

STREAMSIDE TECHNOLOGY

simplified thinking.

Our developed technologies are broken down into two classifications, ACTIVE and PASSIVE - both scalable for large or small projects.

Our Sand Wand™ Technology is our active technology, with our services being performed throughout the USA and Canada by our subsidiary company, Streamside Environmental.

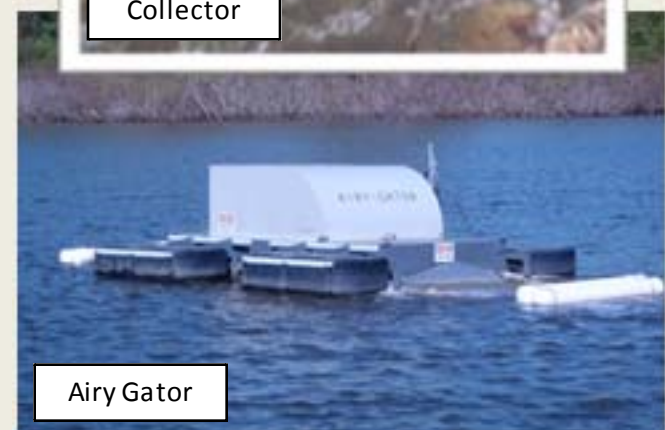
The Sediment Collector and Airy Gator System serve as our passive technology.



Sand Wand



Collector



Airy Gator

Why Remove Sediment?

- Excess harmful sediment has frequently been identified as the primary pollutant and water quality impact to surface waters. Flushing sediments downstream only perpetuates and spreads the damage, and bulk removal of sediments (as with dredging or excavating) can harm stream stability and remove critical and desirable sediments.
- Streamside Systems Sediment Collectors selectively removes only the harmful fine sediments that are most responsible for biological and habitat impacts, and sediment-associated contaminants, thereby restoring quality aquatic habitat and preventing ongoing downstream impacts.

Harmful Sediments

- Allowing excessive levels of harmful sediments to remain in aquatic systems is responsible for billions of dollars in economic, environmental, and biological impacts (reduced fish populations and fish harvest; increased water treatment costs; reduced reservoir storage capacity; reduced hydroelectric generating capacity; increased flood risk; reduction or extinction of desirable species (mollusks, fish); reduced navigation depths and commercial trade; reduced recreational and esthetic values; increased disease and parasitism from muck habitat hosts; loss of real property value with reservoir filling; loss of valuable agricultural soils and nutrients; and eventual estuarine habitat impacts and larger “dead zone” in coastal waters.

Active Technology

Sand Wand™ System



OUR INSTREAM HABITAT RESTORATION IS IMMEDIATE, WHEREAS NATURAL RECOVERY COULD TAKE DECADES OR LONGER.

Unique Approach

Sedimentation is the primary water quality and habitat impact in rivers, streams, ponds, canals & estuaries.

Dredging, digging or other mechanical efforts will either miss much of the harmful material, or will unselectively remove the desirable coarser habitat materials, and can thereby aggravate the environmental damage.

Streamside Environmental specializes in the restoration of sediment-impacted habitats using our patented Sand Wand™ technology. Our Sand Wand™ is manually operated, and involves a combination of variable water jet and suction removal, to selectively remove fine sediments from the surface and subsurface of gravel and cobble streams.



Sand Wand™ System

- Portable, rapid response
- Made in 2", 3" or 4" skid or float mount systems
- Hand operated, for use while wading in depths of 4 feet or less
 - Selective removal of silt and sediment, leaving gravel and cobble
- Shroud prevents added turbidity during operation
- Cleans interstitial areas 3-12 inches deep into substrate
- Adjustable suction and jet pressure
 - Patent Pending





