

Dredging

Bringing New Life to Old Ponds and Lakes

Presented by Trent Lewis, FPC
For NCTCOG Luncheon

DREDGING

Removing accumulated sediment from surface water systems such as lakes, ponds, streams, channels and wetlands

Silt versus Sediment

SILT	SEDIMENT
Defined by small size	Defined by large size
Inorganic particles	Inorganic particles
Size - .004 to .06 mm	Size – exceeds .06 mm
Easily transported by currents	Harder to transport
Settles in still water	Can settle in moving water
Consolidated aggregate – “siltstone”	Consolidated aggregate – “mudstone”
Silt deposits formed by wind – “loess”	

Sediment Load Sources

Internal Loading	External Loading
Shoreline Erosion	Watershed features
Bank Scour	Tributaries and streams
Aquatic or Terrestrial Vegetation*	Stormwater BMP's
Fisheries and Wildlife*	Construction upstream

*Detritus – decomposed organic matter and the “fertilizer” of the food or “energy” base.

Good Dredging Begins With Good Data

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Hydrographic Surveys



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What is Hydrography?

The branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas, coastal areas, lakes and rivers, as well as the prediction of their change over time, for the purpose of safety of navigation and all other marine activities including economic development, security and defense, scientific research and environmental protection.

Source: International Hydrographic Organization (IHO)

How Do We Survey?



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4 Components of Accuracy

- Survey Crew
- GPS Instruments (x,y)
- Sonar Instruments (z)
- Data processing protocol



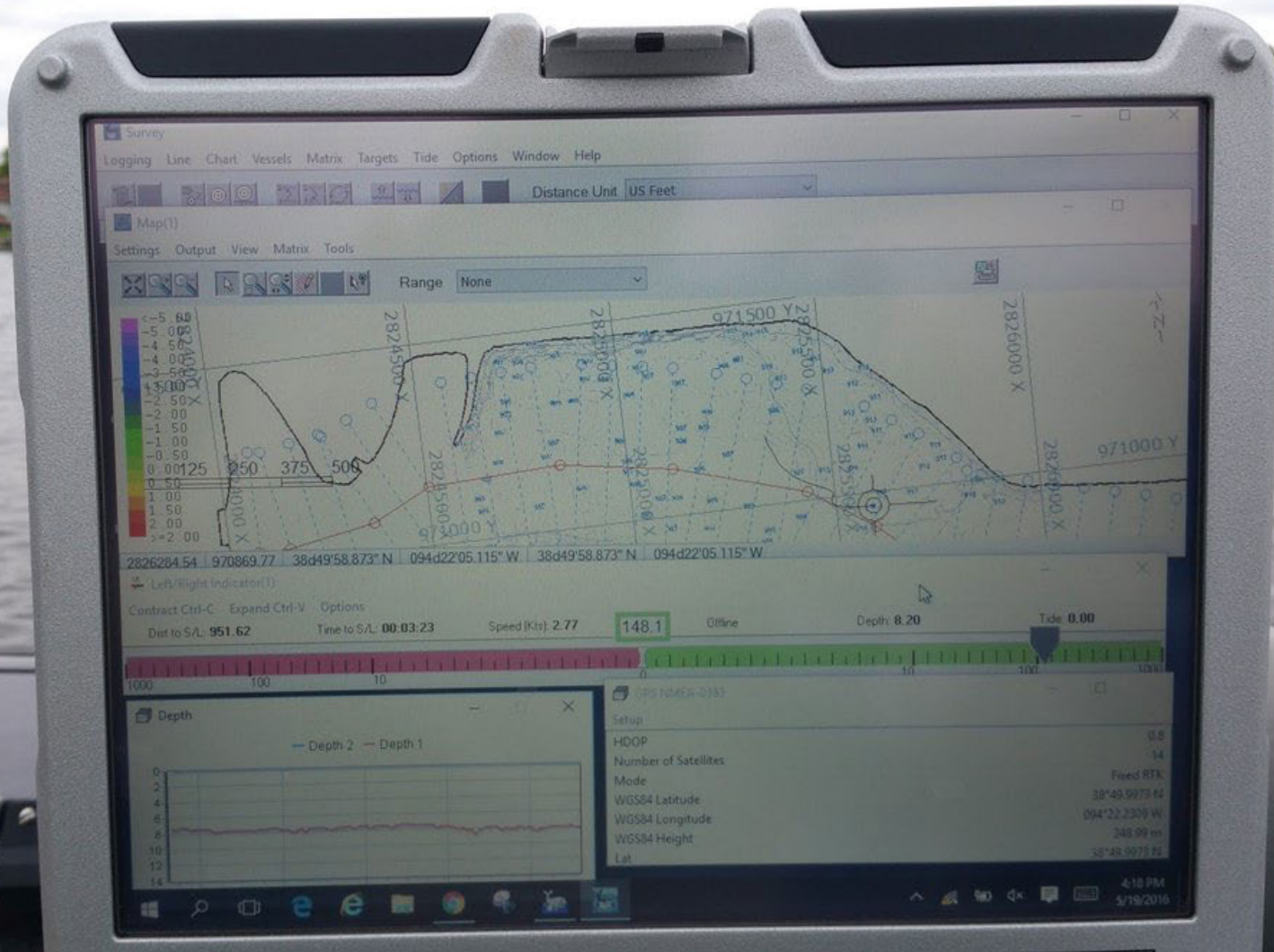
Missing component(s) = decreased accuracy

