Sand to Soil on the Kankakee River

Beneficial Use of River Sand for Ecosystem Restoration, Biosolids Remediation, and Emerald Ash Borer Damaged Tree Disposal

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Illinois Nutrient Monitoring Council
Springfield, IL

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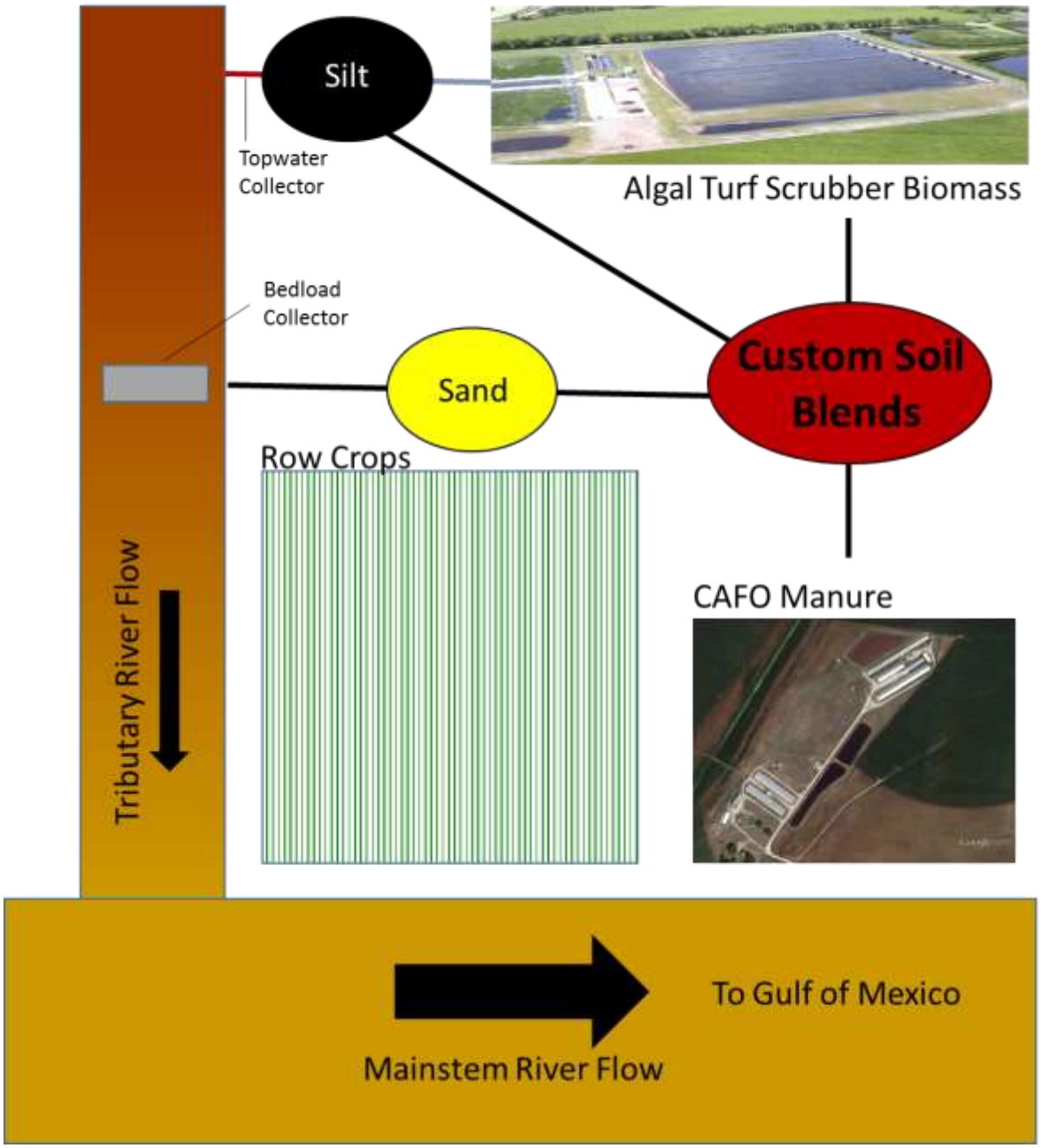
What is Sand to Soil?

Chuck Theiling – "Unconventional Ideas" presented Aug 2015 to Beardstown, Illinois stakeholders



