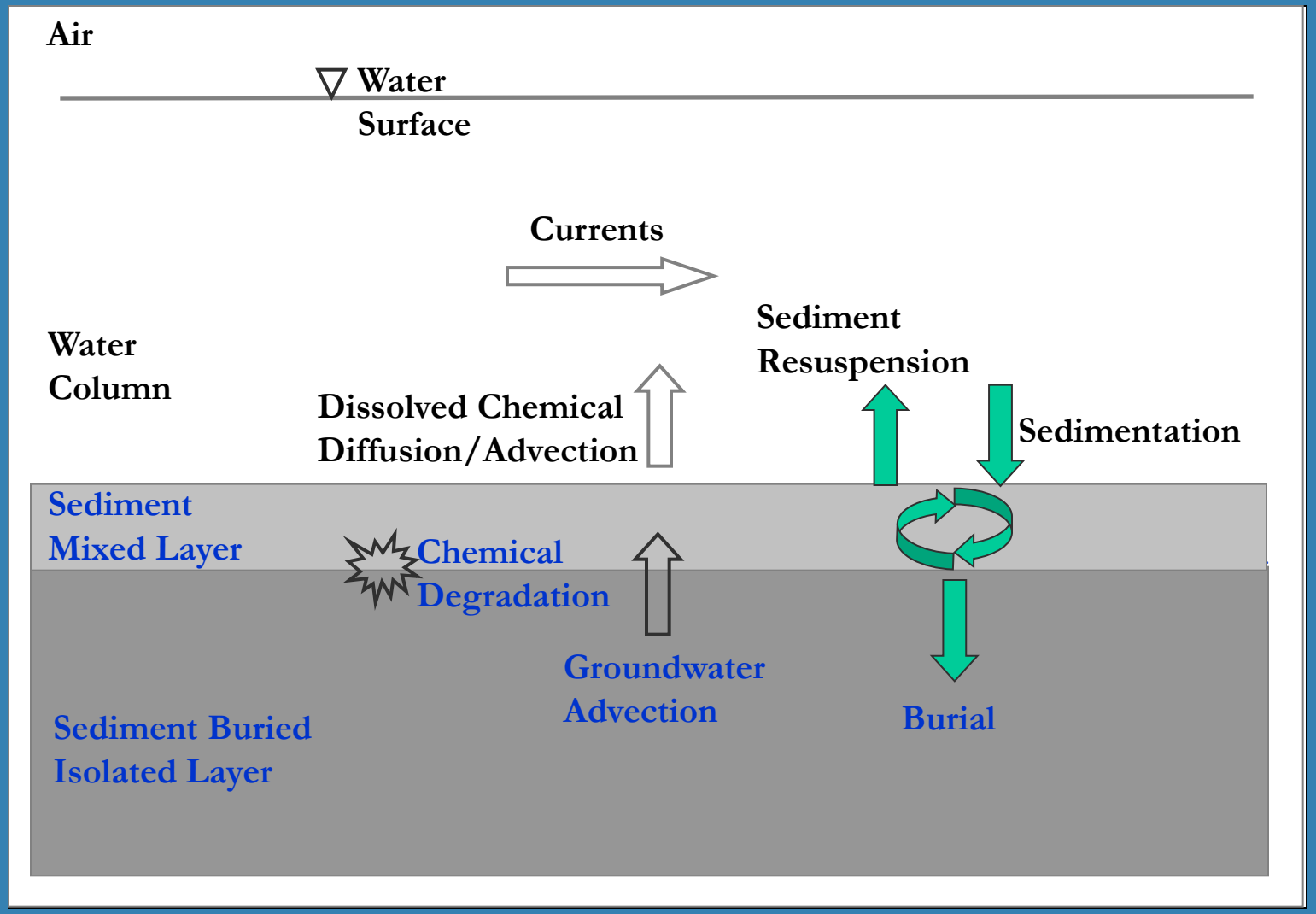
Monitored Natural Recovery Processes



Evaluating Monitored Natural Recovery

- EPA Lines of Evidence and Measures
  - Chemical trends in historical sediment core data
  - Chemical trends in surface sediment chemistry or toxicity
  - Chemical trends in biota
  - Chemical trends in surface water
  - Characterize sources and controls
  - Characterize fate and transport processes
  - Develop acceptable and defensible predictive models

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Conclusions

- Dredging and MNR both have pros and cons
- No one technology is best for every situation
- Technologies will be used in combination
- Next month: Treatment and Capping

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Questions?

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