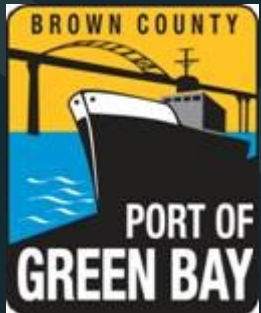


# Beneficial Use Project – Port of Green Bay

## WEDA Midwest Chapter Meeting

Faith M. Zangl-Wiese, P.E., P.G.  
GEI Consultants

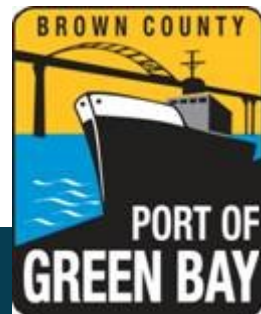


March 23, 2022



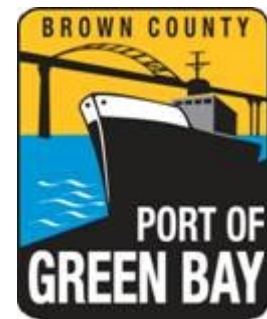
# Agenda

- Background
- Objective
- General Project Approach
  - Material Characterization
  - Marketing
  - Stakeholder Working Group
  - Regulatory



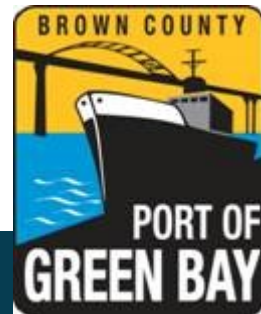
# Background

- 1.8 million tons of cargo annually
- Key commodities: coal, limestone, cement, salt, general cargo
- Navigation channel – 14 miles
- Requires maintenance dredging every two years to maintain channel depth
  - Sandy material from bay is deposited in the Cat Island Chain
  - **Fox River dredged material is placed in Bayport Sediment Rehandling Facility**



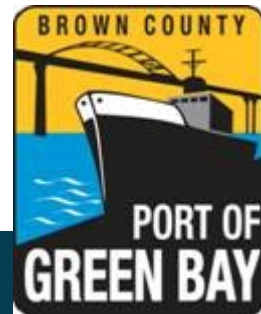
# Fox River Dredge Sediment

- Primarily composed of farm field runoff.
- Sediment appearance comparable to native topsoil.
- Current state regulations define sediment as a “solid waste” by default, therefore, Port must apply for authorization to reuse on a project-by-project basis.
- **What happens to newly dredged material now that the river has been remediated?**
- **Can safe uses be found for historical dredged material still stored onsite?**



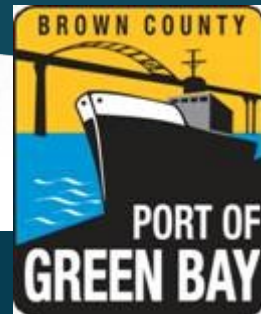
# Objective

- Provide legal and technical pathway for newly dredged sediment and material in Bayport to be beneficially used



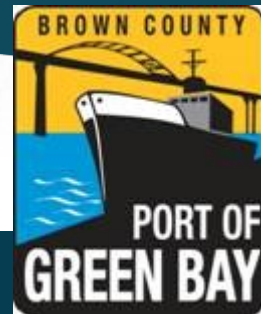
## PROJECT APPROACH

- Sediment Characterization
- Marketing Study
- Stakeholder Working Group
- Regulatory



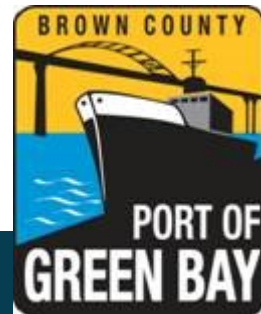
## PROJECT APPROACH

- **Sediment Characterization**
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# Chemical Characterization