Custom Soil Blending

Custom Blend Mix

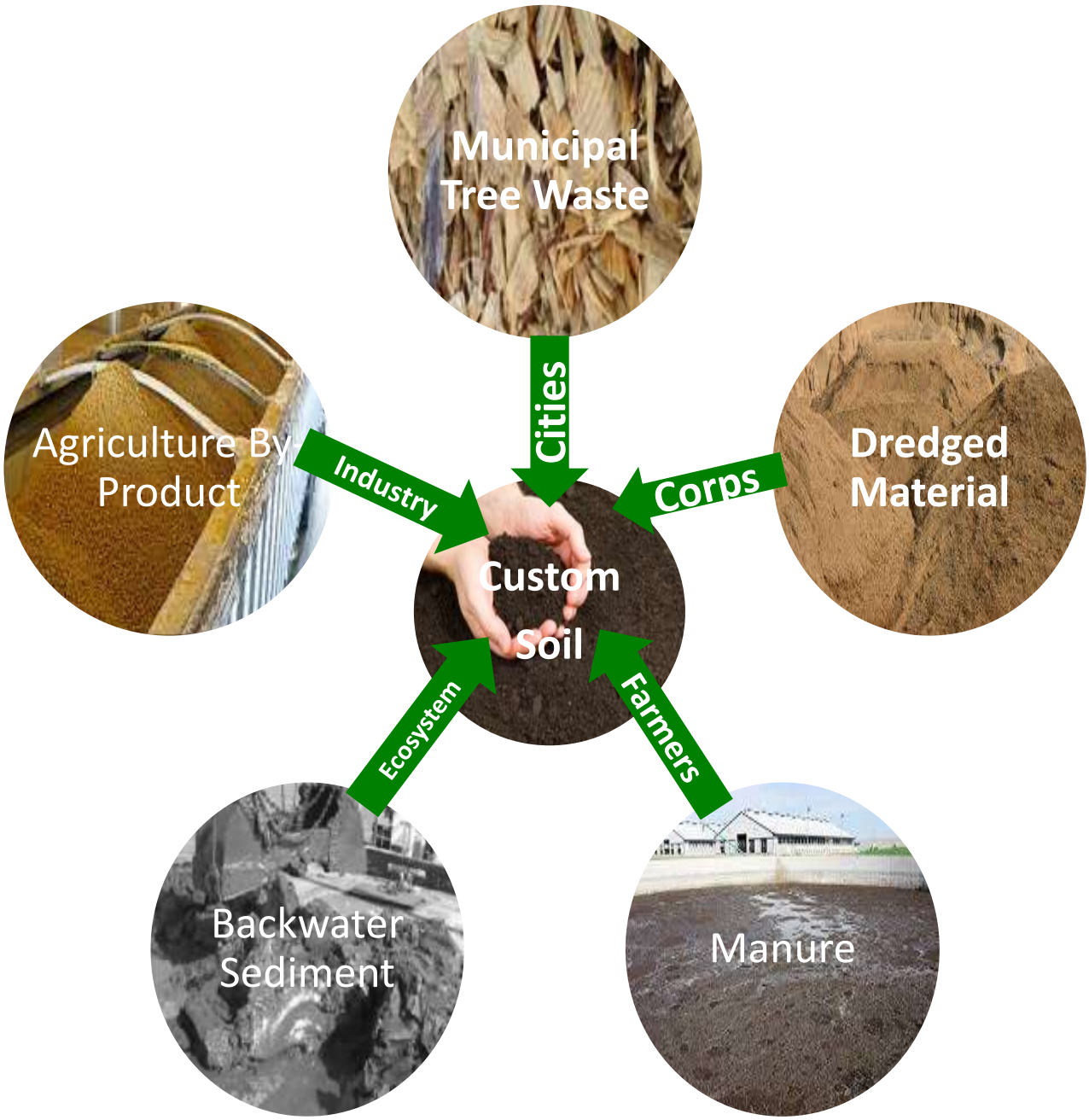
Product Information:

•Let us know your unique application and we will try to mix you a custom blend

Menu of Materials:

•Peat
•Wood fines
•Black dirt
•Sand
•Manure

Beneficial Use Model



Site Operations

Mulch Compost

Sand Stockpile and Blending

Move the lightest or most valuable material the farthest.

Site Operations

Drying fine material

Input stockpile

Custom soil inventory

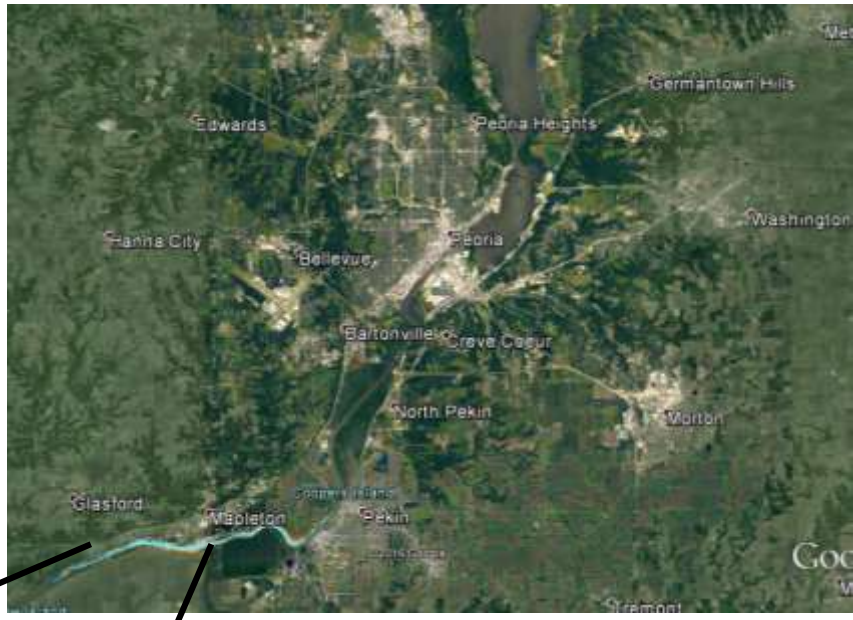
Customers

- **Highway shoulder and ditch construction (DOT):** "Provide manufactured soils for use as a medium for treating and filtering stormwater in rain gardens, horizontal filter berms, dikes, bioswales, and bioslopes." Mn DOT Standard Specifications for Construction 2016
- **Construction**
- **Municipalities:** Stream and organic waste management
- **Rain gardens**
  - Landscaping
  - Municipal stormwater management
- **Ecosystem restoration**
  - Sand removal
  - Site preparation for revegetation
  - Disposal for Timber Stand Improvement (TSI) slash
- **Brownfield remediation**
- **Contaminants remediation**
- **Waste recycling** (as input material)
  - Municipal mulch
  - Municipal biosolids
  - Agricultural by-products
  - Livestock manure
  - Navigation dredged material

