



Operating Methods and Strategies

(Tab J)

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Training Objectives

- Learn terminology for SMUs, dredge prisms, and dredge cuts,
- Learn considerations for vertical and horizontal sequencing of work
- Learn considerations of method of operation

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Operational Considerations – Outline



- Sediment Management Units, Prisms, and Cuts
- Sequencing Removal
 - Vertical sequencing
 - Horizontal sequencing
- Operations Plan

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SMUs, Prism, Cuts, etc.



How to slice and dice:

- Sediment Management Units
 - Large areas with differing characteristics
- Dredging Prisms
 - 3-D geometric volume of sediments to be dredged
- Dredging Management Unit
 - Units within an SMU with specified unique final cutline elevations
- Cuts
 - A specific production cut within a DMU
- Compliance Demonstration Areas
 - Area sampled to confirm dredging effectiveness

Note: There is no standardized definitions of these terms

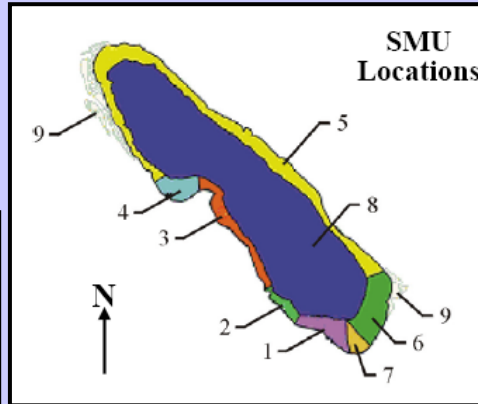
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Sediment Management Units

- Usually based on larger areas with differing characteristics




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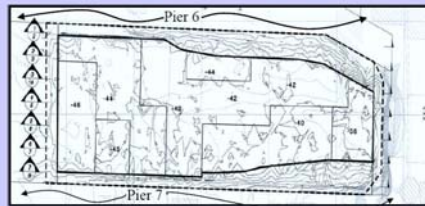
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Dredging Prisms

- 3-D geometric space for volume of sediments to be dredged
- Can be composed of areas with multiple cutline elevations

Complex Dredge Plan/Tight Quarters 



Puget Sound Naval Station

Source: Elmer and Lally (EPA Forum)

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Dredging Management Units



New Bedford Harbor – DMUs used for:

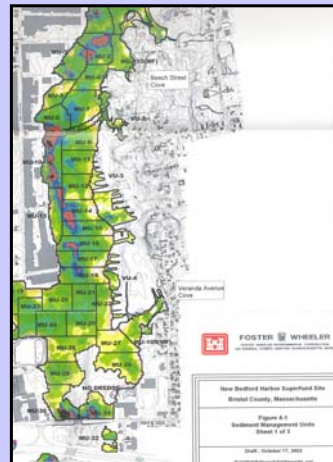
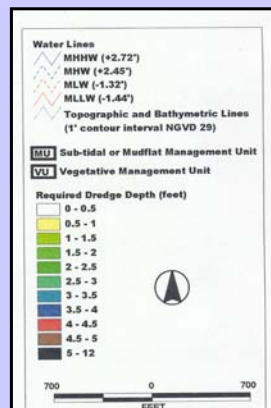
- Projecting annual resource requirements;
- Improving accuracy of material balance calculations;
- Specifying sequence of removal;
- Providing data to bidders on sediment types for each unit; and,
- Monitoring remedial progress.

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Dredging Management Units – New Bedford Example

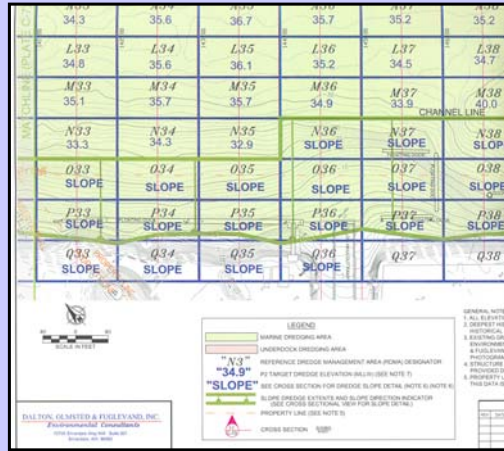


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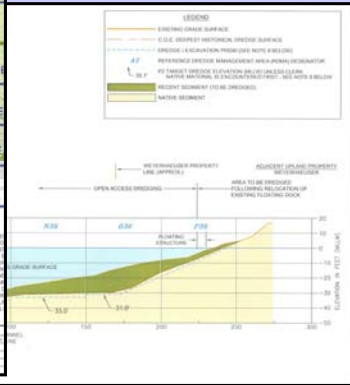
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Dredging Management Units - Head of Hylebos Example



Reference Dredge Management Areas (RDMAs)