Benefits & Applications

**SELECTIVE REMOVAL OF TARGETED SEDIMENTS,
WITHOUT THE NEGATIVE IMPACTS OF DREDGING**

**RESTORE SEDIMENT-IMPACTED HABITAT FOR AQUATIC
LIFE INCLUDING THREATENED OR ENDANGERED SPECIES**

**RESTORE SPAWNING HABITAT, AND IMPROVE
SPAWNING SUCCESS AND RECRUITMENT**

**REMOVAL OF CONTAMINATED SEDIMENT AND
MATERIAL FROM RIVERS, LAKES & STREAMS**

**REDUCE IMPACTS FROM EXCESS FINE
SEDIMENTS ON FISH & MACRO-INVERTEBRATES**

**IMPROVE DISSOLVED OXYGEN LEVELS
& REDUCES WATER TEMPERATURE**







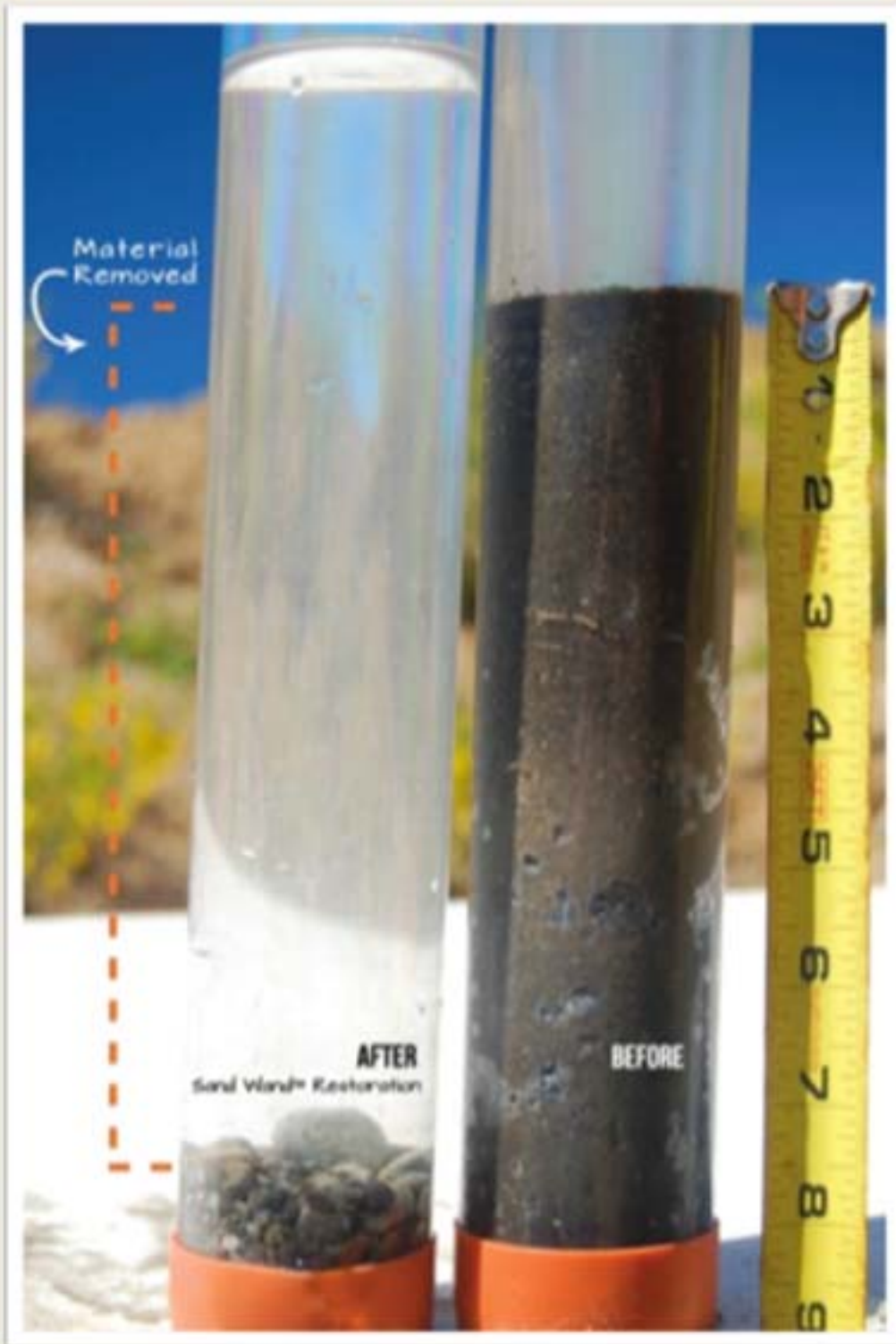
Minimal Impact

A Sand Wand™ Restoration has minimal impact to the surrounding area. A narrow path is cleared from the waterway to the discharge location to allow access for our Stream Team & equipment placement.

Alternative methods require heavy machinery and large staging areas that adversely effects the area surrounding the river.

Our small footprint does not only satisfy mother nature, it also allows us to access remote areas and perform restoration services on smaller rivers & streams.





Dramatic Results

After a Sand Wand™ Restoration between 4-8" of material will be removed from the surface and interstitial areas, exposing gravel & cobble (when present).





BEFORE



AFTER



Trout population almost doubled!

FISH POPULATION

- * In 2010 there were 58.4 Trout/100 sq. m before Sand Wand™
- * In 2011 the site had 100.7 Trout/100 sq. m after Sand Wand™

That is almost double the trout population the year following the Sand Wand™ cleanup.

THE PROJECT SITE

The project site included over one kilometer of Irish Cove Brook along the edge of an old limestone quarry in Cape Breton, Nova Scotia. The goal was to remove as much of the sand and silt as possible within the pool and spawning areas and lightly cleaning the riffle areas to ensure summer low flows on the surface. Fisheries and Oceans Canada and the Nova Scotia Department of Transportation and Infrastructure Renewal supported the use of the Sand Wand™ to restore the fish habitat.

SUBSTRATE SAND/SILT CONTENT

In 2010 the sand and silt content was 22% by weight before cleaning and 2.3% after cleaning.

an 89% reduction of sands & silts

In 2011, we established an additional test site and it had 20.7% sand and silt before cleaning and 2.4% sand and silt after cleaning.