Matching Sources, Markets, and Missions for Increased Efficiency

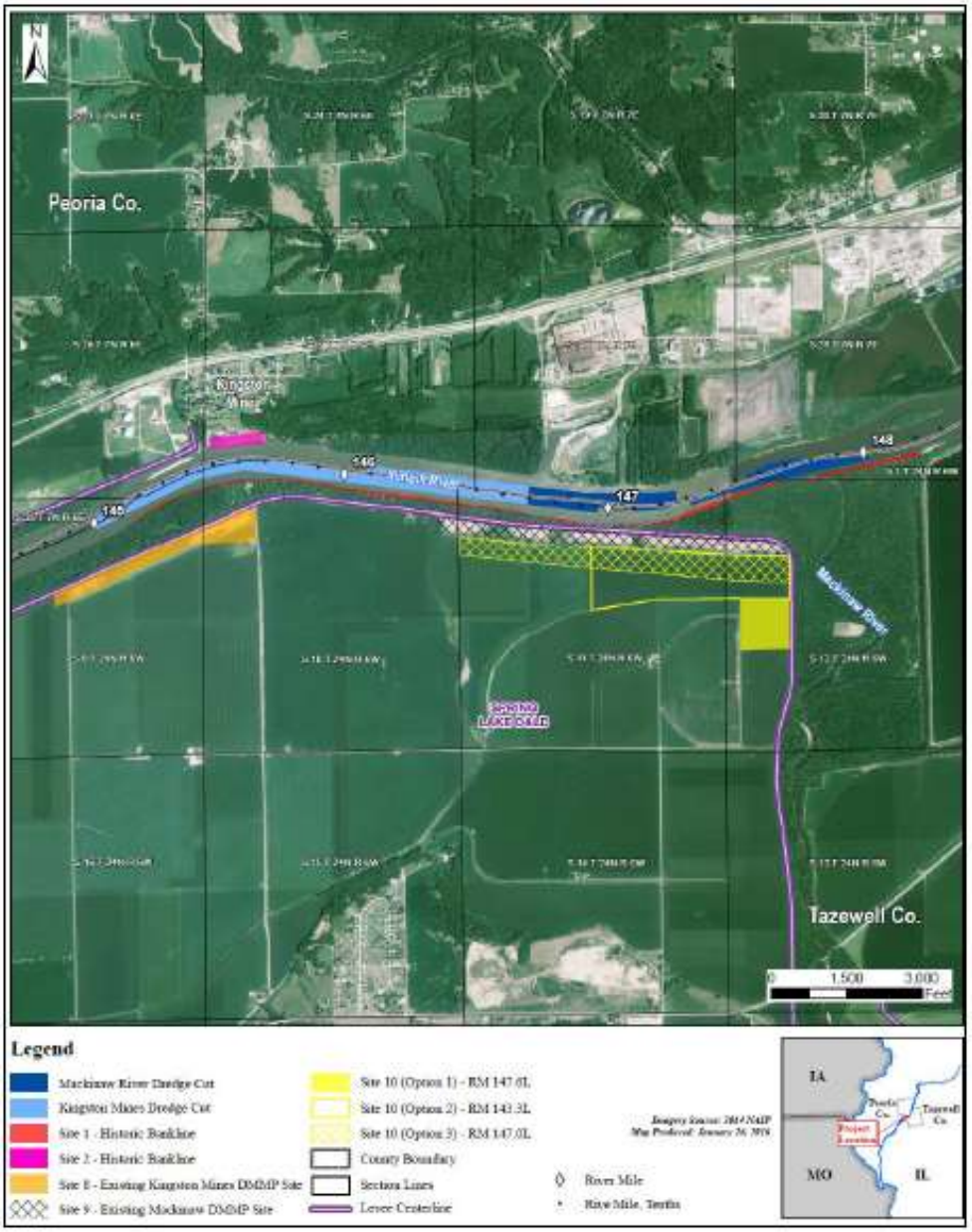
Mackinaw River Stockpile

- Peoria/Pekin municipalities
- Agriculture by-products
- Chicago market - barge



61 Acres
~1,000,000CY
Almost full

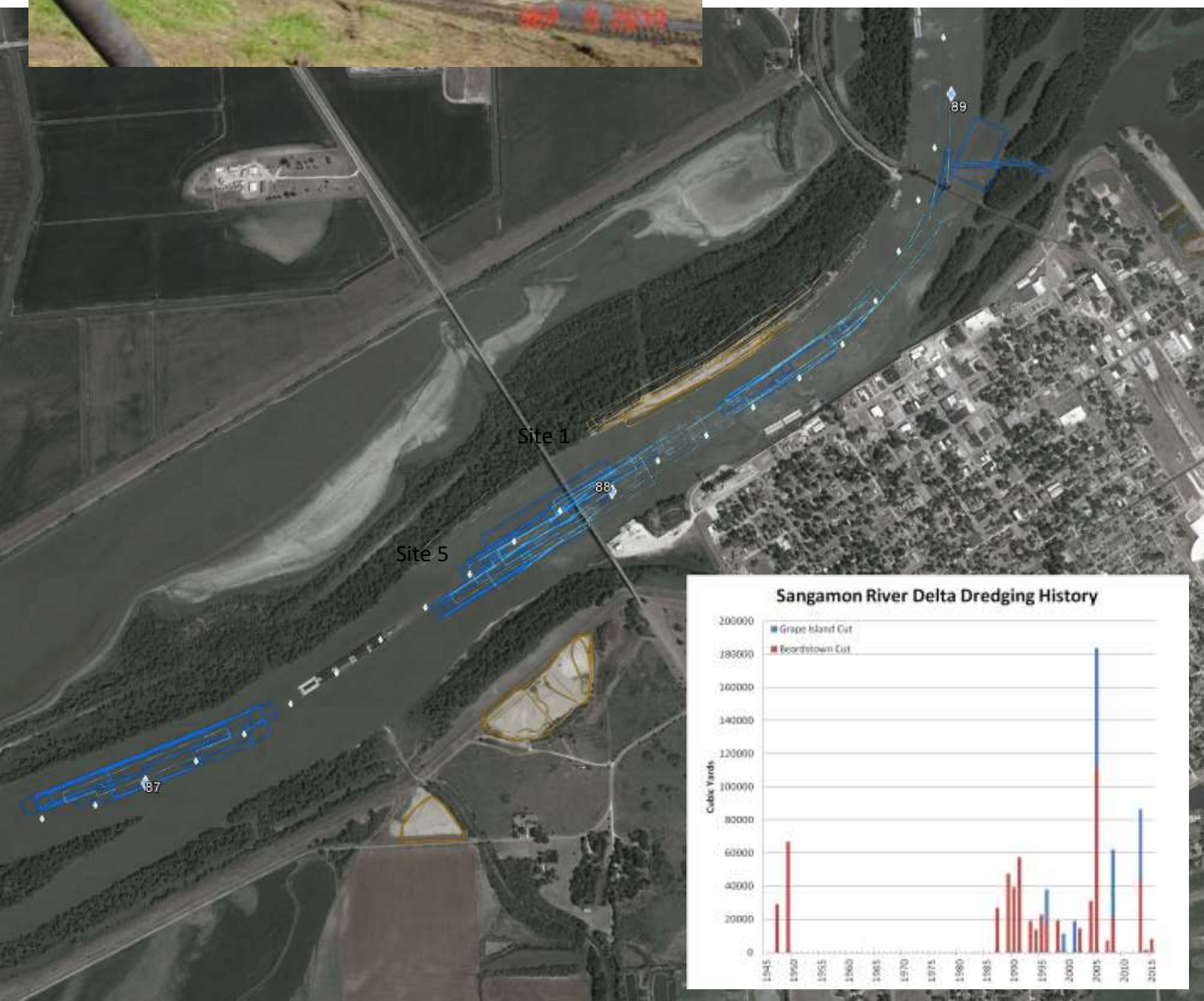
Seek to avoid purchasing 140 acres for 40 more years of current practices