Accuracy #1 - Survey Crew

EXPERIENCE AND SKILL in HYDROGRAPHIC SURVEYING is MANDATORY

- Execute to meet client expectations
- Establish tide, setup and calibration
- Ground truthing
- Evaluate environmental factors that affect survey
- Transect establishment and tracking





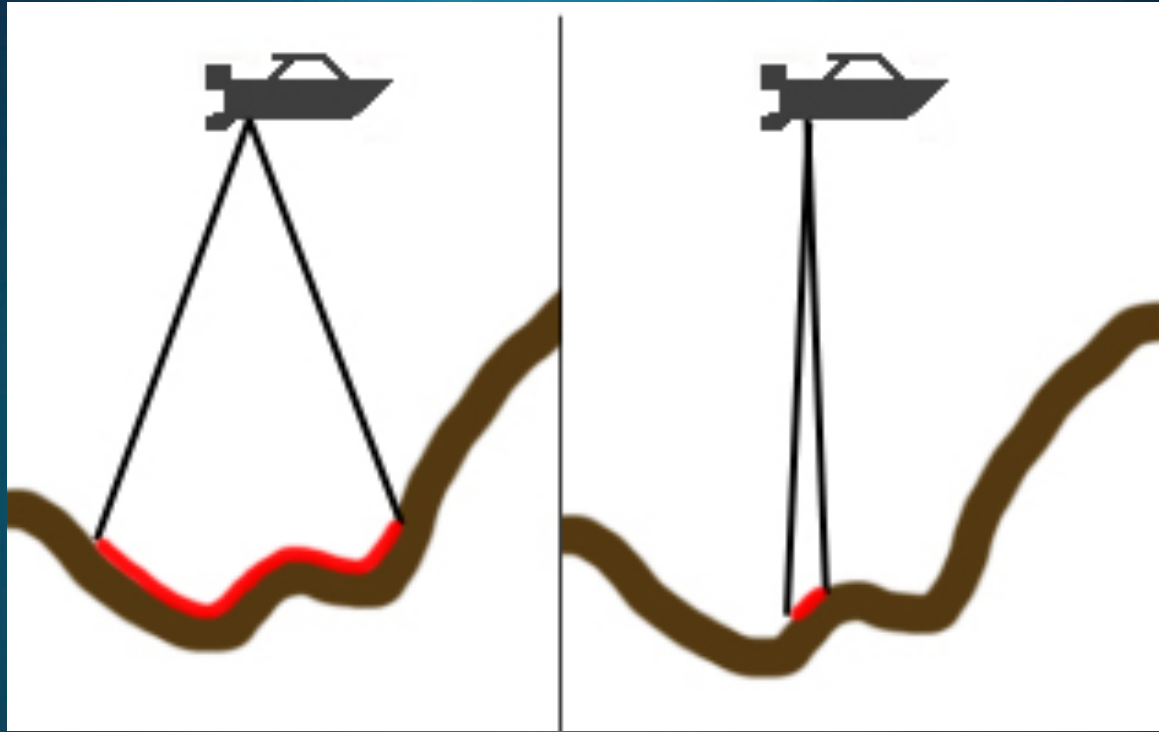
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Accuracy #2 - GPS

- **Real Time Kinematic (RTK or RTK with VRS) – 0.10 ft accuracy**
- **Differential GPS – 0.5-1.0 ft accuracy**
- **Location accuracy (x,y) can affect end product**

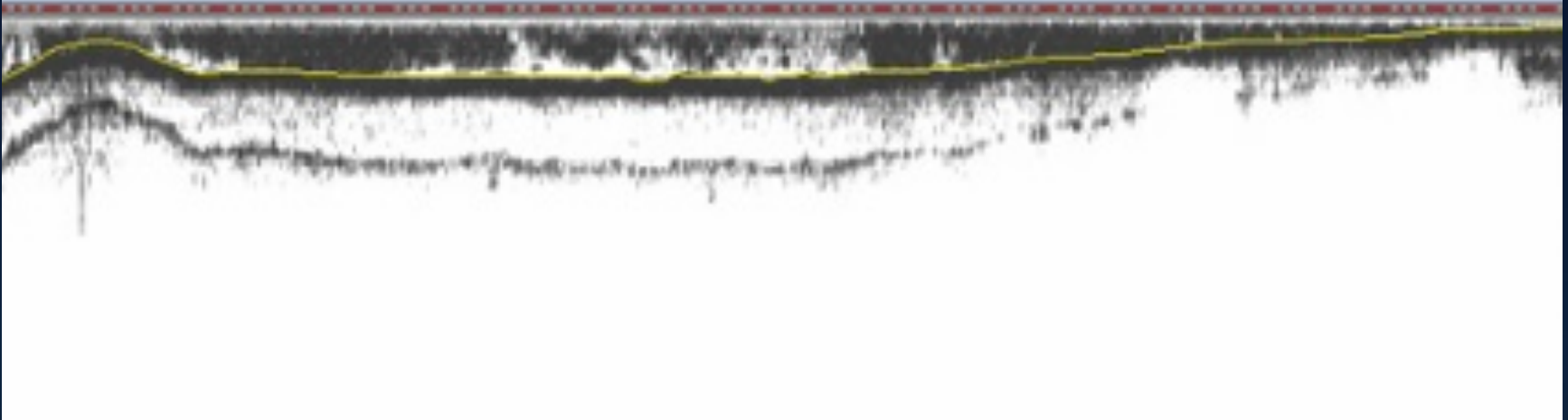


Accuracy #3 - Sonar



Recreational | Survey-grade

Accuracy #4 – Post Processing




Survey-grade data – reviewed point for point

Recreational data – generalized and averaged


Check out the maps to see the difference.....

