



# Alternative Method of Dredging by Removing Bedload Using Sediment Collectors

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# Sediment Collector System

- Sediment Collectors, are a innovative patented technology, with simple physical principles to capture targeted sizes of bedload sediments.
- Passive Collectors, uses the rivers energy to move bedload sediment to and up the Collector's ramp and gravity places it into the hopper.
- Sediments are pumped to a dewatering or disposal site.





# Sediment Collector

## Benefits

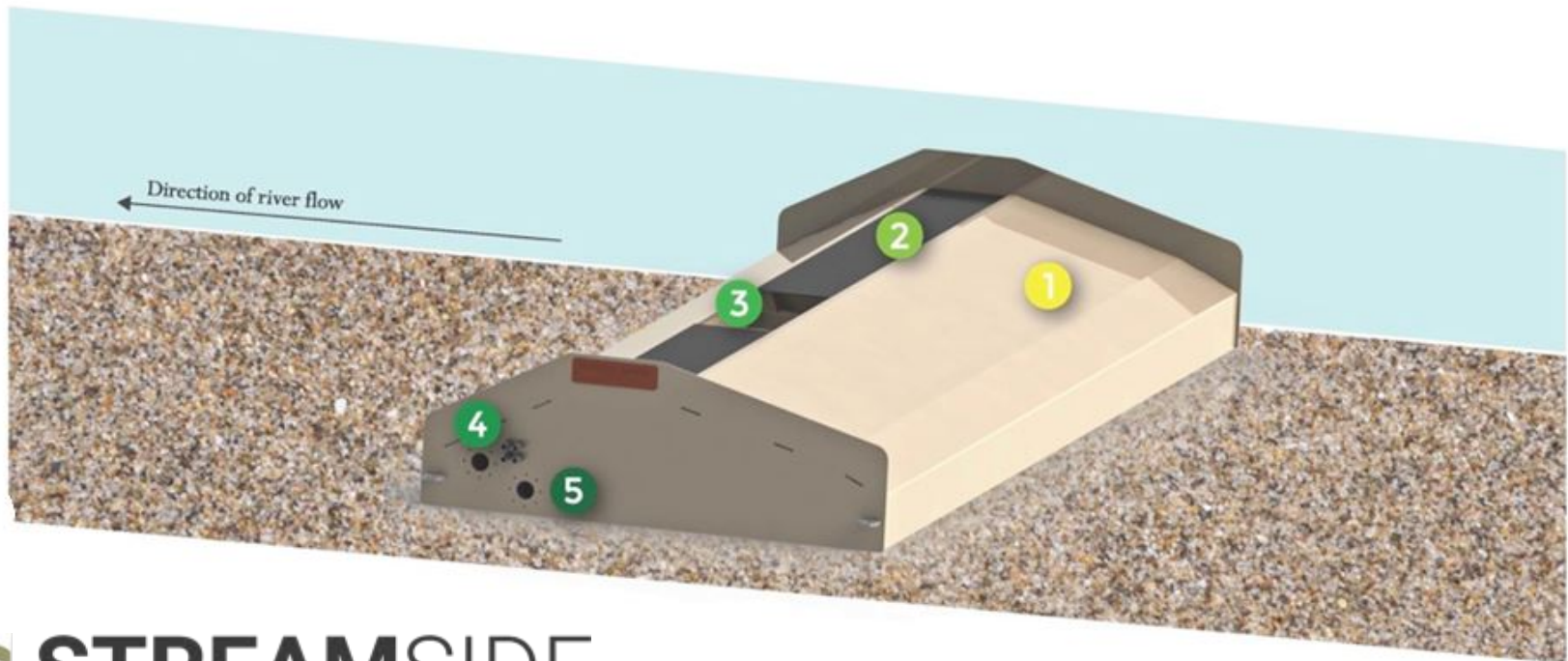


- Monitor bedload transport rates
- Scalable
- Selectively captures and remove bedload sediments
- Capture bedload during regular flows or major storm events
- Can reduce flooding and sediment deposition
- Reduces deposition in navigation channels
- Inexpensive sediment reclamation source for clean sand