"The dredging frequency during this period for the Mackinaw Dredge Cut is on average one event every 0.89 years. Over the 40-year period of analysis, it is projected that 44 events would yield a volume of 2,456,960 cy (*44,672 average per event + 0.25 contingency* x *44 events = 2,456,960 cy*). "

Illinois Waterway at Beardstown, IL

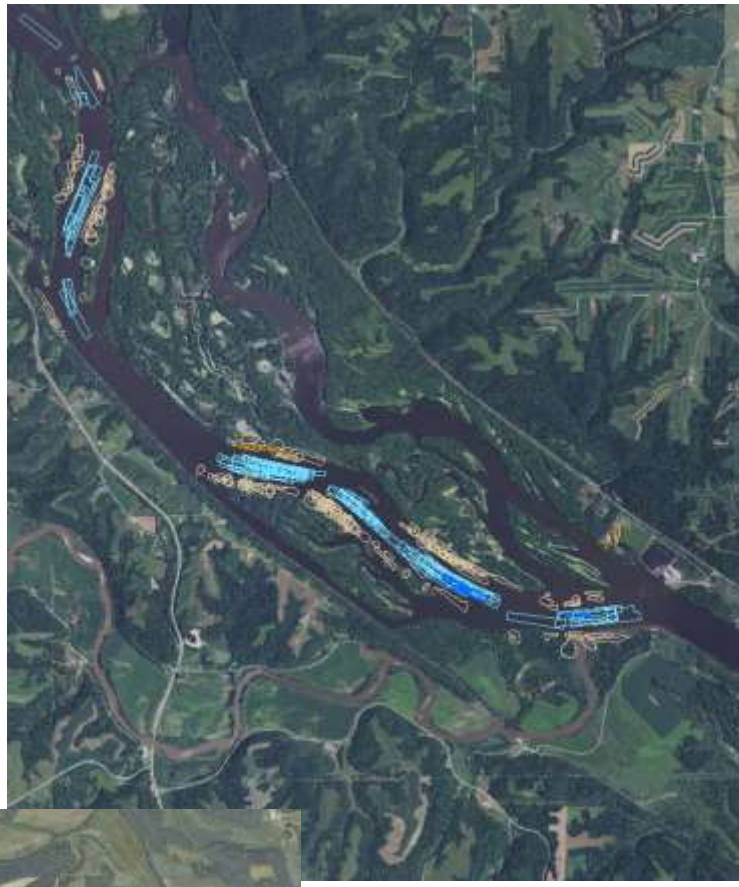
- Sanganois dredging
- Sanganois TSI
- Agriculture by-products
- St. Louis market - barge