Accuracy #4 – Post Processing



Recreational Level 3D Map 



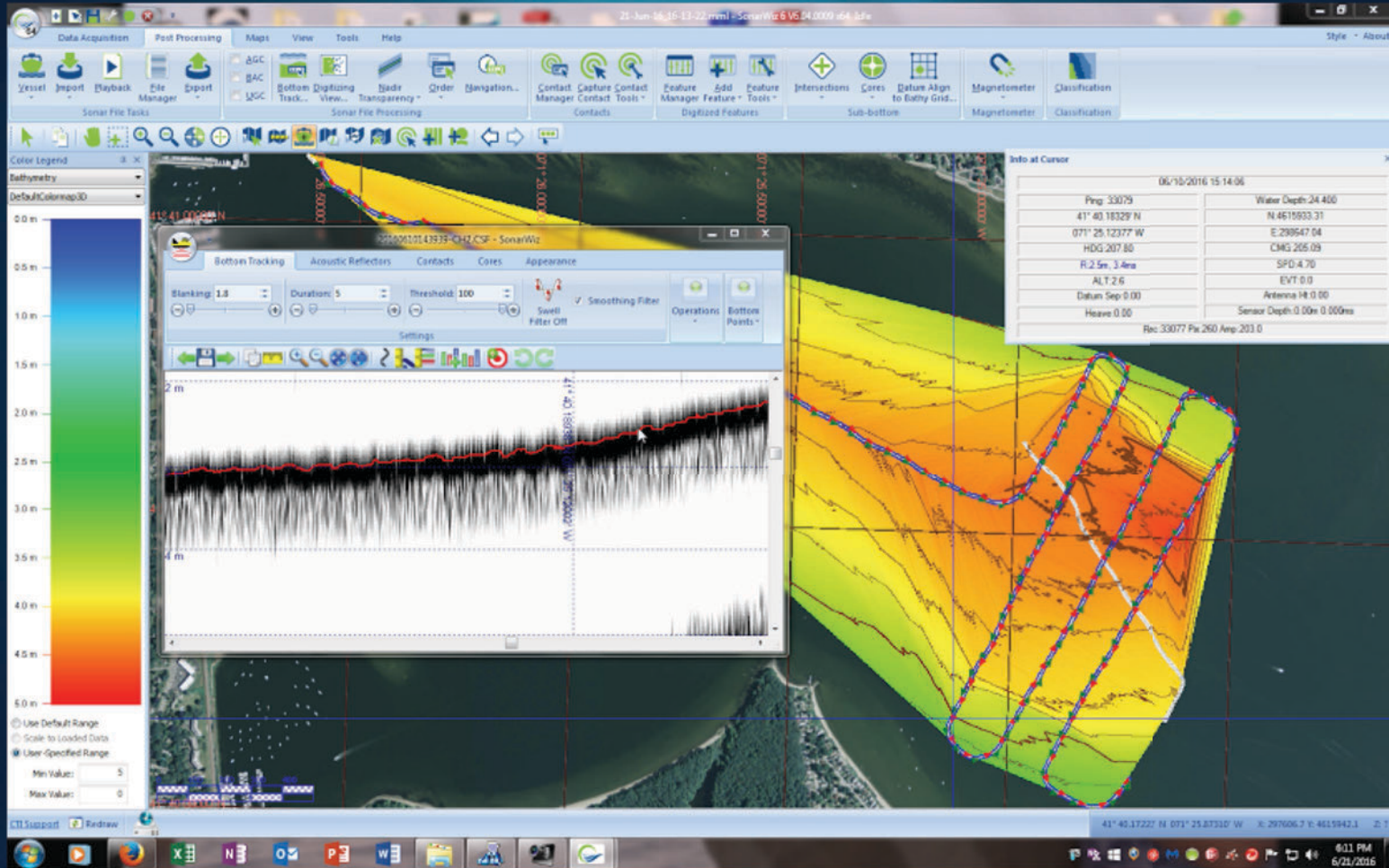
Professional Level 3D Map 