an 88% reduction of sands & silts



PARR IN CLEAN HABITAT



SMELT RUN IN IRISH COVE



Information courtesy of
Bob Rutherford
Nova Scotia Salmon Association
902 466 2095

Proven Technology

Nova Scotia Salmon Association and Adopt a Stream performed an evaluation of our technology.

Key Aspects

- 89% reduction of sand & silts in 2010 test area.
- 88% reduction of sand & silts in 2011 test area.

“Trout population almost doubled the year following the Sand Wand™ cleanup”



Discharge Methods

We understand all projects are different, the variations below represent typical discharge methods. In the planning phase of a Sand Wand™ Restoration our team works with the client to determine the best method. All methods are subject to permitting and regulations set forth in each state or province. Size and duration of project will determine the required size and area needed for each method.

Dewatering Pit

Dewatering pits are the preferred discharge method. These pits are temporary and excavated in upland areas. They allow the water to percolate into the ground and the material to remain in the pits. The material can either be removed and hauled away or back-filled and graded into the original state.



Discharge Methods



Filter Ring

Filter Ring provides a low cost discharge solution. The Filter Ring is a stormwater filtration system that will act as a barrier to both allow water filtration through the media as well as percolate into the ground.



Dewatering Bag

Dewatering bags are made of filter fabric which allows the water to percolate while retaining sediment. Additional sediment control methods should be used if the discharge is being immediately reintroduced into the waterway.



Discharge Methods

Settling Basin

Settling basin areas are designed to collect suspended stream sediments. The discharge slurry enters the basin and very fine particles in the water are separated by means of gravity. Water can then be processed through a filtration process (chitosan) to return to waterbody or hauled away via truck.



Haul Away

This method is primarily used when removing contaminated or harmful materials. The discharge slurry is pumped directly into the tanker truck and hauled away to a designated site to be processed.