Pool 11 – DMMP Sites

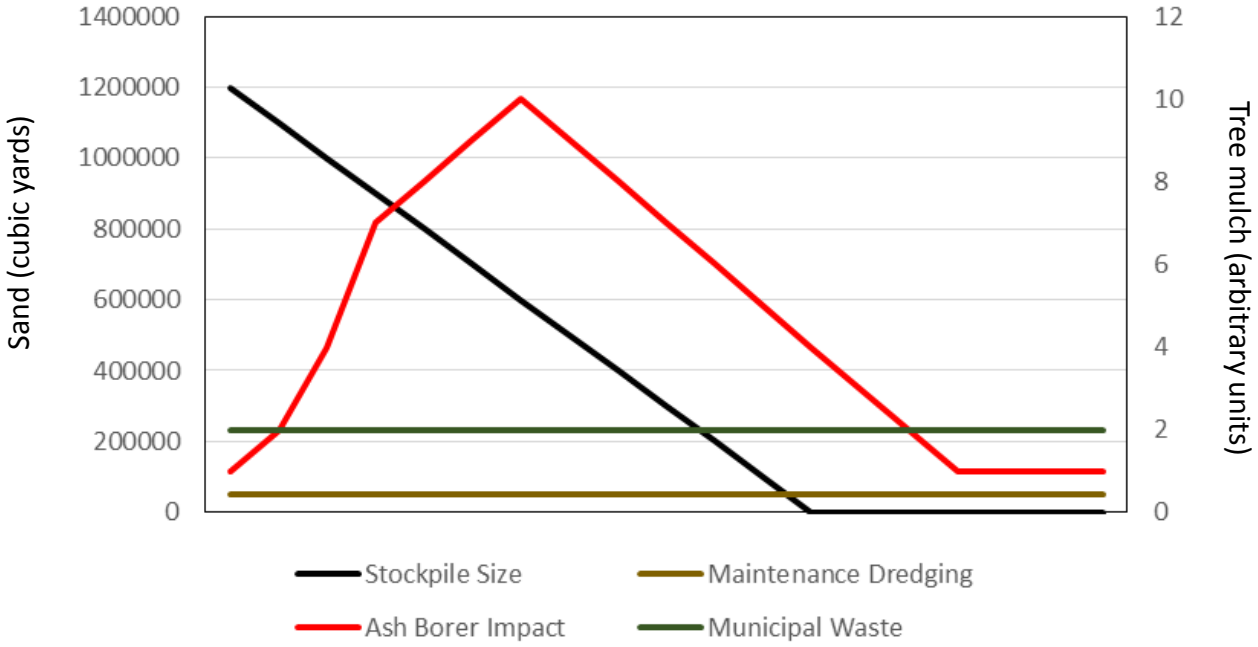
- Refuge TSI
- Agriculture by-products
- Dubuque market – barge/truck