THE FALSE BOTTOM



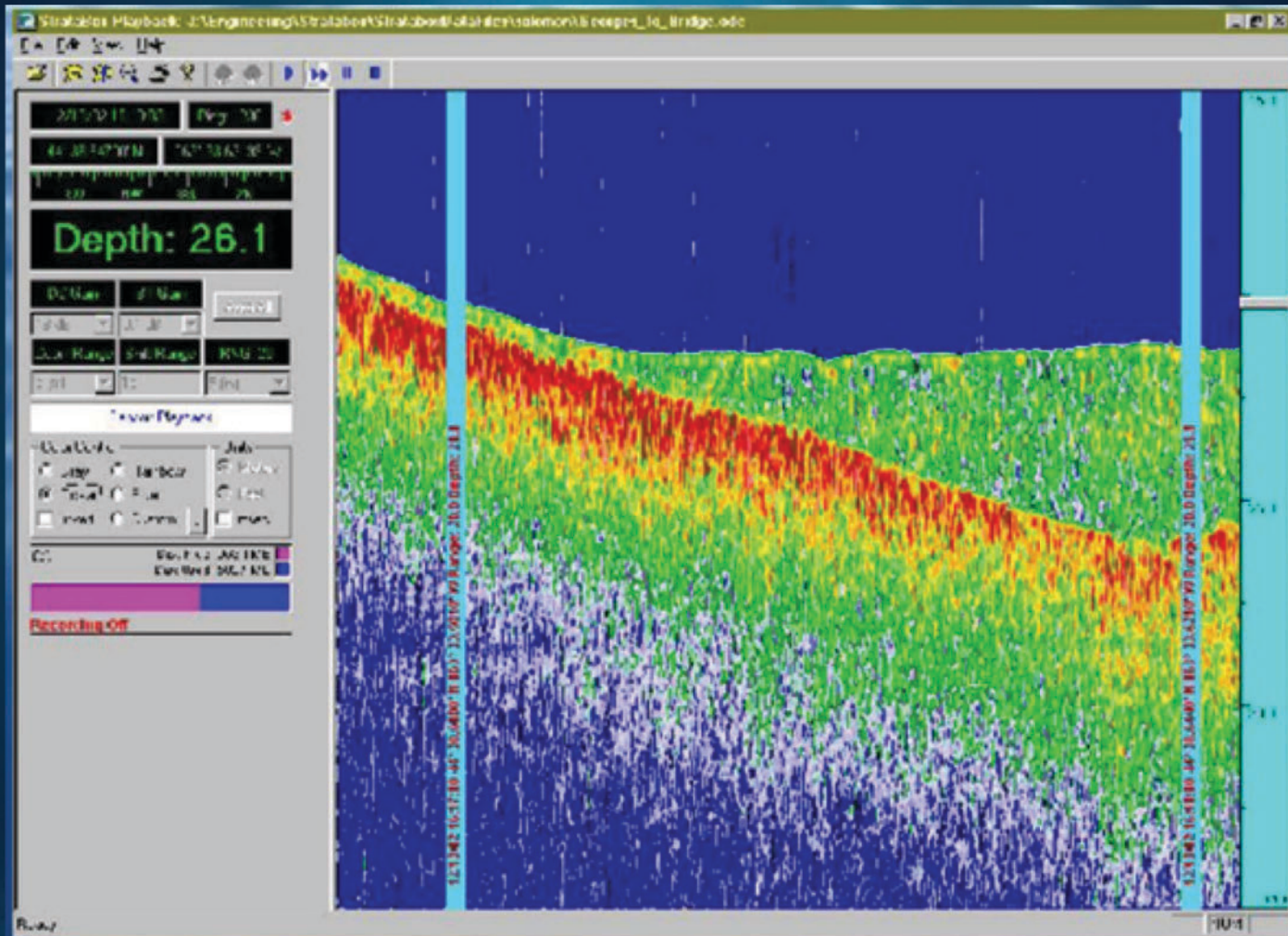
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WHAT'S YOUR Z?