# Bedload Collector Operation

1. Coarse grain bedload migrates up ramp
2. Grate system screens for selective particle size removal
3. Hopper retains the sediment until pumped
4. Harvest sediments are pumped as slurry to placement site
5. Water from dewatering is returned into collector



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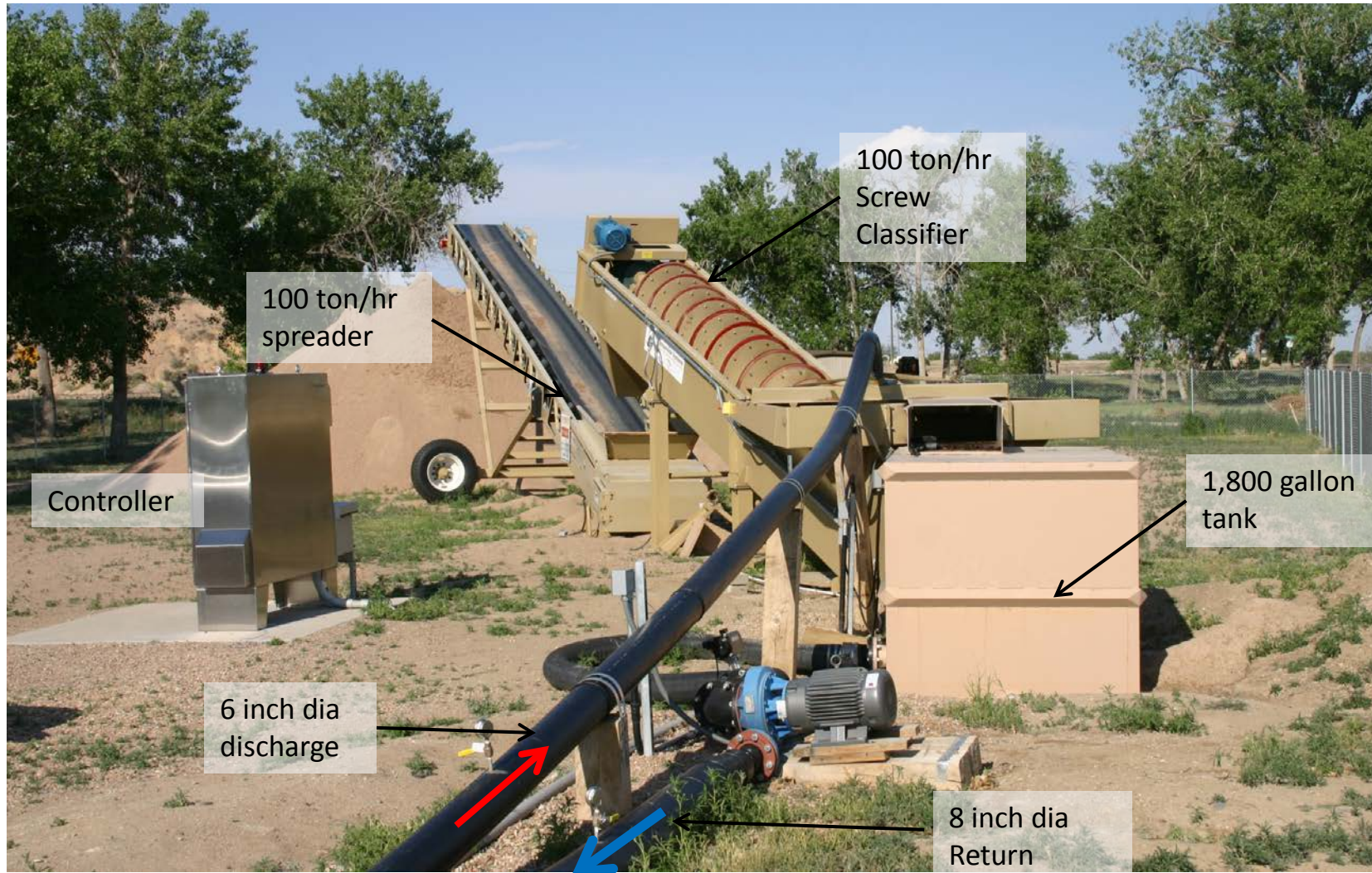


