

Lake Rip Rap, Inc.

Macoupin Boats

the product of Lake Rip Rap, Inc.

“Affordable Shoreline Stabilization with Limited Funding”

By: Hank Sutton



www.LakeRiprap.com

www.MacoupinBoats.com

Illinois reservoirs have one problem in common.

Shoreline Erosion

Lake Rip Rap, Inc.





Lake Rip Rap, Inc.

Much of which is impaired.

Illinois reservoirs have
over 2,000 miles of erodible shoreline.

Illinois soils are some of the most susceptible to shoreline erosion.
Compounded by annual weakening of freeze-thaw stresses.





Carlyle Lake



Clinton Lake



Coffeen Lake



Evergreen Lake, Bloomington

Photo Credit: Wayne Kinney
Midwest Streams, Inc.



Mill Creek Lake, Marshall



Sangchris Lake, Pawnee



Stephen Forbes State Park



Lake Shelbyville

11,000 acres - 250 miles of shoreline

Some of the most severe shoreline erosion
anywhere with raw banks up to 40' high...



Lake Shelbyville - after 40 years of erosion



Circa: 1970



Lake Shelbyville - before and after 40 years of erosion

Shoreline erosion control

Lean, effective and affordable



Shoreline Surveying Methods for Economy

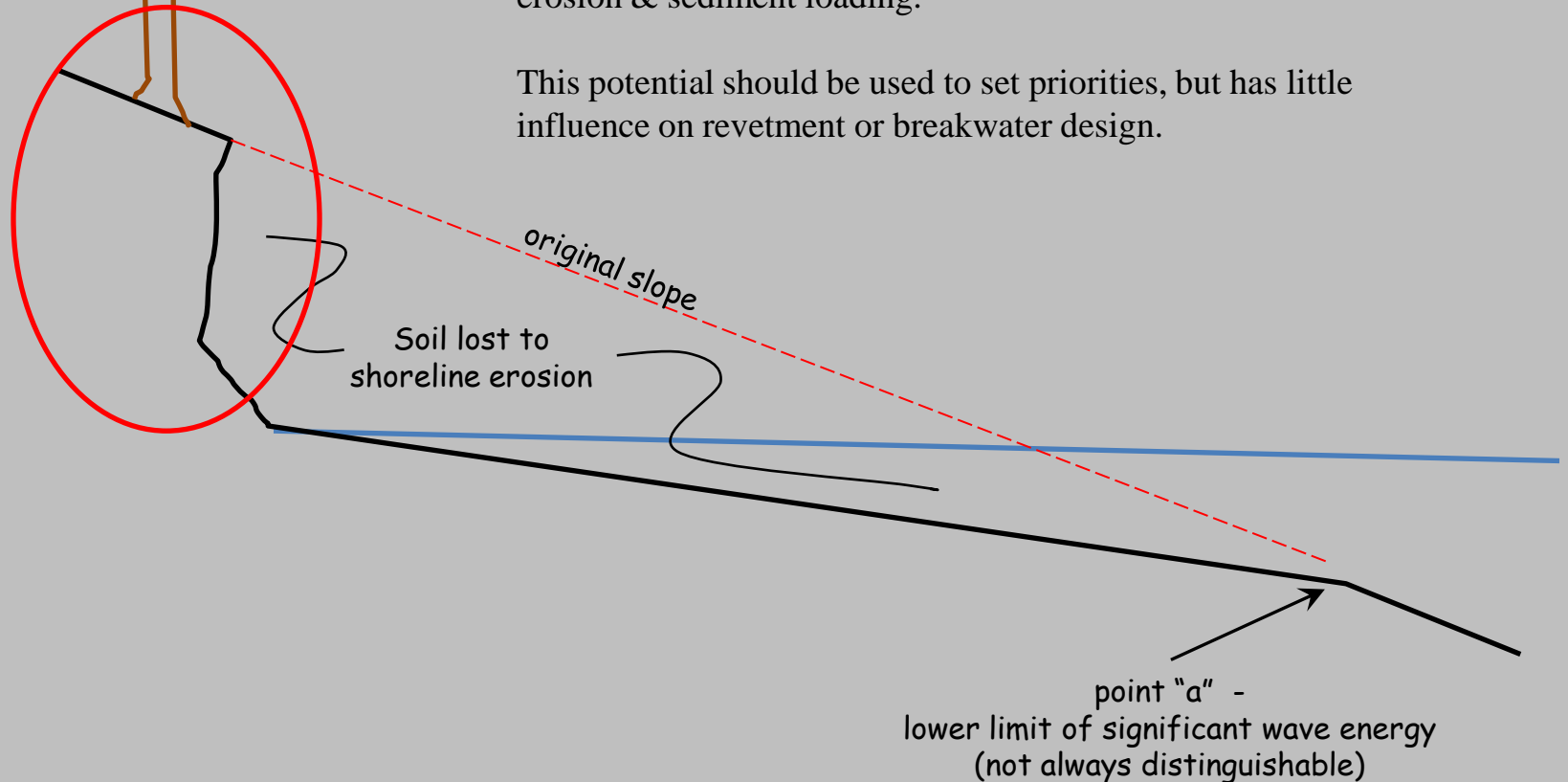


Lake Rip Rap, Inc.