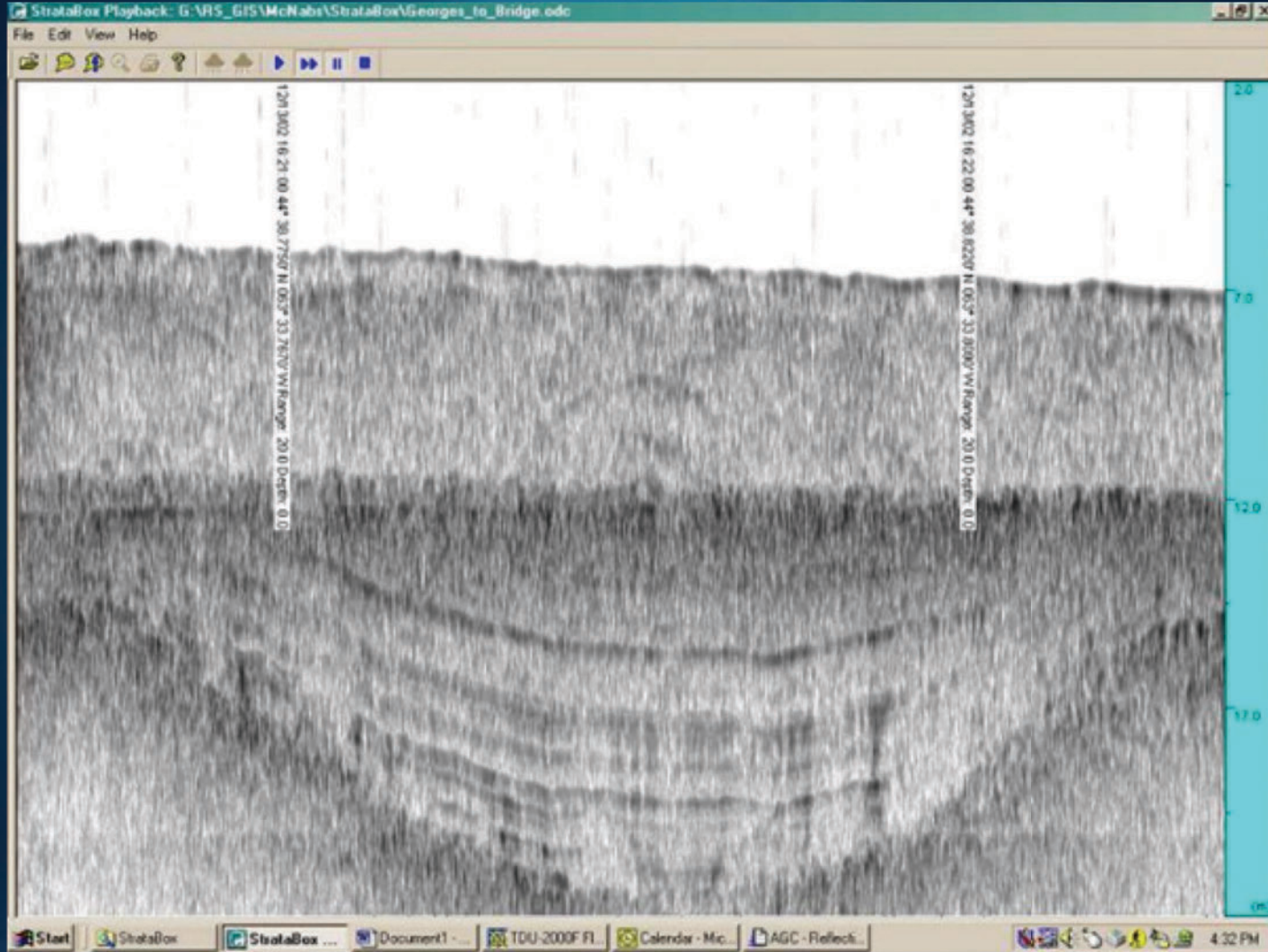
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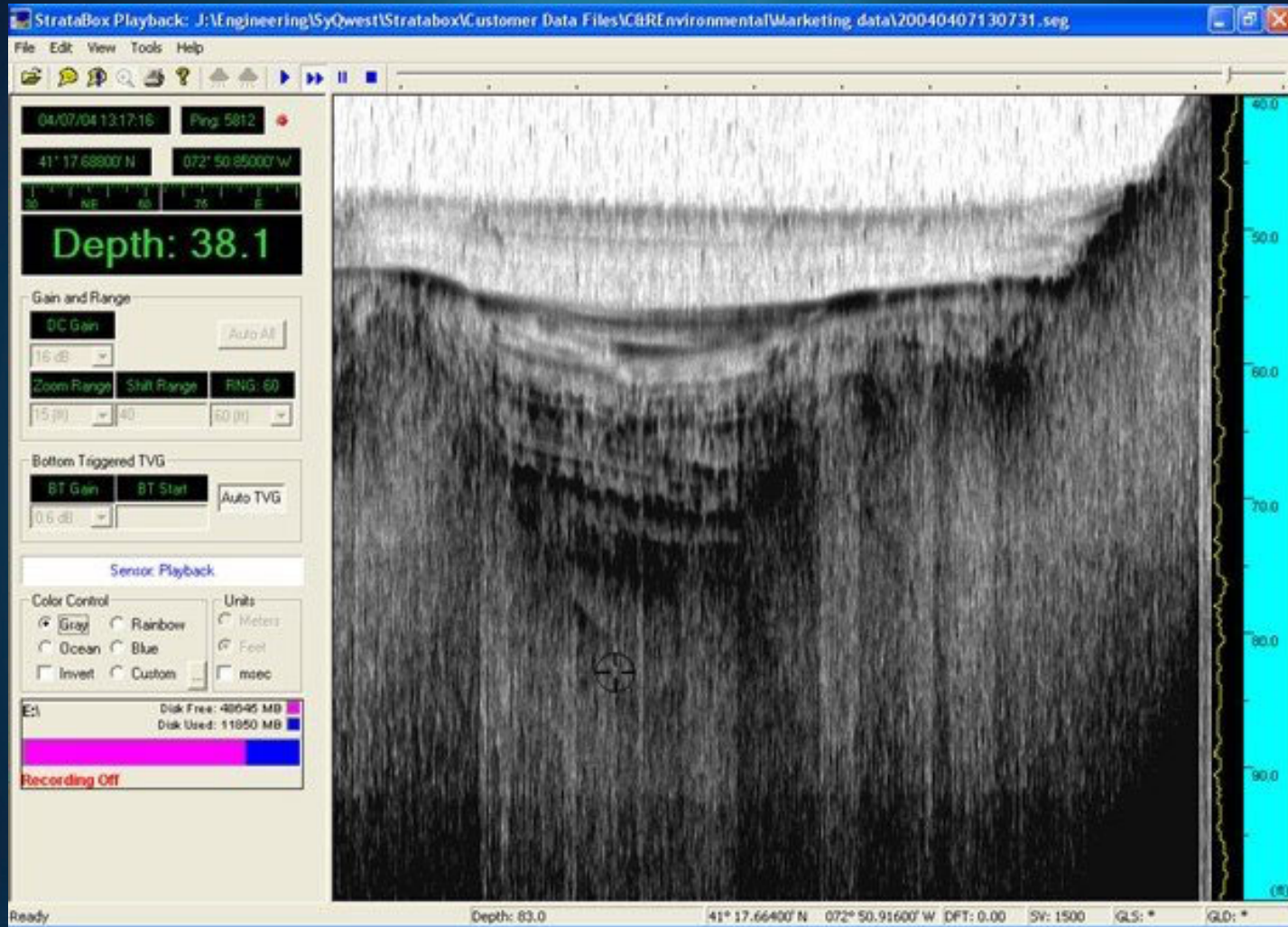
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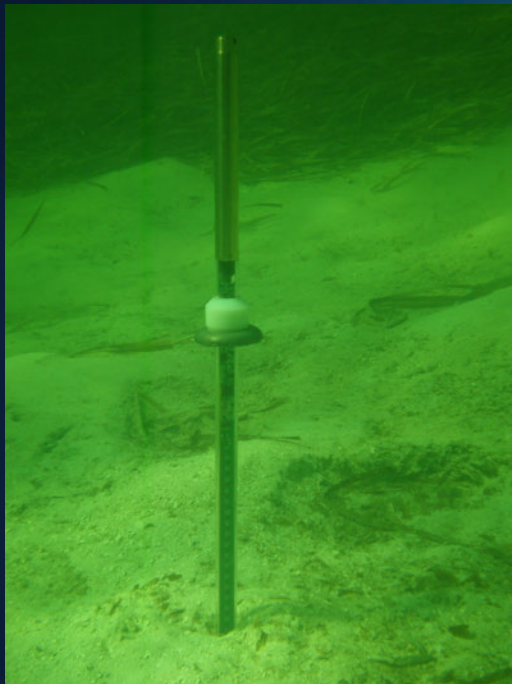