Notable Project

Fawn River Restoration

Orland, Indiana, USA




FAWN RIVER

IN 1998, AN EVENT INUNDATED A FIVE MILE STRETCH OF THIS ONCE PRISTINE RIVER WITH OVER 100,000 CUBIC YARDS OF ORGANIC SILT AND FINE SAND, BURYING THE PREVIOUSLY NATURAL GRAVEL & COBBLE BOTTOM.



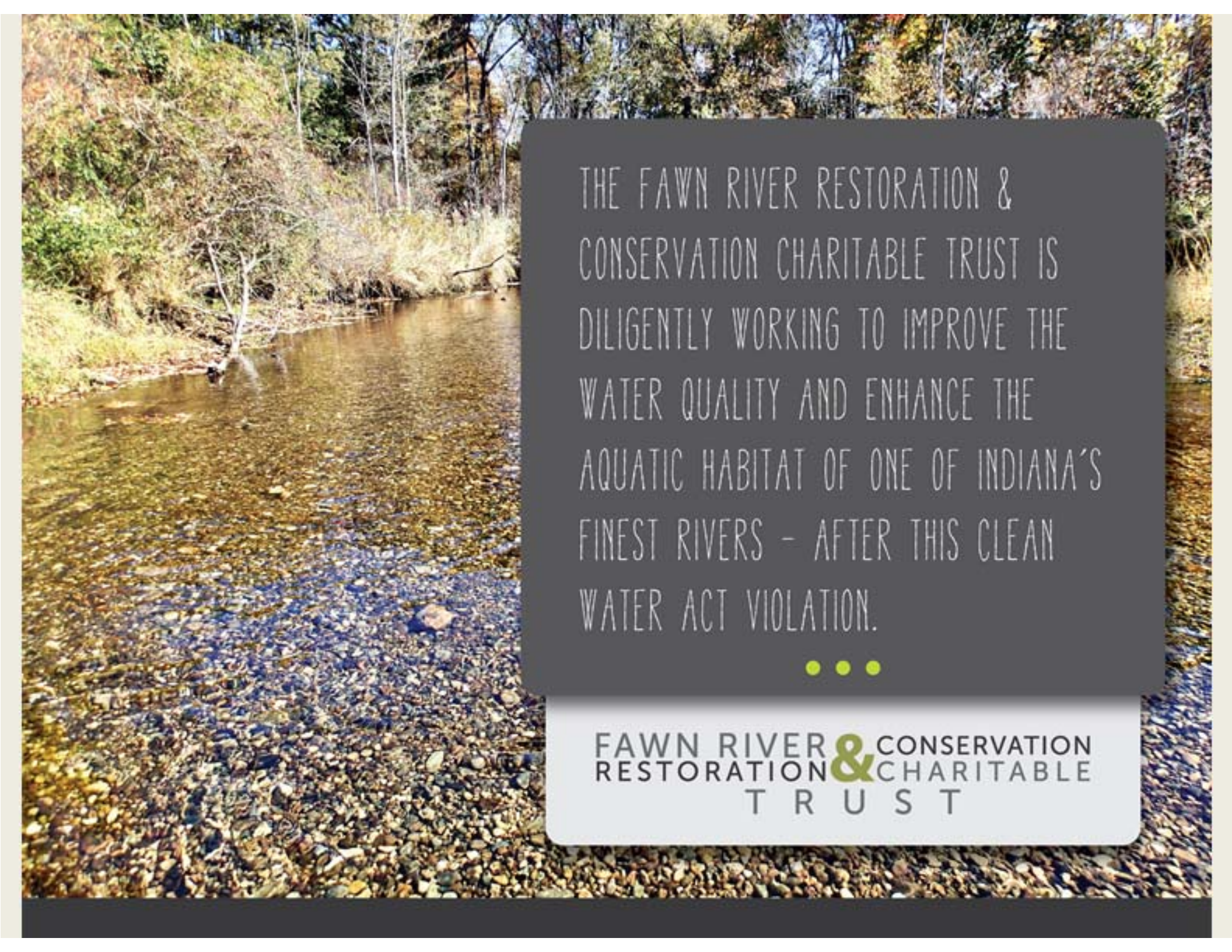
THE IMPACT





EXCESS SEDIMENT IS THE NATION'S LEADING CAUSE OF WATER QUALITY AND AQUATIC HABITAT IMPAIRMENT. THE DIVERSITY, HEALTH AND QUALITY OF RIVER LIFE IS DIRECTLY LINKED TO BOTH THE QUALITY AND AMOUNT OF CLEAN GRAVEL AND COBBLE BOTTOM AVAILABLE.





THE FAWN RIVER RESTORATION & CONSERVATION CHARITABLE TRUST IS DILIGENTLY WORKING TO IMPROVE THE WATER QUALITY AND ENHANCE THE AQUATIC HABITAT OF ONE OF INDIANA'S FINEST RIVERS - AFTER THIS CLEAN WATER ACT VIOLATION.