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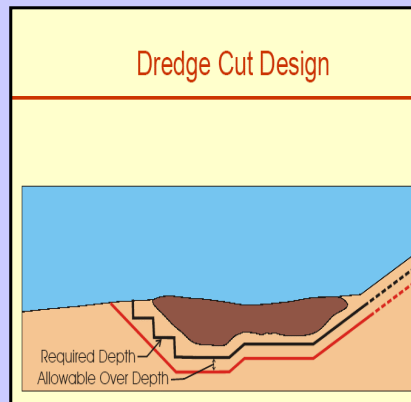
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Dredging Cuts



- Cut - a specific area and associated depth of cutline
- Area a function of sediment data and dredge operating factors
- Set final cutline at lowest points of contamination
- Box cuts to follow slopes



Source: USACE Dredging Fundamentals 2004

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Implications of Dredge Cuts



- Dredges can't easily follow slopes
- Box cuts result in increased sediment removal to achieve desired results
- Sloughing of box cuts are problematic
- Layback slopes may be needed for deeper cuts
- Account for potential increases in volumes

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Compliance Demonstration Areas



- Area sampled to confirm dredging effectiveness
- Spacing of borings drive size of acceptance units

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Sequencing Removal

- Vertical sequencing
 - Within a DMU
- Horizontal sequencing
 - Sequencing of DMUs

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Vertical Sequencing

For a given Dredging Management Unit:

- Cutlines selected to remove contaminated sediment and meet CULs
 - NOT to achieve a given cutline elevation or volume (don't let the contractor "drop the bottom" to meet an elevation target)
- Selection of thickness/ number of cuts
 - Drives equipment selection
 - Will influence the residual concentration
 - Consider flowback of residuals
- Cleanup passes

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Horizontal Sequencing

- Riverine – work upstream to downstream
- Estuarine – more complicated
 - Remove hot spots first
 - Work upstream to downstream wrt predominant flow regime
 - Partial removals over entire area (last cuts with lower concentrations due to overdredging)
 - Schedule around tidal cycles for critical DMUs

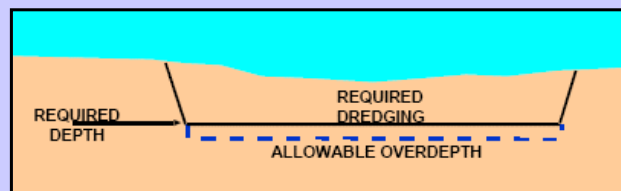
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Overdredge Allowances

- Overdredge allowance should be tighter for ED as compared to Navigational Dredging
- 6 inches is the “state of the practice”
- Incentives – Bonus for minimal overdredge
- Disincentives - Penalties for excessive overdredging



Source: USACE Dredging Fundamentals 2004

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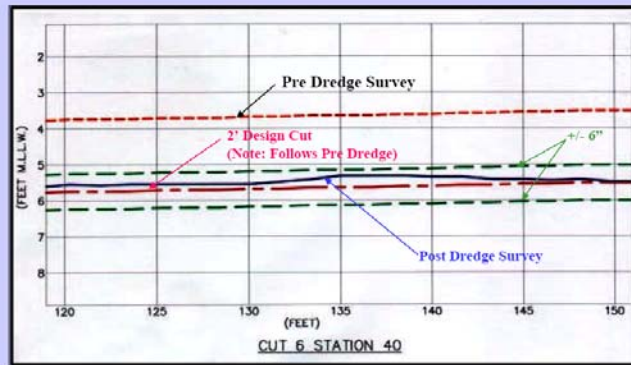
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Overdredge Allowances



Profiles



Source: Elmer and Lally (EPA Forum)

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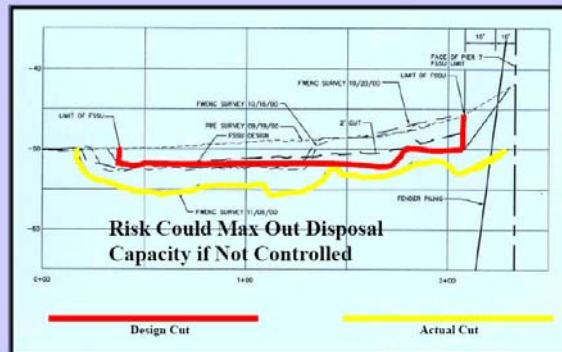
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Overdredge Allowances



Example of Overexcavation



Risk Could Max Out Disposal Capacity if Not Controlled

Source: Elmer and Lally (EPA Forum)

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Methods of Operation



Manistique – outriggers used to control positioning of auger dredge



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Methods of Operation



Manistique - Diver operated suction using dredge pumps



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Operations Plans



- Should be a written document, approved by the PM
- Mob/ Demob
- Equipment for production and cleanup passes and for debris removal
- Mode of operation of equipment
- Logistics for rehandling and transport
- Should delineate SMUs, DMUs, Cuts, etc.
- Should identify sequence of work
- Management actions and contingencies

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QUESTIONS?



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