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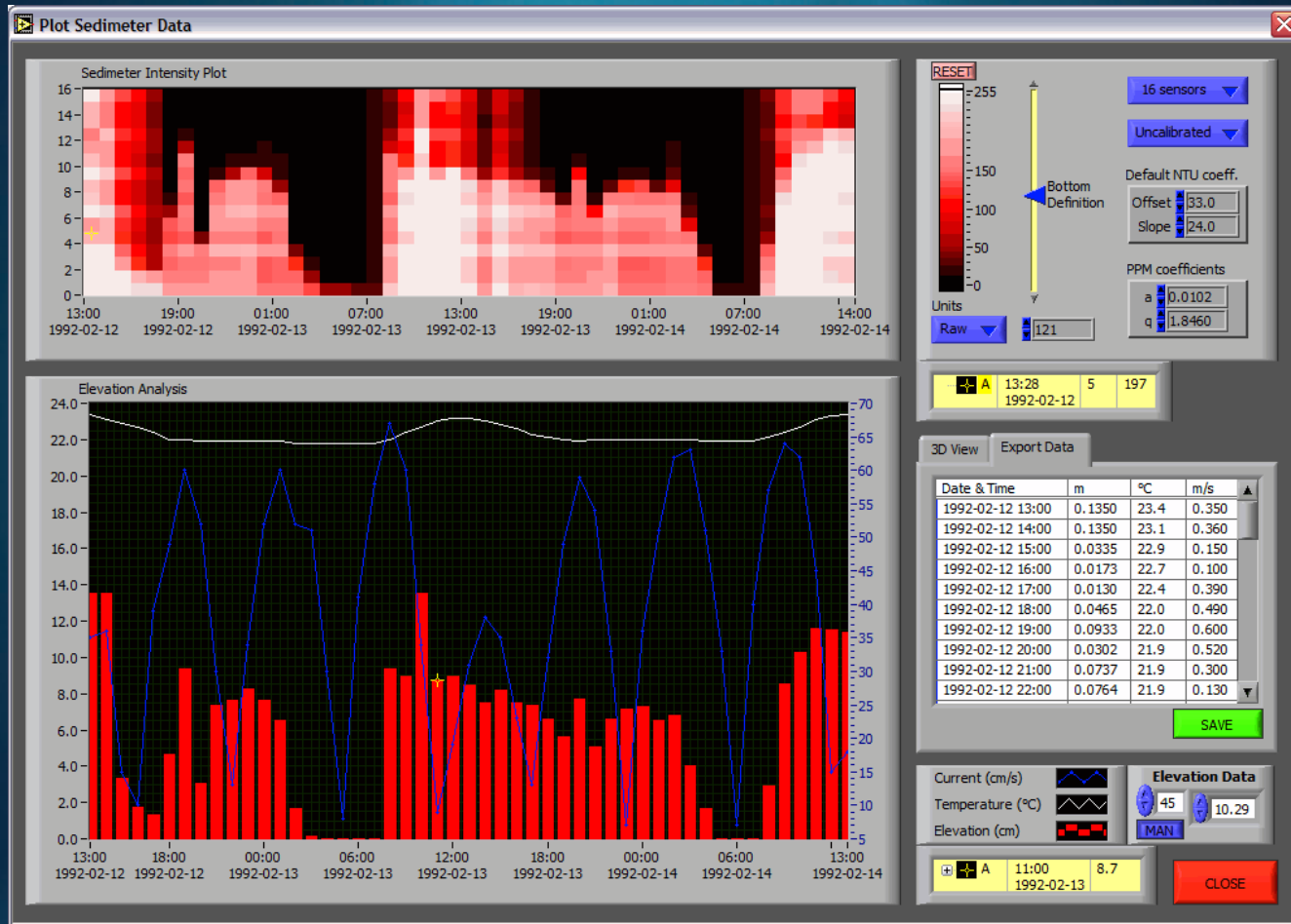
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Monitor, project and plan