# How it Works





# How it Works





# Dewatering System





# Sediment Collector Installations







# Bedload Collector Testing and Demonstration Projects

- Initial design tested at Colorado State University
- Fountain Creek (Pueblo CO), July 2011
- MRV District Demo – Mackinaw River, July 2013
  - (w/ERDC)
- Cuyahoga River (Near Cleveland, OH) Start Date – Installed June 2015



# Fountain Creek Demo, Pueblo, CO

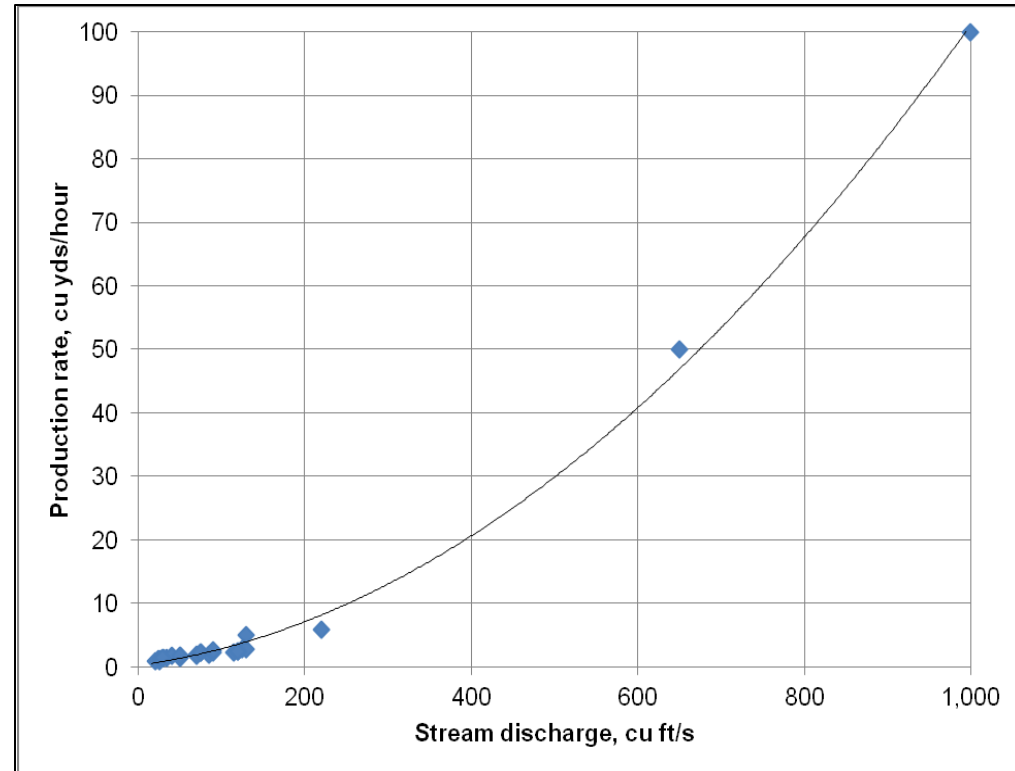
- Demonstration project
  - Need to reduce dredging in Arkansas River
- Supported by:
  - EPA 319
  - City of Pueblo
  - Pueblo County
  - NRCS
  - Colorado Water Conservation Board (CWCB)
  - Streamside Technology, LLC





# Fountain Creek Performance

- Average peak production:
  - 100 CY/hr
  - ~876,000 CY/year
- Survived extreme storm
- No wear or corrosion
- Operated about 500 hours so far