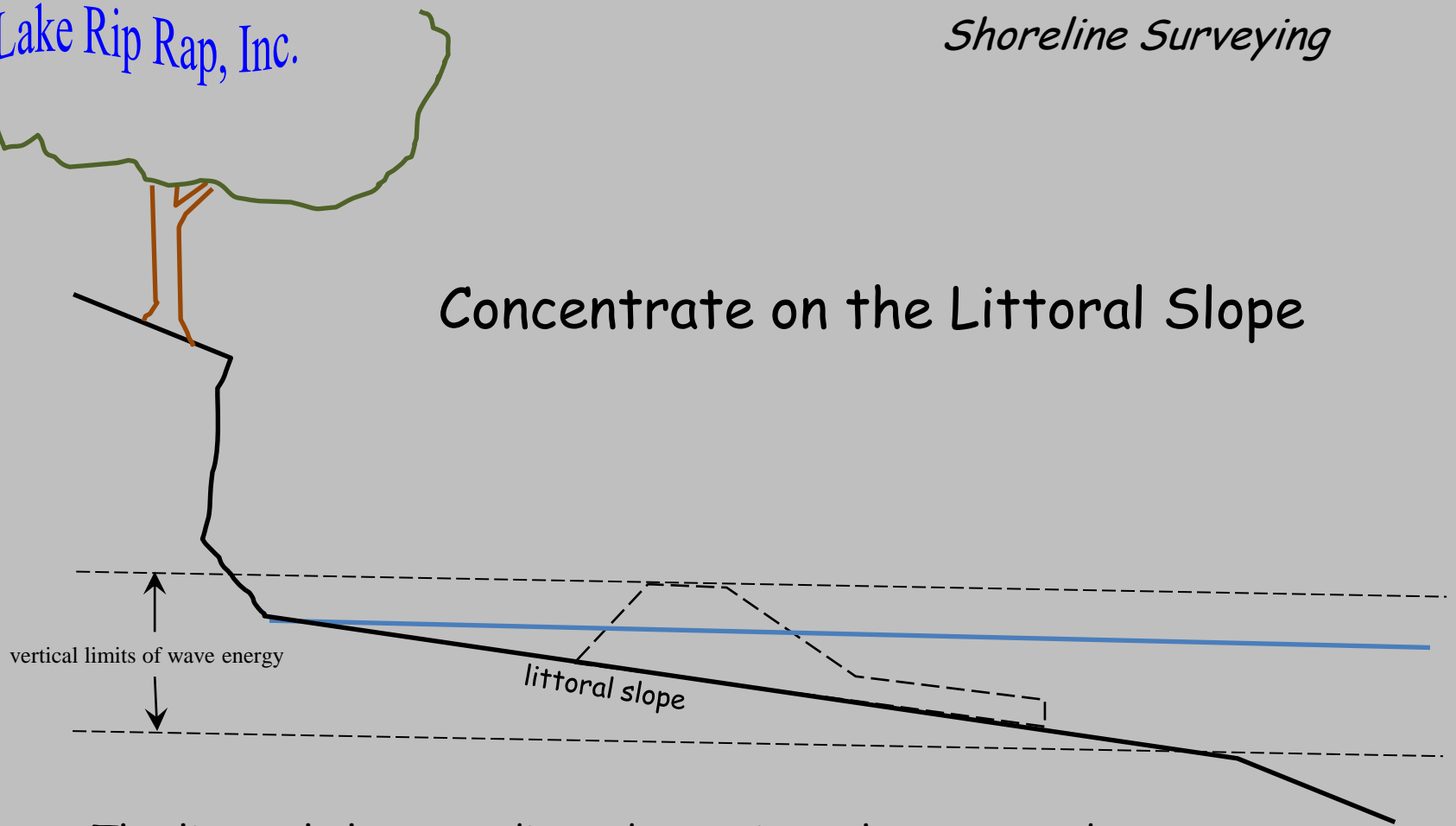
Shoreline Surveying typical existing cross section

Bank height and the upland slope indicate the potential for erosion & sediment loading.

This potential should be used to set priorities, but has little influence on revetment or breakwater design.



Concentrate on the Littoral Slope



The littoral slope gradient determines the proposed breakwater design. Use the water level as your benchmark.