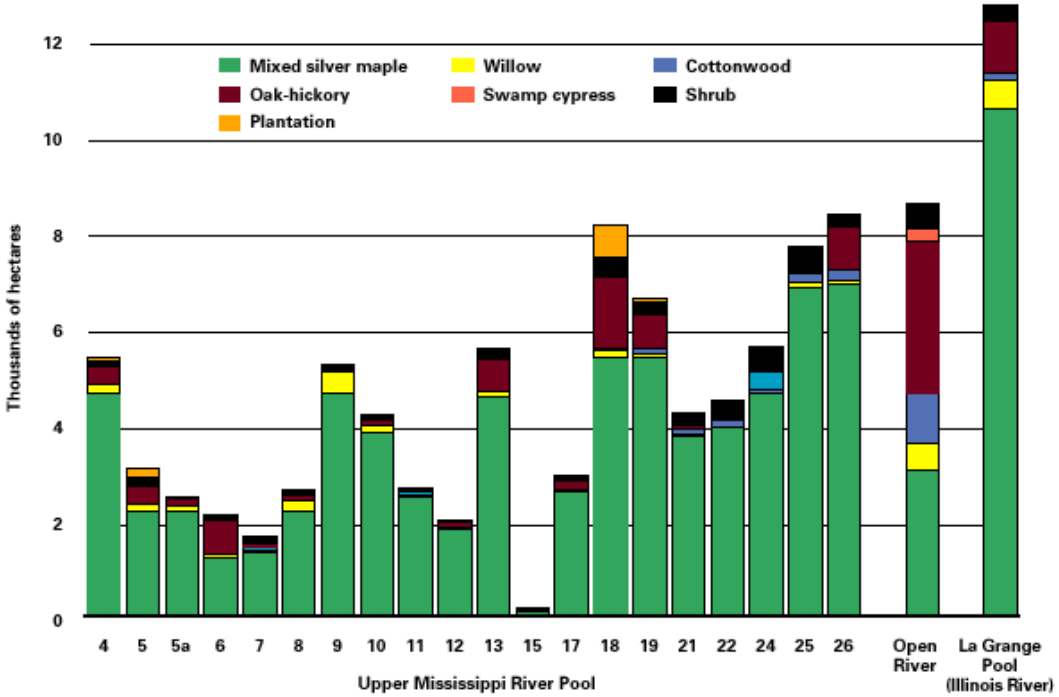
Turkey River Dredge Cuts and Placement



Hurricane Island
Dredge Cuts and Placement

Coincidental Glut of Organic Load from Emerald Ash Borer





Kankakee River Opportunities

US Army Corps of Engineers®
Rock Island District

ILLINOIS RIVER BASIN RESTORATION
SECTION 519

KANKAKEE RIVER MAINSTEM
CRITICAL RESTORATION PROJECT

SUMMARY REPORT
SEPTEMBER 2014

Kankakee River Basin Commission

Kankakee River Conservancy

Metropolitan Water Reclamation District *of* Greater Chicago

Press Release

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David St. Pierre, MWRD executive director, “Our biosolids program has developed into a strong, well-managed process that takes treated waste and converts it into a superior, usable product. We are always willing to share our insight and demonstrate techniques that are instrumental to our success.”

KANKAKEE RIVER MAINSTEM CRITICAL RESTORATION PROJECT

CONCLUSION AND RECOMMENDATIONS

The 2006 USACE report showed that dredging in the Six-Mile Pool would reduce sand concentrations in the riffle sections downstream, but preliminary cost analysis indicated that this type of project was infeasible. Costs to dredge would be nearly $20 million, not including placement costs. It is estimated that recurring dredging would occur every 10 years or less adding to maintenance costs.

At this time there are no recommended viable projects in the Kankakee mainstem. Sand deposition threatens quality habitat but removing this sand from local areas on the mainstem is costly and does not reduce the high sediment load coming into the Kankakee Mainstem Area which shortens the time period of benefits. It is recommended that future focus include reducing sediment load into the system from the tributaries and watershed in the upper basin including the Iroquois River and Yellow River basins.

Now is different, can sand capture be cheaper?

Now is Different, Can Sand Management be Cheaper?

- New tools
  - Bedload sediment collector
  - Bubble curtain to precipitate fine sediment
  - Custom soil blends for beneficial use

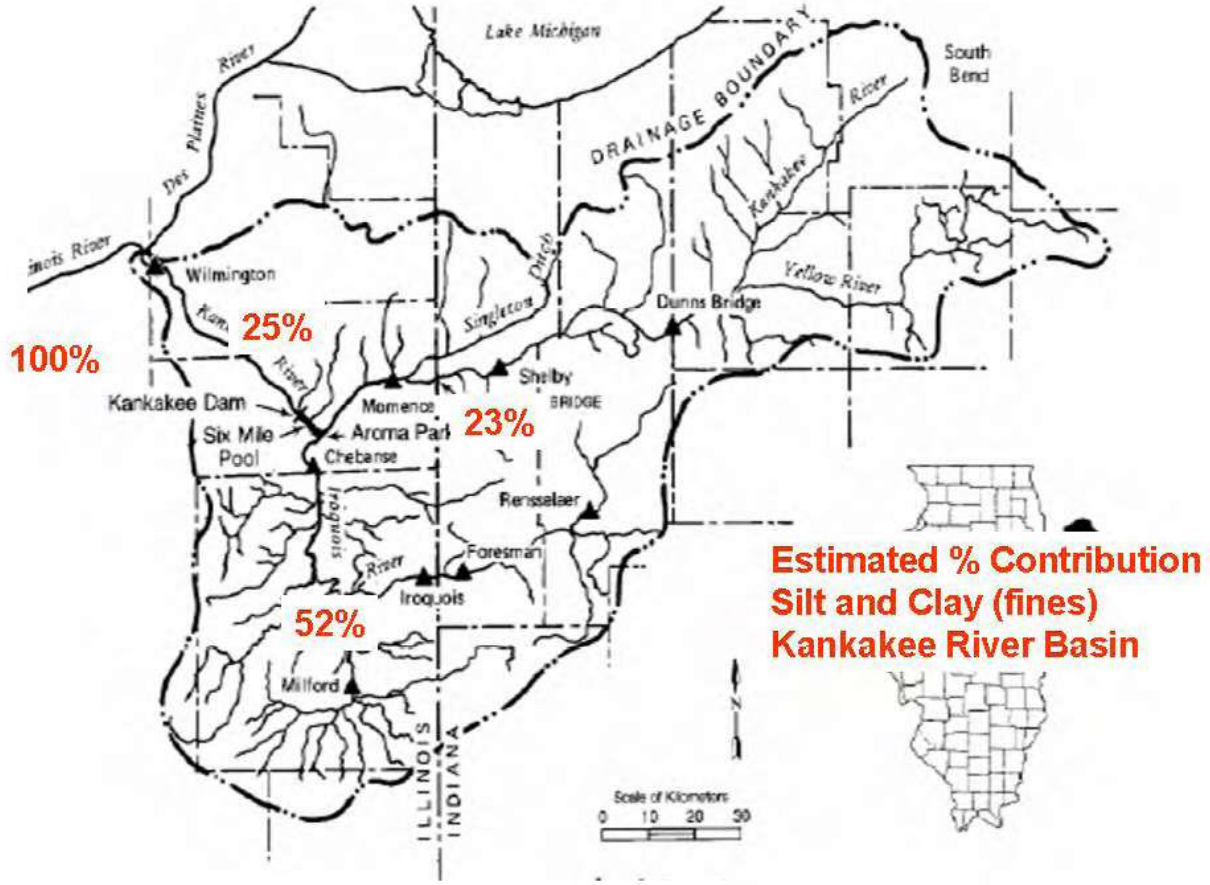
- New partners
  - MWRD
  - USACE ERDC
  - IDOT
  - Minnesota Mulch and Soil