# MVR Mackinaw River Demo



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# MVR Mackinaw River - Demo

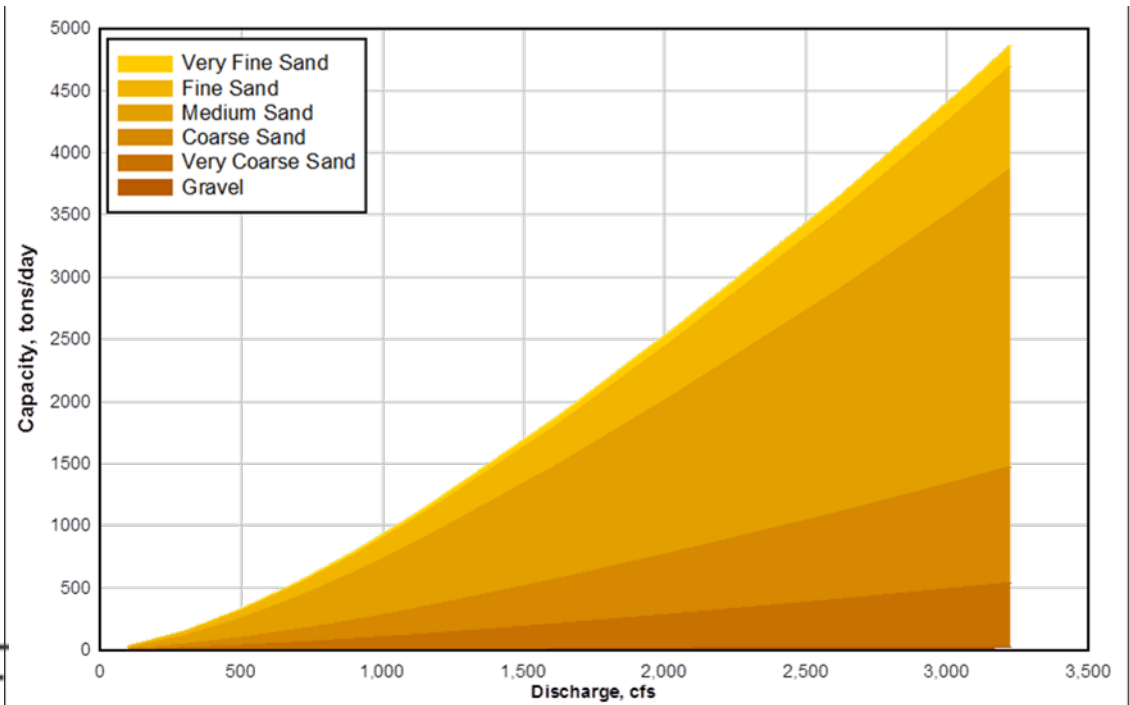
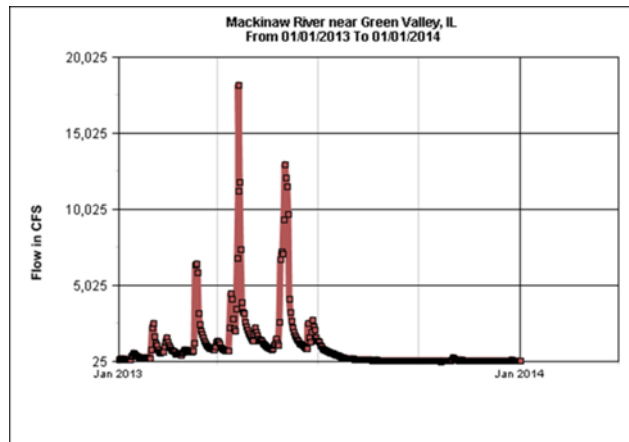




# MVR Mackinaw River

When the average Mackinaw River discharge value from July 23 and 24 July 2013 flows (283 CFS) is applied to the SCR in Figure 14, the corresponding capacity value is 140 tons/day (or 96 yd<sup>3</sup>/day). This value shows relatively good agreement to the calculated sediment harvesting value of 119 yd<sup>3</sup>/day of a 120 ft long bedload collector system (based on the 4 ft collector trials in Mackinaw River flows on 23 and 24 July 2014).