FAWN RIVER & CONSERVATION
RESTORATION CHARITABLE
TRUST

STREAMSIDE ENVIRONMENTAL, AN ENVIRONMENTAL COMPANY DEVELOPING INNOVATIVE TECHNOLOGIES TO REMOVE EXCESS SEDIMENT, HAS BEEN CONTRACTED BY THE TRUST TO IMPLEMENT THEIR SAND WAND™ SYSTEM ON FAWN RIVER. THIS PROPRIETARY TECHNOLOGY SELECTIVELY REMOVES THE NON-NATIVE SILTS & FINE SAND MATERIAL WHILE LEAVING THE NATIVE COBBLE AND GRAVEL IN PLACE.

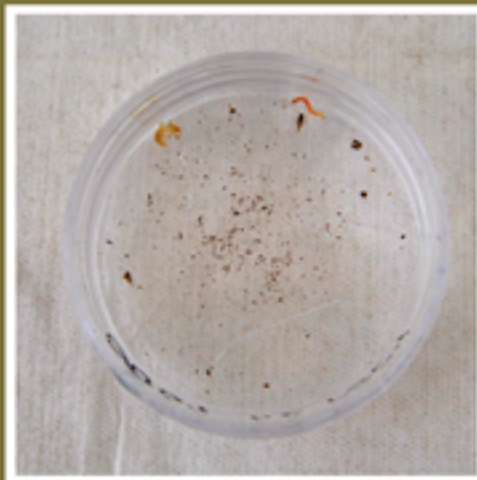


WORKING TO RESTORE THE BENTHIC COMMUNITY ● ● ●

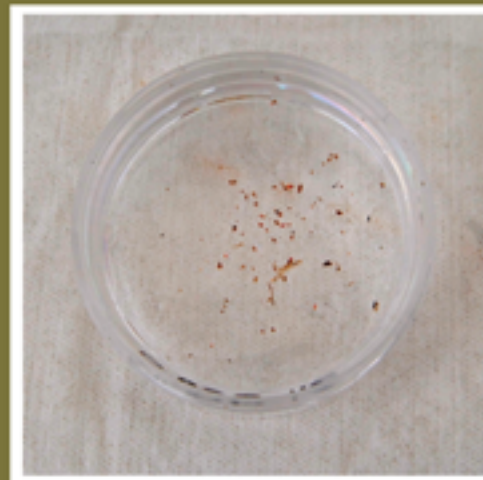
FAWN RIVER RESTORATION



AUGUST 1, 2012
PRE SAND WAND RESTORATION



AUGUST 6, 2012
4 DAYS POST RESTORATION



AUGUST 9, 2012
7 DAYS POST RESTORATION



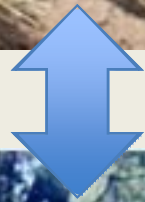
AUGUST 15, 2012
13 DAYS POST RESTORATION