Littoral cross sections should be thoroughly documented.

Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.
No excavation or bank reshaping is necessary



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

It is not cost-effective for a quarry to adjust and calibrate their screening equipment to make non-standard riprap.

One of the four standard riprap gradations available will be suitable for any reservoir in Illinois.

Photo credit: Rock Systems, Inc.



IDOT approved stockpile
Standard RR-4 riprap
at Anna Quarry



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

- Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.
- No excavation or bank reshaping is necessary
- No seeding or planting is necessary
- Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat
- The contract should address working around down trees by proven methods of fabric and riprap placement
- Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications- do not write a non-standard spec.
- Specify only 'A' quality riprap

originally a 400 pound rock



Low quality RR5 reduced to rubble in 15 years



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector



Contract Language & Specifications

Discourage the use of a standard or "catch-all" contract.

Lake Rip Rap, Inc.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then consult IDOT if questionable material is delivered



Contract Language & Specifications

Discourage the use of a standard or "catch-all" contract.

Lake Rip Rap, Inc.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then consult IDOT if questionable material is delivered

Use the proven methods of the "Lake Rip Rap Lean Design"



Contract Language & Specifications

Discourage the use of a standard or "catch-all" contract.

Lake Rip Rap, Inc.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then consult IDOT if questionable material is delivered

Use the proven methods of the "Lake Rip Rap Lean Design"

Dissipate most of the energy most of the time - naturally colonized vegetation will dissipate occasional over-topping waves



High water: 2 feet above full pool



Water at full pool

Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then IDOT if questionable material is delivered

Use the proven methods of the "Lake Rip Rap Lean Design"

Dissipate most of the energy most of the time - naturally colonized vegetation will dissipate occasional over-topping waves

Overdesigning is extremely expensive and should be avoided



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then consult IDOT if questionable material is delivered

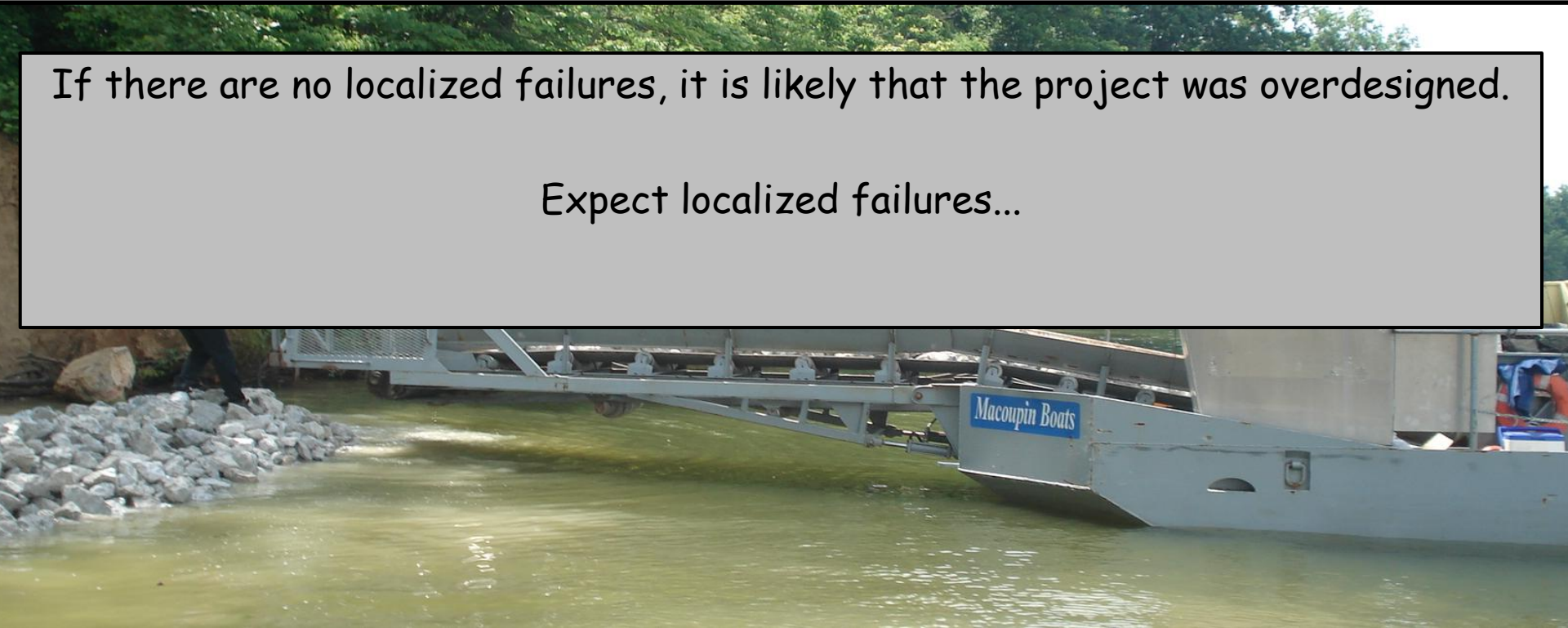
Use the proven methods of the "Lake Rip Rap Lean Design"

Dissipate most of the energy most of the time - naturally colonized vegetation will dissipate occasional over-topping waves

Overdesigning is extremely expensive and should be avoided

If there are no localized failures, it is likely that the project was overdesigned.