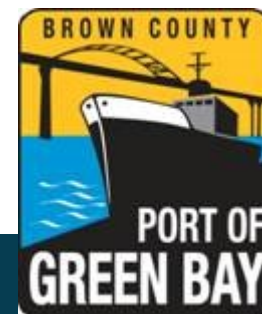
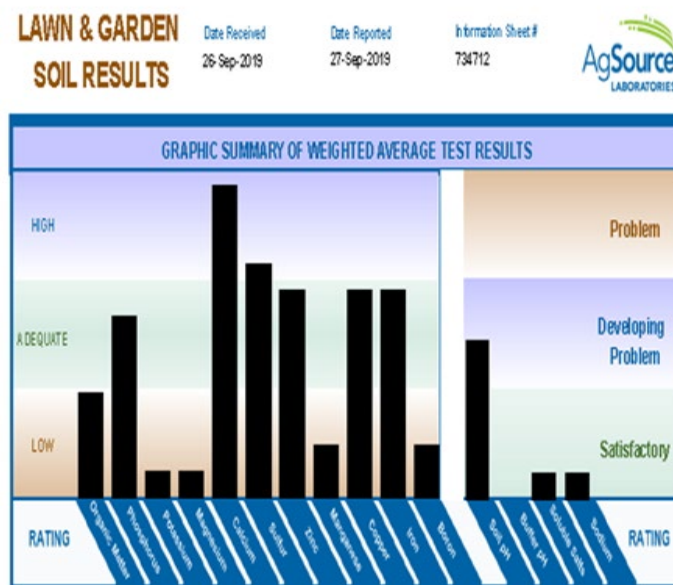
- Representative sample analysis:
  - Storage Cells at Bayport
  - Discrete samples from navigation channel (pre-cleanup)





# Agronomic Characterization

- Sediment has macro and micro-nutrients available for plant growth, with exception of potassium.
- Supplemental fertilizers could be added to address the lower potassium, either during processing or during application.



# Chemical Characterization

The UCL 95 for each of the three sampling events along with the UCL95 for data with similar distributions were combined.

Results of the UCL95 values provide an indication of the Exposure Point Concentration (EPC) for each chemical of potential concern.

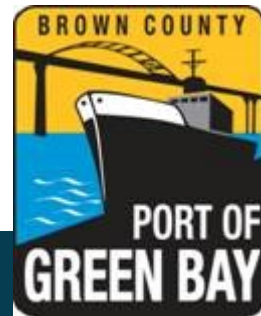
	Background Threshold Value	Non-Industrial Direct Contact RCL	Groundwater Quality RCL	Navigation Channel UCL 95	Cell 7 UCL 95	Cell 8 UCL 95	Combined Data UCL 95
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
<b>Total PCBs</b>	<b>Not Est.</b>	<b>0.234</b>	<b>0.0094</b>	<b>0.12</b>	<b>0.242</b>	<b>0.207</b>	<b>0.152</b>
Arsenic	8	0.677	0.584	9.78	6.54	6.54	7.93
Barium	364	15,300	164.8	50.72	234.3	92.95	111.7
<b>Cadmium</b>	<b>1</b>	<b>71.1</b>	<b>0.752</b>	<b>2.44</b>	<b>1.15</b>	<b>0.77</b>	<b>1.93</b>
Chromium	14,536	100,000	360,000	27.3	52.98	45.86	37.48
Copper	35	3,130	91.6	27.01	51.66	42.6	34.31
Cyanide	Not Est.	27	4.04	1.59	0.52	0.46	0.47
Iron	34,314	54,800	Not Est.	12,573	19,971	19,362	20,152
Lead	52	400	27	25.79	49.88	45.18	51.37
Manganese	2,637	1,830	39	361.8	413.3	403.3	440.6
<b>Mercury</b>	<b>Not Est.</b>	<b>3</b>	<b>0.208</b>	<b>0.67</b>	<b>0.8</b>	<b>0.37</b>	<b>--</b>
Nickel	31	1,550	13.06	12.7	22.46	18.78	16.12
<b>Selenium</b>	<b>Not Est.</b>	<b>391</b>	<b>0.52</b>	<b>1.78</b>	<b>1.37</b>	<b>0.904</b>	<b>1.04</b>
Zinc	150	23,500	Not Est.	62.42	131.2	108.4	84.49

## Notes:

RCL = Residual Contaminant Level established under NR720, Wisconsin Administrative Code.