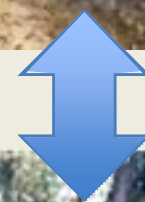
OCTOBER 9, 2012
50 DAYS POST RESTORATION



DECEMBER 7, 2012
120 DAYS POST RESTORATION



BEFORE



AFTER



Upcoming Projects

- Continuation of Fawn River Restoration in Orland, Indiana, USA
- Collaborative project with USGS and US Bureau of Reclamation in Idaho – summer 2013
- City of Puyallup, WA, USA pilot restoration – summer 2013
- Trout stream restoration for DFO and Fish & Game in Salmon Arm, BC, Canada – summer 2013

Passive Technology

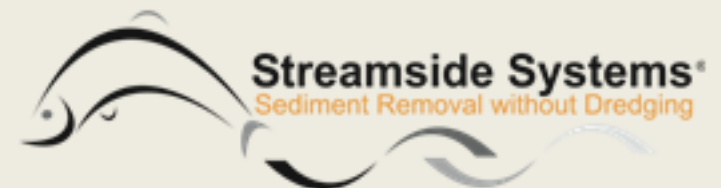
Sediment Collector System



Sediment Collector System

Sediment Collectors represent a new, innovative technology, using simple physical principles to capture targeted sizes of bedload sediments.

Passive Collectors allow the energy of the stream to move bedload sediment up the Collector's ramp and into a hopper. As the sediment fills the hopper, it is pumped to a dewatering or disposal site.



Collector Sizes

- **Streamside Technology has designed & developed the following Collector sizes:**
 - *2ft Stainless Steel bedload samplers*
 - *4ft Stainless Steel high capacity*
 - *4ft Stainless Steel Gravity Collector*
 - *4ft – 12ft Forebay Collectors*
 - *10' Precast Concrete Collectors*
 - *4ft -12ft Stainless Steel modular High Capacity Collector*
 - *30' Fabricated High Capacity Siphon Collectors*
 - *30' Fabricated High Capacity Internal Pumped Collectors*
 - *50' Fabricated High Capacity Siphon Collectors*
 - *50' Fabricated High Capacity Internal Pumped Collectors*
 - *Large River Collectors Sectional designed Collectors large enough to span the Missouri River. Dredge Pumps to 5000 GPM or 3000 GPM of sand*

Sediment Collector



How it Works

A Sediment Collector sits on or at grade of the river bottom and is used to capture bedload sediment as it migrates in flow. The sediment builds on the upstream ramp of the Collector and gradually makes its way to specified sized grates where it falls into the collector's hoppers. There, the sediment is pumped out to a discharge and processing site. Our larger collector systems return the discharged water back to the hoppers. This balance does not have an impingement on the collector grates so fish, debris, and anything in suspension within the water column is not pulled into the collector.



Notable Project

Fountain Creek Project

Pueblo, Colorado, USA

30' SEDIMENT COLLECTOR ON FOUNTAIN CREEK



Project Supported By

EPA 319 Grant funds, City of Pueblo , Pueblo County, NRCS, Colorado Water Conservation Board (CWCB), Streamside Technology, LLC

- The picture above displays the installation of the 30' Collector on Fountain Creek, CO. Streamside was called upon to help with a solution to the endless sedimentation issue on Fountain Creek which flows over 40 miles from Pikes Peak in Colorado Springs, CO to the confluence of the Arkansas River in Pueblo, CO. The collector serves as one of many tools to help keep sediment out of the Arkansas river and control the overload in Fountain Creek

Screw Separator & Conveyor



Clean washed sand



The Results

- ERDC (Army Corp Research Group) study and release paper at International Sediment conference regarding Sediment Collector technology.
- The system, as designed on Fountain Creek, has the capability to remove 874,000 Cubic/Yard per Year, if operated continuously and the river is able to produce that amount of material.
- This validation was accomplished at Fountain Creek over a three day storm event, which the system removed 7,500lbs per minute. The cost of the complete system and engineering was around \$800,000.00, with continuous operating costs \$55,000.00 worth of electric.