Expect localized failures...



Contract Language & Specifications

Lake Rip Rap, Inc.

Discourage the use of a standard or "catch-all" contract.

Certain aspects of building a riprap structure in the water differ from building a riprap structure on land.

No excavation or bank reshaping is necessary

No seeding or planting is necessary

Working around down trees can be a challenge but tree removal is very costly and down trees enhance the habitat

The contract should address working around down trees by proven methods of fabric and riprap placement

Use only standard Ill. Dept. of Transportation riprap and filter fabric specifications - do not write a non-standard spec.

Specify only 'A' quality riprap

Representative sampling and repeatable testing of riprap is very difficult even for an experienced Aggregate Inspector

Require riprap to be shipped from IDOT approved stock - then consult IDOT if questionable material is delivered

Use the proven methods of the "Lake Rip Rap Lean Design"

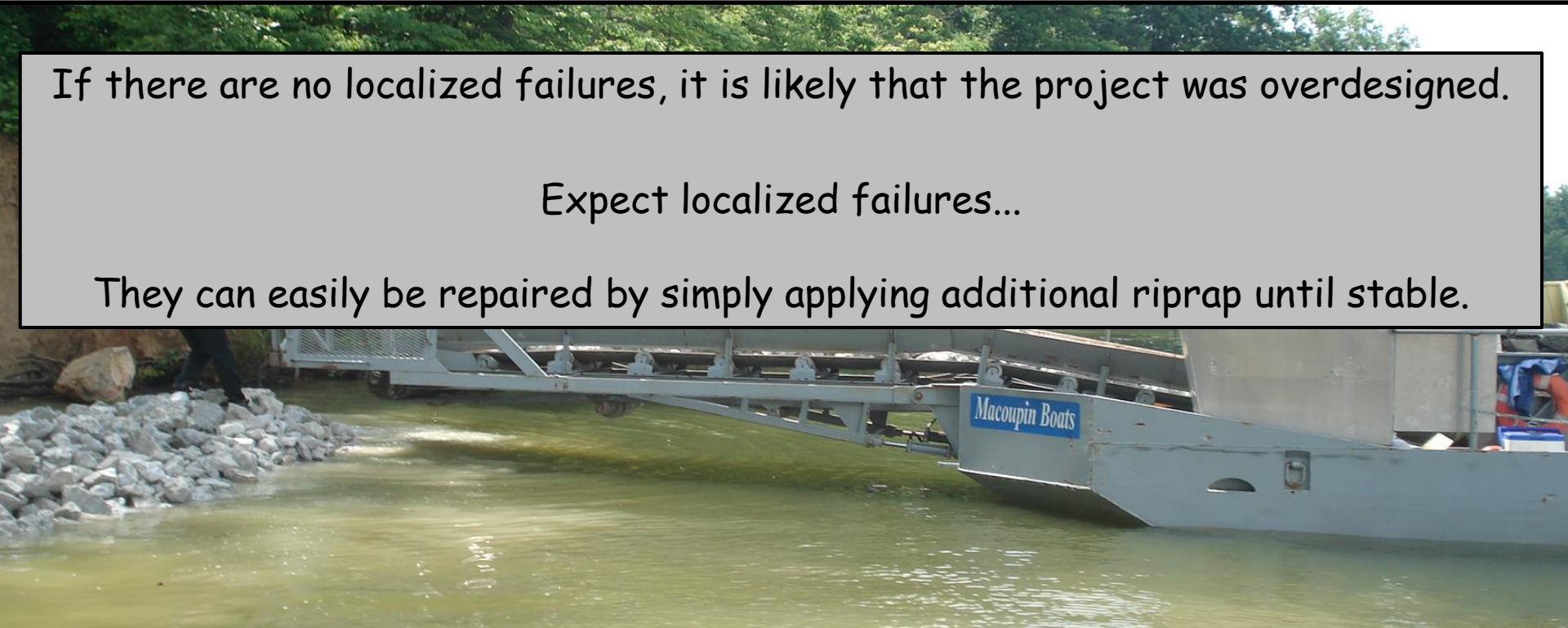
Dissipate most of the energy most of the time - naturally colonized vegetation will dissipate occasional over-topping waves

Overdesigning is extremely expensive and should be avoided

If there are no localized failures, it is likely that the project was overdesigned.