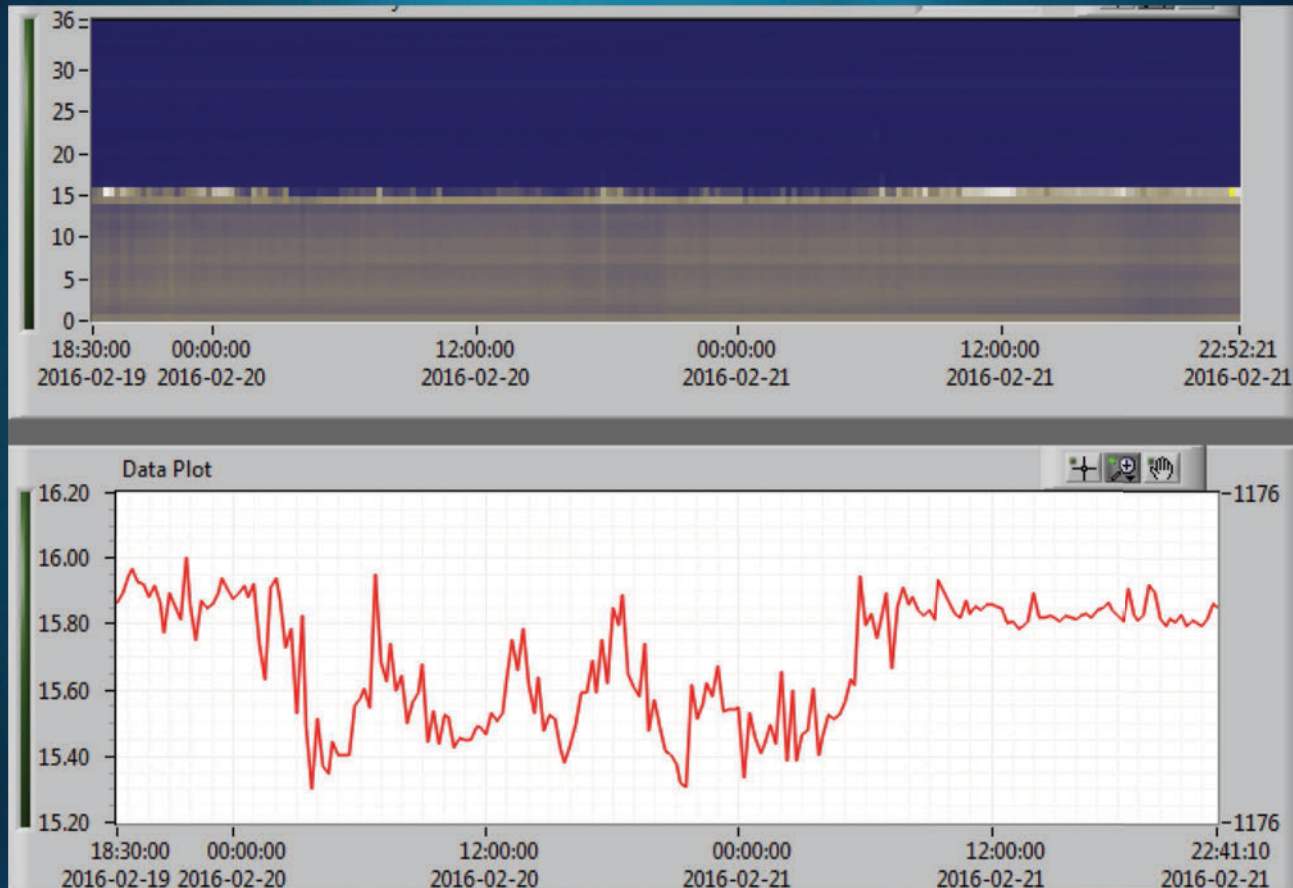
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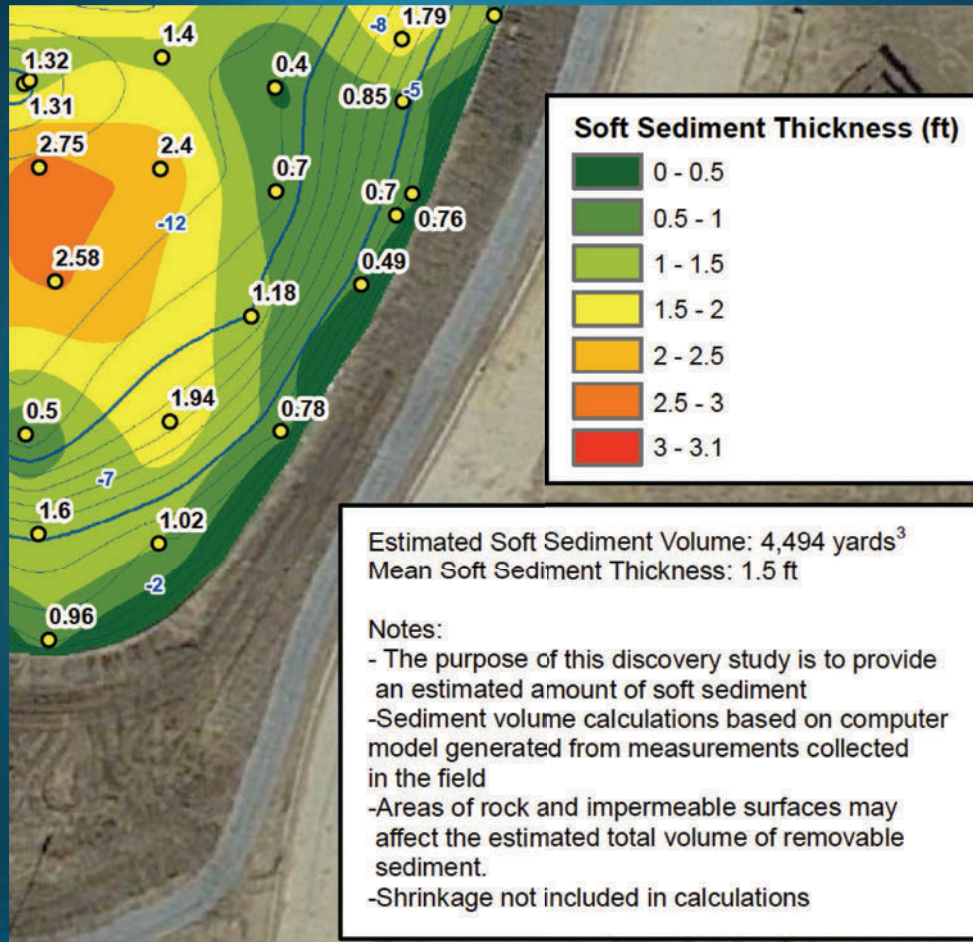
Once you have the DATA,
Then it's time to develop a
PLAN