Trial	Time Minutes	Measured 4 Ft Collector Production						Daily Production yd <sup>3</sup> /24hr	Calculated 30 Ft Collector Production		
		Volume Gallons	Volume ft <sup>3</sup>	Production ft <sup>3</sup> /min	Volume yd <sup>3</sup>	Production yd <sup>3</sup> /min	Production yd <sup>3</sup> /hr		Production 30 footer yd <sup>3</sup> /hr	Production 30 footer yd <sup>3</sup> per 24hr	Production 30 footer yd <sup>3</sup> per year
1	15	6.0	0.80	0.05	0.030	0.002	0.12	2.85	0.89	21	7,807
2	30	20.0	2.67	0.09	0.099	0.003	0.20	4.75	1.49	36	13,012
3	30	13.0	1.74	0.06	0.064	0.002	0.13	3.09	0.97	23	8,457
4	24.5	19.0	2.54	0.10	0.094	0.004	0.23	5.53	1.73	41	15,136
5	30	10.0	1.34	0.04	0.050	0.002	0.10	2.38	0.74	18	6,506
6 grate off	4.5	2.0	0.27	0.06	0.010	0.002	0.13	3.17	0.99	24	8,674
7 grate off	8.93	6.0	0.80	0.09	0.030	0.003	0.20	4.79	1.50	36	13,114
8 grate off	14.16	10.0	1.34	0.09	0.050	0.003	0.21	5.04	1.57	38	13,783



# Cuyahoga River Collector Project

- 30' Collector installed summer of 2015 – 1/3 the river width [additional system(s) 2016]
- P3 (Public Private Partnership) with County, State, Private sponsorship (EPA/DNR, Port Authority, Kurtz Bros., Streamside)
- Harvesting sediment for beneficial reuse upstream, reduces the need for navigation channel dredging
- Modeled bedload transport - downstream effects for navigation channel dredging
- Seasonal flows – seasonal operation

# Cuyahoga River Collector Project



**Standby Collector prior to installation**

**Collector being lowered into river**





# Cuyahoga River Collector Project

## Features of the Sediment Collector

- Fully automated operations – controller cycles collector pumping based on river flow data from USGS gauging station to optimize performance
- No impact on recreation or boating
- Provides clean, washed sediment, ready for beneficial reuse
- Works on the demand of the river
- Can operate and maintain Collector from onsite or remote locations with internet connection



# Cuyahoga River Collector Project

- Capacity – up to 100 tons per hour
- Semi-Closed Loop System with no direct discharge to the river
- Power Consumption – electricity operating continuous 24/7 (seasonal) 300 days < \$40,000/yr
- Approx. 5,000 cy storage capacity with auto/manual traversing stacker
- 12% or less moisture of harvested/stacked material
- Has a deck wash system to remove debris from grates





# Cuyahoga River Project Summary

- Total project cost \$1.2 Million total with engineering, equipment, installation and O&M for a 2 year pilot.
- Funded by Ohio DNR grant from Great Lakes Restoration funds.
- Production: Seasonally and Operating intermittently during various river flows, Collector has harvested to date approximately 4,000 cubic yd<sup>3</sup> of coarse grain sediment.
- Currently in discussions and proposals with additional stakeholders in Cleveland on the Cuyahoga River to install four additional sediment collectors just upstream of the USACE channel to intercept sediment from getting into their channel.
- OEPA has been contacted in the proposal phase and is on board with Partial the project. This is an opportunity for a potential successful P3 model that had been discussed by USACE in Cleveland, OH earlier this year.





# Summary - Outcome

- Bedload Collector Technology demonstrated
  - Fountain Creek
  - Cuyahoga River
- Bedload Collector Sampling Technology has been used at
  - Mackinaw River
  - Many other sites across the US and Canada
- Cuyahoga project continues to evolve
  - System removed 2000 cu/yds in the first month and half, which was sold as a sand product.
  - Additional Collector next to the first is in planning/funding phase
  - 3 additional systems down stream are being planned
- Actively seeking new sites and partnerships
  - 9 additional Collector Systems in process
  - Do you have a site?



# Contact Us

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# Questions?