Expect localized failures...

They can easily be repaired by simply applying additional riprap until stable.





Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the loading site prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain a barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the loading site prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain a barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the loading site prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain a barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the staging area prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain a barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the loading site prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain the barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Project Partnering Sample Contract Language

“The contractor will provide automated riprap barges, other necessary equipment and experienced manpower to construct off-shore breakwaters along the shore of Pine Lake within 1 ½ miles of the barge loading dock. The contractor will trim brush as needed and pin filter fabric in place. The contractor will load the barges, transport by water and place riprap to specified lines and grade. The contractor will rough grade the loading site prior to vacating the site.

The City will furnish and deliver riprap, filter fabric and pins to the loading site. The City will furnish and maintain a barge dock, provide rock for maintenance at the loading site, finish grade and reseed the loading site at completion of the project.”



Improvements to Macoupin Boats for increased productivity.



Improvements to Macoupin Boats for increased productivity.

Macoupin Boats are not built for speed and with these "heavy haulers", increasing the cruising speed is not feasible.



Improvements to Macoupin Boats for increased productivity.

Macoupin Boats are not built for speed and with these "heavy haulers", increasing the cruising speed is not feasible.

The Macoupin 410 & 415, shown here use back-hoes to off-load 20 tons in 8 to 12 minutes



Improvements to Macoupin Boats for increased productivity.

Macoupin Boats are not built for speed and with these "heavy haulers", increasing the cruising speed is not feasible.

The Macoupin 410 & 415, shown here use back-hoes to off-load 20 tons in 8 to 12 minutes

New design Macoupin 420: off-load 20 tons in 90 seconds



Macoupin 409 - Otter Lake Special

(prototype for the Macoupin 420)

Lake Rip Rap, Inc.



This new design increases production up to 120 tons per day with improved safety features and ease of operation.

Macoupin 409 - Otter Lake Special

(prototype for the Macoupin 420)

Lake Rip Rap, Inc.



This new design increases production up to 120 tons per day with improved safety features and ease of operation.

Average time saved per load: 9 minutes

X 20 loads per day

Average time saved per day: 180 minutes = 3 hours per day

Macoupin 409 - Otter Lake Special

(prototype for the Macoupin 420)

Lake Rip Rap, Inc.



This new design increases production up to 120 tons per day with improved safety features and ease of operation.

Average time saved per load: 9 minutes

X 20 loads per day

Average time saved per day: 180 minutes = 3 hours per day

Extra 6 loads per day X 20 tons = 120 tons

Macoupin 415



Macoupin 420 (prototype)



Macoupin 415



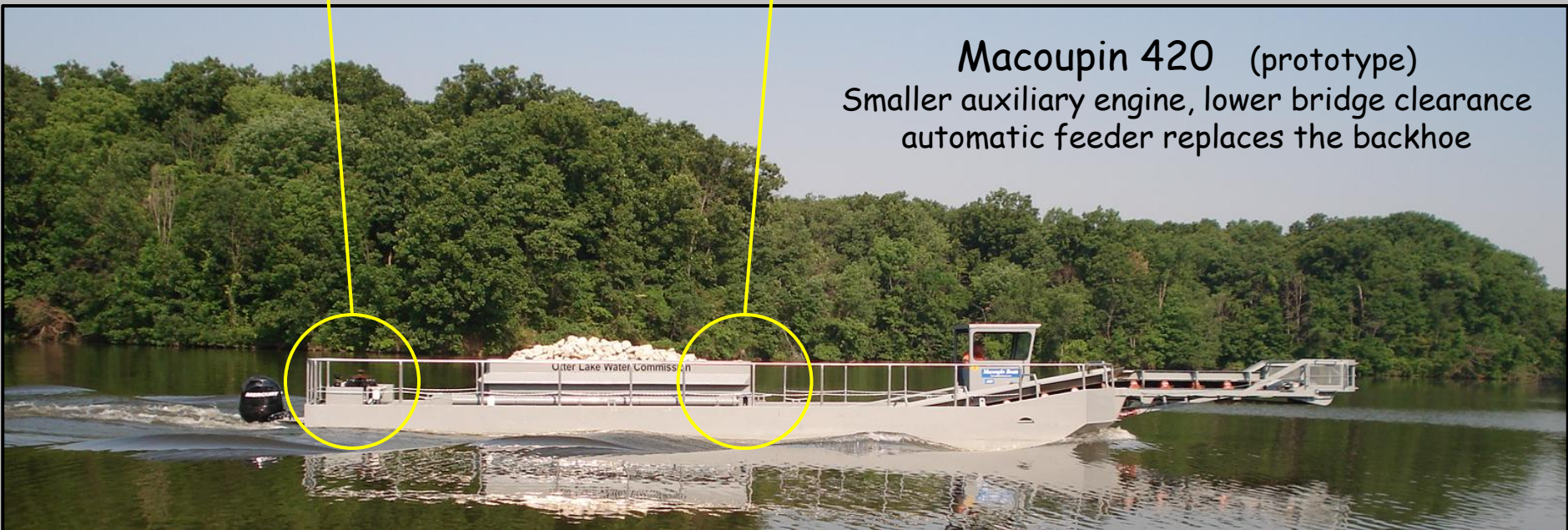
Macoupin 420 (prototype)
Smaller auxiliary engine, lower bridge clearance