How to plan a dredging project

QUESTIONS TO ASK

1. How much sediment?
2. Where's the sediment located in the water body?
3. What type of silt or sediment? Firm? Soft?
4. Are there any harmful substances in the sediment?
5. What removal methodology?
6. How will it be dewatered?
7. Where will it be disposed of after dewatering?

How much sediment?



What type of sediment?



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Are there any harmful substances?

RCRA Metals (EPA 6010B) (mg/kg) ¹	Site 1	Site 2	TRRP Texas-Specific Median Background Concentration	TRRP Tier 1 Residential Soil PCLs		TRRP Tier 1 Commercial/Industrial PCLs	
				^{GW} Soil _{ing} ² (mg/kg)	^{Tot} Soil _{Comb} ³ (mg/kg)	^{GW} Soil _{ing} (mg/kg)	^{Tot} Soil _{Comb} ⁴ (mg/kg)
Arsenic	9.535	11.01	5.9	5	20	5	200
Barium	143	200	300	440	8,100	440	120,000
Cadmium	0.515	0.496	N/A ⁵	1.5	52	1.5	2,600
Chromium	18.83	23.55	30	2,400	33,000	2,400	120,000
Lead	27.64	29.58	15	3	500	3	1,600
Mercury	<0.0898*	<0.1044*	0.04	2.1	8.3	2.1	19
Selenium	<0.434*	<0.484*	0.3	2.3	310	2.3	4,900
Silver	<0.587*	<0.654*	N/A	0.48	97	1.4	2,300

* Analyte not detected above laboratory detection limits

1. mg/kg = milligrams per kilogram

2. ^{GW}Soil_{ing} = Soil-to-groundwater leaching of COCs to Class 1 and 2 groundwater

3. ^{Tot}Soil_{Comb} = Residential: Combined ingestion, dermal contact, inhalation of volatiles and particulates, and ingestion of above-ground and below-ground vegetables with COCs in soil.

4. ^{Tot}Soil_{Comb} = Commercial/Industrial: Combined ingestion, dermal contact, and inhalation of volatiles and particulates of COCs in soil.

5. NA = Not Applicable

What removal methodology?



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What removal methodology?



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How will it be dewatered?



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How will it be dewatered?



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How will it be dewatered?



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Where will it be disposed?



Plan the work, Work the plan



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Verification Surveys

Tracking/Trending Surveys

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Proactive Maintenance

- Sedimentation basins
- Velocity attenuation devices
- Routine hydrographic surveys – bathymetric delta analysis
- Maintenance dredging
- Shoreline stabilization
- Watershed management
- BMP enforcement
- Vegetated buffers
- Nutrient and biomass management

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