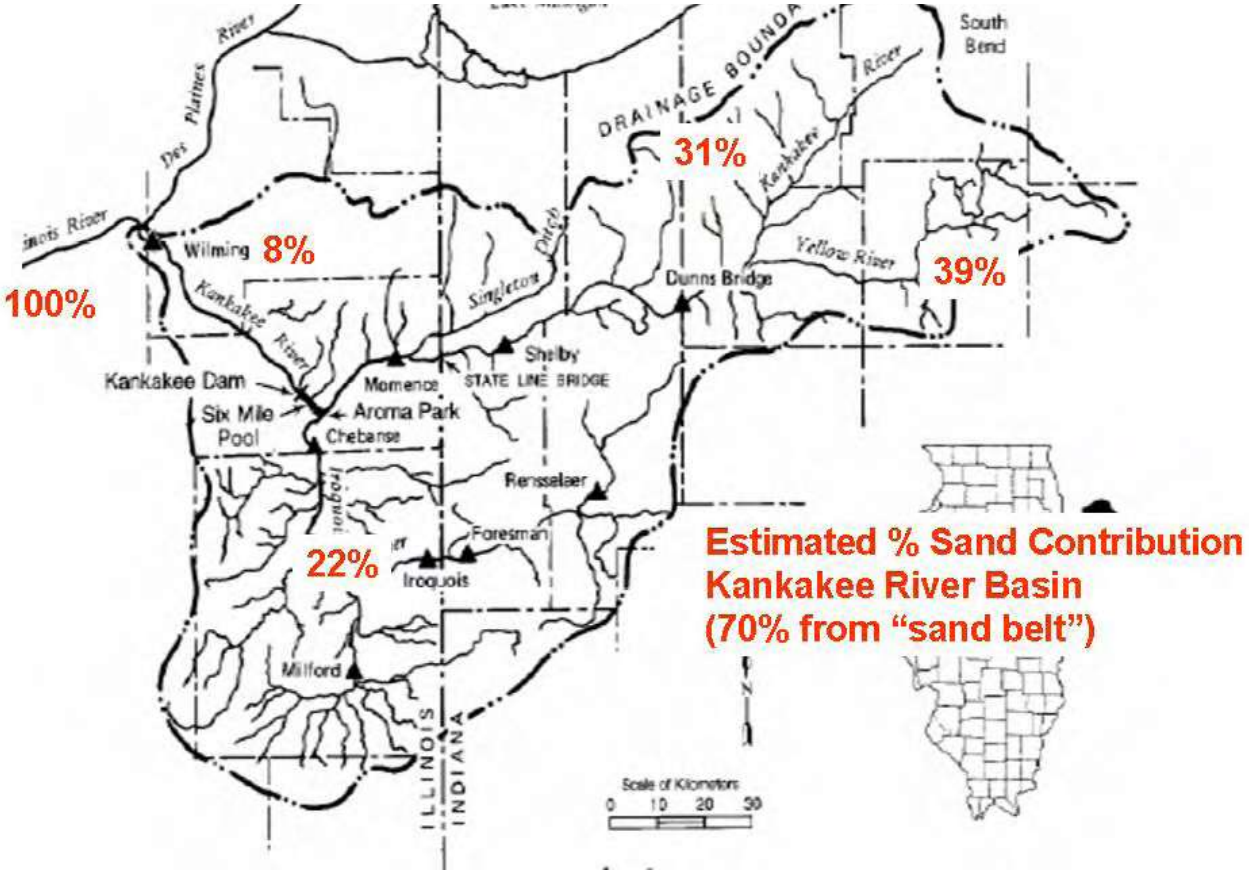
- Site prioritization
  - SIAM Model

Ideally, Corps tech transfer will introduce new restoration methods and partnerships that prove cost-effective for managing MWRD biosolids and ecosystem restoration by selling waste disposal and manufactured soil products.