Macoupin 415



Macoupin 420 (prototype)
Smaller auxiliary engine, lower bridge clearance
automatic feeder replaces the backhoe



Macoupin 409

Lake Rip Rap, Inc.

The prototype, shown here, has an effective conveyor width of 24”
the Macoupin 420 will have an effective conveyor width of 42”



res·er·voir : 1. a place where anything is collected and stored; esp., a natural or artificial lake in which water is stored for use. 2. a receptacle for holding a fluid..... etc.



**PLEASE CONSERVE WATER
UNTIL FURTHER NOTICE**

We are loosing storage capacity to erosion & sediment loading.

Shoreline erosion is one source of sediment that can be easily identified and corrected.

A large sign made from a repurposed metal container, possibly a shipping container, mounted on a black metal post. The sign has a red top and bottom border and a tan corrugated metal body. The text is painted in black, bold, sans-serif capital letters. The text reads: "PLEASE CONSERVE WATER" on the first line, "UNTIL FURTHER NOTICE" on the second line. The word "FURTHER" is split across two lines, with "FURT" on the first and "HER" on the second. The sign is located in a grassy area with a gravel driveway and industrial buildings in the background.

**PLEASE CONSERVE WATER
UNTIL FURTHER NOTICE**

A sustainable shoreline erosion control program:



State wide: 4 miles per year suggested minimum.

10 miles, or more, per year is possible utilizing Macoupin 420's in tandem

A sustainable shoreline erosion control program:



For economy, projects should be no less than one mile each with a weighted average water haul distance of no more than 1½ miles.

Shoreline stabilization using
off-shore breakwaters at Kinkaid Lake

John P. Severson

Jack R. Nawrot

Mike W Eichholz

Cooperative Wildlife Research Laboratory
Southern Illinois University, Carbondale, IL

Kinkaid Lake
UP-DATE

shoreline progress since the study was completed

2004 - 2005

Principal Findings:

Shore erosion greatly reduced by lean breakwaters

Bank stabilized

Reduced sedimentation

Enhanced littoral habitat by natural colonization

Improved water quality

Before treatment:

12 plant species identified in the littoral zone,
very sparsely populated with very little wildlife activity.

3 years after treatment:

121 volunteer plant species;

plus

104 fauna species identified in the littoral zone

(the complete report is available upon request)

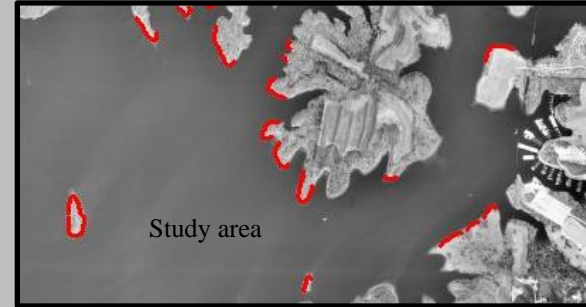
Southern Illinois University, Carbondale

Steel pins driven to monitor bank retreat at Kinkaid Lake - John P. Severson



The Largest Reservoir Shoreline Project Ever Completed by Transportable Riprap Boats

Kinkaid Lake, Murphysboro, Illinois

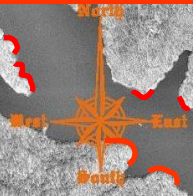


At completion of the study

6,700 lineal feet - 8,000 tons of riprap

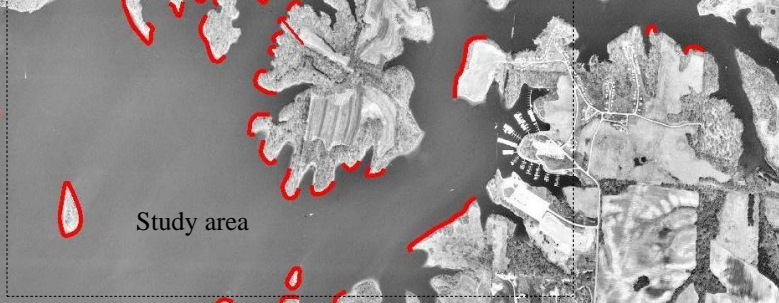
The Largest Reservoir Shoreline Project Ever Completed by Transportable Riprap Boats

Kinkaid Lake, Murphysboro, Illinois



Over 40,000 tons of riprap in place.