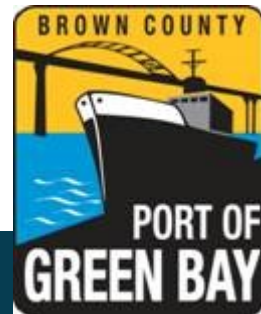
UCL 95 = Upper Confidence Limit at a 5% significance level

Highlighted cells indicate UCL 95 values that exceed groundwater RCL and Background Threshold Value.



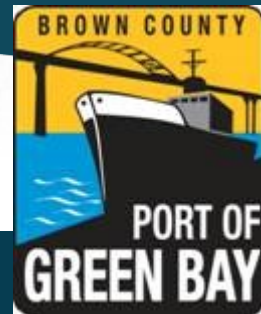
# Conclusions

- All chemicals of potential concern
  - Less than direct contact RCL under a non-industrial land-use/receptor scenario.
  - Less than the ceiling limits of Chapter NR 204, Wisconsin Administrative Code for high quality sludge.
- Total PCBs, cadmium, mercury, and selenium exceed the background threshold value and groundwater RCL.
- PCB concentration less than 1 mg/kg



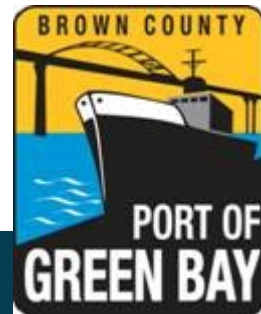
## PROJECT APPROACH

- Sediment Characterization
- **Marketing Study**
- Stakeholder Working Group
- Regulatory



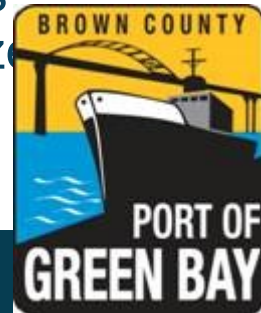
# Objectives of Market Study

- Complete stakeholder discussions
- Determine the market demand for a topsoil replacement or high-end bagged product produced using dredge material generated from the Fox River navigation channel.
- Supplement previous studies and sampling results to characterize the suitability of dredge material as a product or soil amendment.
- Outline site operation measures necessary to improve sediment quality for high-end uses which would facilitate bulk distribution.



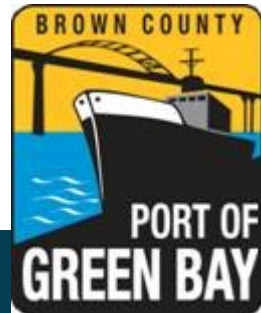
# Marketing Conclusions

- Distribution and sale of basic topsoil has been consistent, with no significant new demand anticipated.
- End users access materials from current suppliers in the area with materials ranging in price from \$15 to \$25 per cubic yard.
- **The majority of topsoil sales are small volume and intended for small scale projects.**
- Large scale projects, requiring larger volumes of topsoil, typically have access to materials generated on site during the construction activities and do not require the purchase of additional topsoil.
- Potential need for higher quality premium garden mixes as most topsoil providers are simply selling screened pulverized native topsoil.



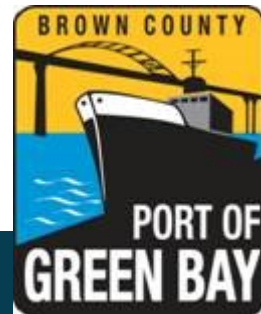
# Marketing Challenges

- Significant seed bank of weeds and invasive species.
- Public perception that dredge material may be contaminated and represents a risk to human health or the environment.