Bedload sediment collector

Sediment Impact Analysis Methods (SIAM) Model Results





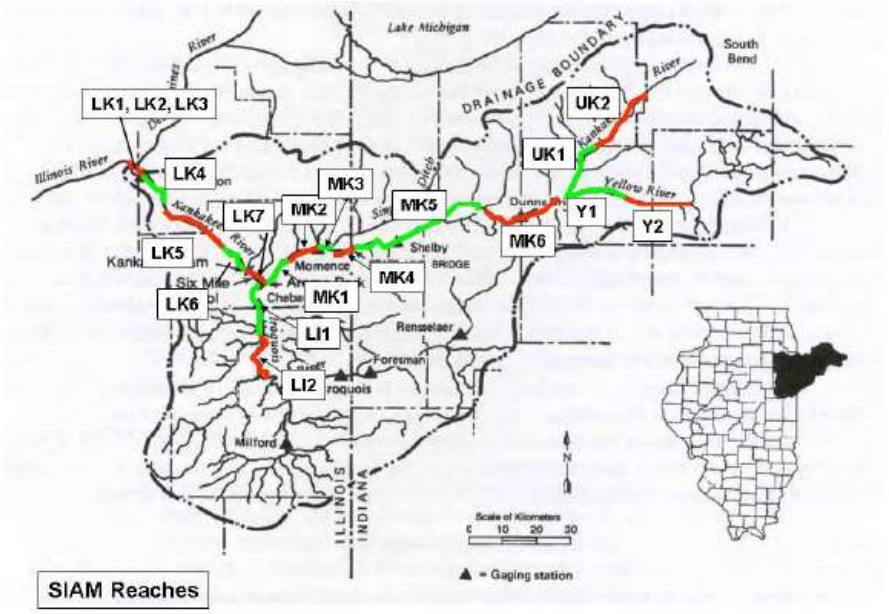


Figure 8 SIAM Reaches.

Kankakee – Preliminary SIAM Results

SIAM - **PRELIMINARY RESULTS** - Local Balance and Total Load in tons/year

	Existing		Alt 1		Alt2		Alt3		Alt4		Alt5	
Reach	local bal	total	local bal	total	local bal	total	local bal	total	local bal	total	local bal	total
LK1	0	947,000	0	943,000	0	931,000	0	738,000	0	895,000	0	947,000
LK2	-4,508	1,077,000	-4,508	1,073,000	-4,508	1,061,000	-4,508	868,000	-4,508	1,025,000	-4,508	1,077,000
LK3	0	917,000	0	914,000	0	901,000	0	708,000	0	866,000	0	917,000
LK4	-124,000	922,000	-124,000	918,000	-124,000	906,000	-124,000	712,000	-124,000	870,000	-124,000	922,000
LK5	0	715,000	0	711,000	0	699,000	0	506,000	0	663,000	0	715,000
LK6	0	683,000	0	679,000	0	667,000	0	473,000	0	631,000	0	683,000
LK7	69,300	643,600	69,300	639,600	69,300	627,600	69,300	434,600	69,300	591,600	69,300	643,600
MK1	-12,500	295,300	-12,500	292,300	-12,500	279,300	-12,500	295,300	-12,500	244,300	-12,500	295,300
MK2	0	217,000	0	213,000	0	201,000	0	217,000	0	165,000	0	217,000
MK3	-21,100	174,500	-21,100	170,500	-21,100	158,500	-21,100	174,500	-21,100	122,400	-21,100	174,500
MK4	2,081	146,400	2,081	142,400	2,081	130,400	2,081	146,400	2,081	94,600	-16,700	146,400
MK5	-6,859	128,800	-6,859	125,800	-6,859	113,100	-6,859	128,800	-8,998	77,200	9,204	109,986
MK6	33,000	91,600	33,000	88,000	33,000	75,600	33,000	91,600	30,900	52,900	35,700	88,912
UK1	2,974	22,033	2,974	22,033	2,974	22,033	2,974	22,033	124	12,423	2,978	22,029
UK2	2,413	5,987	2,413	5,987	2,413	5,987	2,413	5,987	1,153	3,047	2,413	5,987
LI1	-18,900	439,600	-18,900	439,600	-18,900	439,600	-18,900	229,600	-18,900	439,600	-18,900	439,600
LI2	-1,765	240,765	-1,765	240,765	-1,765	240,765	-1,765	121,765	-1,765	240,765	-1,765	240,765
Y1	19,800	72,100	-669	68,500	18,000	66,200	19,800	72,100	18,000	66,200	19,800	72,100
Y2	-30,900	55,900	-30,900	55,900	-31,600	44,200	-30,900	55,900	-31,600	44,200	-30,900	55,900

degradational or less sediment

aggradational or more sediment

Total load computed for downstream end of reach
Total load is mostly (but not all) fines.

Alt 1 - Yellow River bank erosion reduced by 100% (sand)
Alt 2 - Yellow River watershed yield reduced by 50%
Alt 3: Iroquois River watershed source loads reduced by 50 percent
Alt 4: Kankakee River (above state line) watershed source loads reduced by 50%
Alt 5: Re-meandering of Kankakee River reach from state line through Shelby (SIAM reach M5)

Next Steps

- Introduce partners
- Share technology
- Identify and grow soil market potential
- Design project
- Implement and run project
- Monitor results
- Share results