Macoupin Boats have traveled over 5,000 miles on Kinkaid Lake.



Lake Manager: David Fligor
 Engineer: Gary Raines, HDR Inc.
 Facilitator: Dr. Lou Strack

 <small>801 South Main Street, Springfield, IL 62769-8145 Ph: 217-685-6900 1200 West 10th St., Murphysboro, IL 62956-1004 Ph: 618-284-0999</small>	GRAPHIC SCALE METERS FEET 	Approved: _____	REV	DATE	COMMENTS	Drawing Title	Project Title	DRAWING NO.
						KINKAID LAKE:	SUMMARY OF PROTECTED SHORELINE AREAS AS OF AUGUST 2007 - ALL FUNDING SOURCES	1
						Location	JACKSON COUNTY, ILLINOIS	Building Number
						Date	AUGUST 10, 2007	Drawn By
						Checked	JAK	Design
						Building Number		Date
								Page 1 of 1

Lake Rip Rap, Inc.

2010

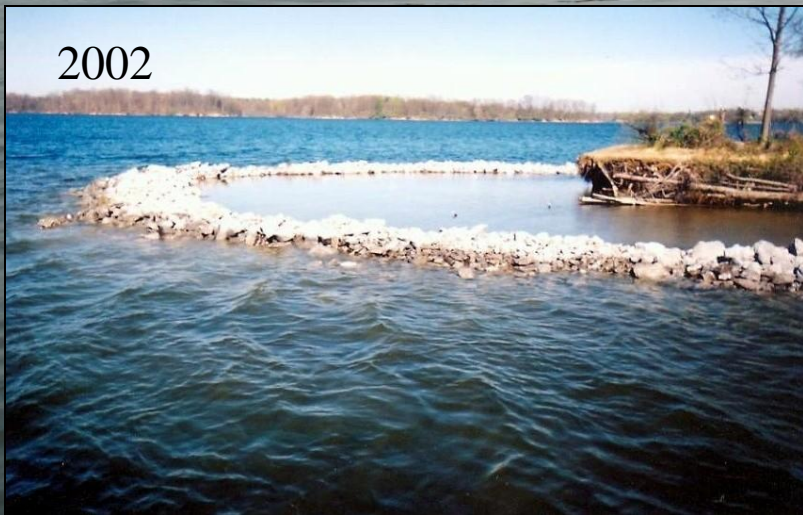


Lake Rip Rap, Inc.

2008



2002



Lake Rip Rap, Inc.

2010



2006



Lake Rip Rap, Inc.

2010



2003

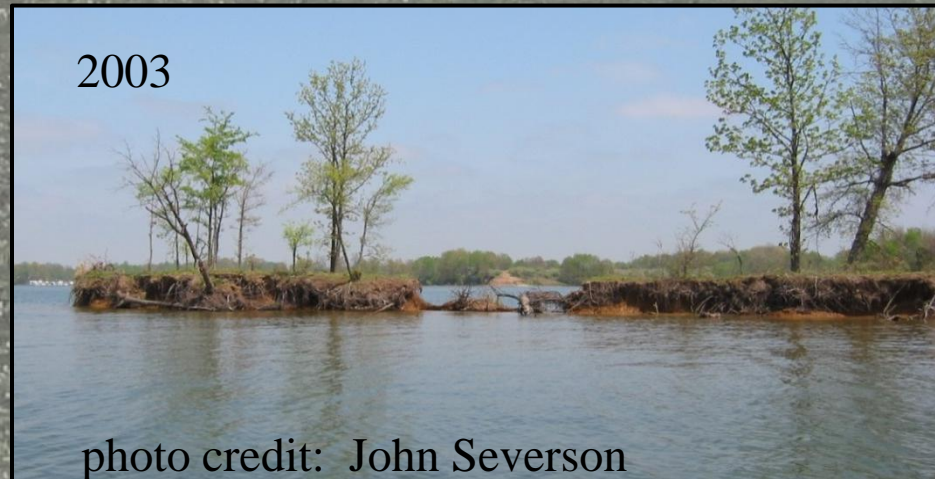


photo credit: John Severson



2000

Notice improved water quality

Turbid water was common in the littoral zone before treatment.