Accomplishments

- **Third Party Validation, Colorado State University in flume testing.**
 - 24 tests under variety of substrates and velocities, to assess the efficiency of total bedload capture, and the efficiency of selective removal of fine sediments: up to 99% efficient.
- **A one year project using Streamside Systems® 30' Internal Pump Sediment Collector has just been completed.**
 - Installation on Fountain Creek in Pueblo, Colorado
 - Demonstrated the capability of removing large quantities of sediment up to 874,000 yd³/year.
 - The project was funded with grant money from the State of Colorado, Arkansas River Watershed and others.
 - It was monitored and studied by ERDC (Army Corp of Engineers Research Group). The paper compiled by ERDC and was presented at the International Dredging Conference October 22, 2012 in San Diego. ERDC is looking for additional installations for 2013.

Benefits of Sediment Collector

- The installation of Collector Systems on major river systems to reclaim the sand as a usable bi-product could generate revenue.
- It would also greatly reduce the environmental impact of dredging and provide a significant reduction in cost.
- This approach would have a dramatic improvement on the environment, fish habitat along with improving shipping and transportation within the harbors and bays.



Sediment Collector Projects in 2013

- **Lake Lure North Carolina, City of Lake Lure, Early spring**
 - 50' high Capacity with Screw Separator and Stacker. Designed to handle 1,200,000 Cu/Yd/YR
 - 1800 GPM
- **Cleveland, Ohio, Cuyahoga River, Port Authority, Late fall**
 - Pilot for sediment capture in navigational channel
 - 50' high Capacity with Screw Separator and Stacker. Designed to handle 874,000 Cu/Yd/YR
 - 1200 GPM
- **Army Corp of Engineers, Galveston, Texas, Coastal Inlet Sediment Interception Pilot**
 - 30' high capacity discharge to screw separator for coastal beach replenishment
 - Evaluation of Coastal inlet bypass and maintaining navigational channel
- **Army Corp of Engineers, Rock Island District, Saginaw River, Illinois**
 - Design meeting in February, Engineering and Planning Meeting in April
- **Army Corp of Engineers, Rock Island District, Illinois River, Illinois**
 - Design meeting in February, Engineering and Planning Meeting in April
- **Ecuadorian Rivers Institute**
 - Design meeting in March, Site Visit to Fountain Creek, Colorado in April

Passive Technology

Airy Gator System

Airy Gator System

- Dissolved oxygen in the water is the key to being able to maintain a healthy, vibrant aquatic environment. The moving of oxygenated water helps keep solids suspended in the water and distributes dissolved oxygen in the water column.



When water flow does not exist, water becomes stagnant and devoid of oxygen, allowing suspended solids to fall out, filling the benthic interstitial areas and covering the bottom, thus reducing dissolved oxygen and choking out the benthic and aquatic life.

Notable Project

Lake St. Mary's
Ohio

Cleaning Lake St. Mary's

13,000 acre lake located in Ohio.

Problems:

- Water quality
- Algae blooms
- Sediment



Part 1 of Solution: Installation of Collector on Tributary



Part 2 of Solution: Installation Airy Gator System



Third Party Battelle Report

- <http://www.lakeimprovement.com/airy-gator-performance-results>
- The Battelle report regarding Airy Gator performance in Grand Lake St. Mary's has been released and found that the Airy Gators were able to successfully reduce low oxygen events and phosphorus transports from the sediments and enhance conditions for desirable organisms.



Key Aspects

- The ability of both active and passive equipment to selectively remove fine sediments is critical to habitat restoration.
- Portability and the ease of use in small systems is important for restoration, monitoring, and emergency response in all areas, from urban settings to remote locations.
- Another benefit is both the Sand Wand™ and Passive Collector technologies can be used simultaneously in a river system to prevent further disruption of sediment from entering the cleaned area.



STREAMS DE
TECHNOLOGY
simplified thinking.

Grafton Ontario