# Opportunities

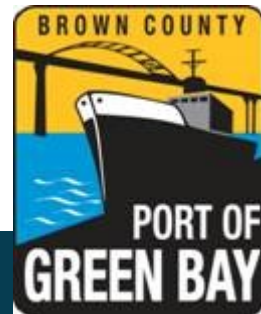
- Growth study and nutrient analysis present unique marketing opportunity.
- No apparent efforts by local topsoil sellers to establish high-quality bagged sales.
- No area municipalities/counties manufacturing and selling topsoil or blended products.
- Quality compost mixed with sediment as a manufactured topsoil has been successfully utilized for agriculture and landscaping in other parts of the country.





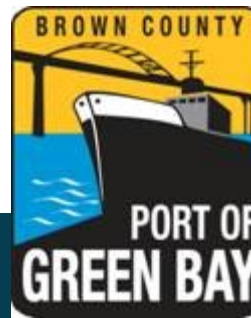
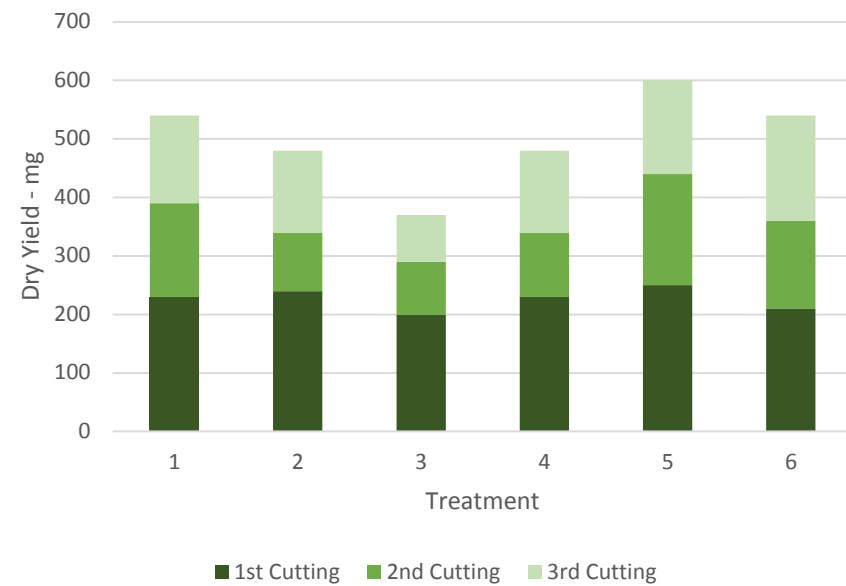
# Incubation and Growth Study

- Incubated mixtures of dredge sediment, compost, and manure in bench-scale setup, monitor temperature
  - Objective: Observe mixes naturally compost at above 140F, at which point weed seeds would be destroyed
- Then complete growth study with composted mixes to observe growth differences and weed prevalence



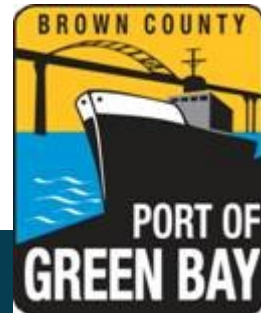
# Growth Study - Results

ID	Treatment
1	100% Dredge
2	100% Compost
3	80% Dredge / 20% Compost
4	70% Dredge / 10% Compost / 20% Manure
5	50% Dredge / 30% Compost / 20% Manure
6	50% Dredge / 50% Compost



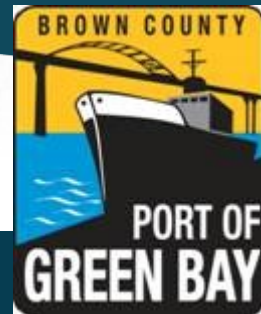
## Incubation and Growth Study – Lessons Learned