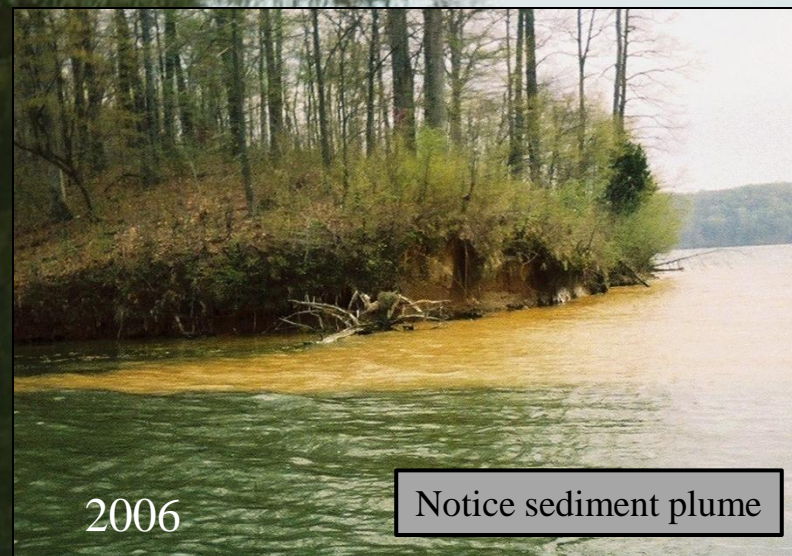


2009

Lake Rip Rap, Inc.



2009



2006

Notice sediment plume

Lake Rip Rap, Inc.

2009



2005





2010

Lake Rip Rap, Inc.



2006



Lake Rip Rap, Inc.

2005



2009





Shoreline retreat - 70 feet

2008

Lake Rip Rap, Inc.

2010



2006

Lake Rip Rap, Inc.

Lean riprap breakwater
built by Macoupin Boats

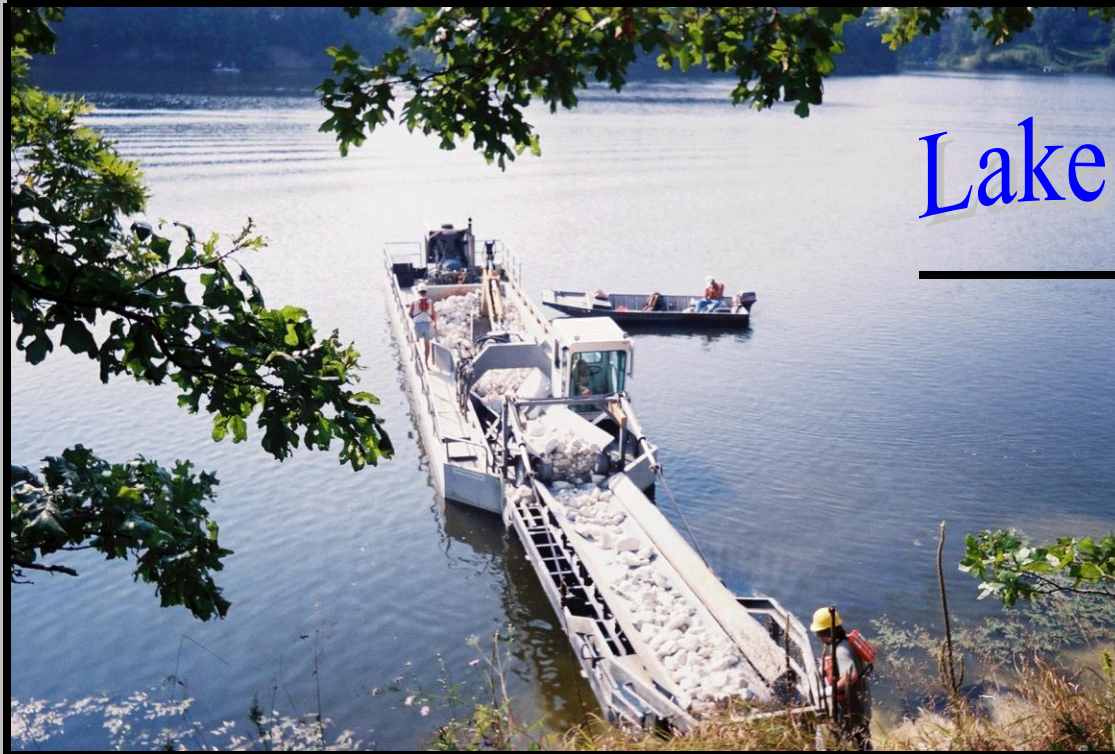


Serious fishermen agree...

*"A lean riprap breakwater improves fishing,
shoreline habitat and water quality."*

Questions?

Thank you for your interest
in shoreline erosion control.



Lake Rip Rap, Inc.

Macoupin Mechanical Boats

Contact: Hank Sutton (217) 899-9706

hank@LakeRiprap.com - www.LakeRiprap.com - www.MacoupinBoats.com