- Bench scale study uses insufficient volume of material to meaningfully change temperature
  - Need larger pile (i.e. pilot scale study size) to generate enough heat to raise temperature to above 140F
- Need immature, clean compost
  - Organic matter in mature compost is decomposed already and will not generate the heat needed to destroy weed seeds
  - Anecdotal accounts from compost operator indicated the high prevalence of plastics in compost, which will impact quality of end product



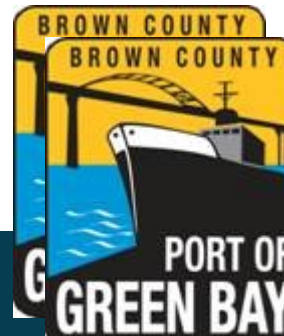
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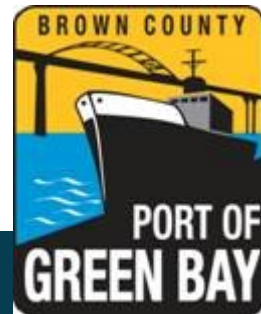
# Stakeholder Working Group

- Comprised of outside institutions and individuals interested in changing current policy
  - Major partners:
    - Port of Green Bay
    - GEI Consultants
    - Brown County Department of Land and Water Conservation
    - University of Wisconsin – Green Bay
    - The Nature Conservancy
    - Wisconsin Sea Grant
  - Minor partners:
    - Major local earthwork contractor
    - Brown County Public Works Association



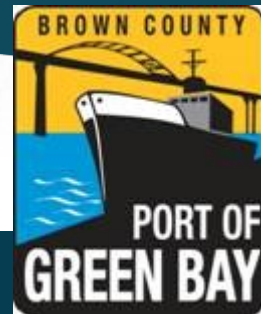
# Stakeholder Working Group

- Objective: To find market potential and necessary actions (regulatory and logistics) to make beneficial use of dredge sediment possible
- Based on the market study, the need is comprised of many small projects
  - Not practical to approve each project on a site-specific basis.
- Conclusion: need an approval process that would encompass several possible uses based on environmental criteria over a specified time period



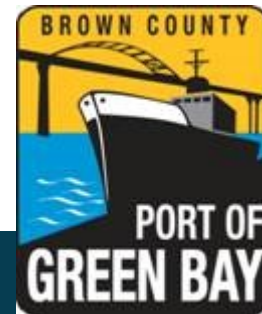
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# Regulatory – Newly-Dredged Sediment

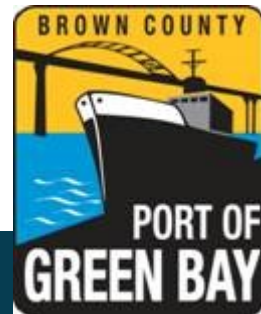
- Drafted Wisconsin State Bill
  - Creates a demonstration program that allows sediment to be mixed with yard waste or other safe material to create a “beneficial use byproduct”
  - Certifies byproduct to be safe for designated uses through testing on a per volume basis
  - Establishes a five-year general permit
  - Produces a cost-benefit study
- Currently looking for a bill sponsor





# Regulatory – Sediment in Bayport

- Ongoing discussions with USEPA regarding possibility of beneficial use
  - Issue: Historically-deposited dredge materials in Bayport fall under the Toxic Substances Control Act (TSCA) based on pre-dredge analysis
    - Sediment with in-situ PCB concentrations greater than 1 mg/kg (pre-dredge) considered “remediation waste”.
  - Evaluating Federal Regulatory Pathway for removing sediment previously deposited in Bayport of beneficial use.



# Thank you!

Faith M. Zangl-Wiese

Email: [fzanglwiese@geiconsultants.com](mailto:fzanglwiese@geiconsultants.com)

Office: (920) 471-4961

