Shoreline Protection Strategies and Natural Shoreline Design

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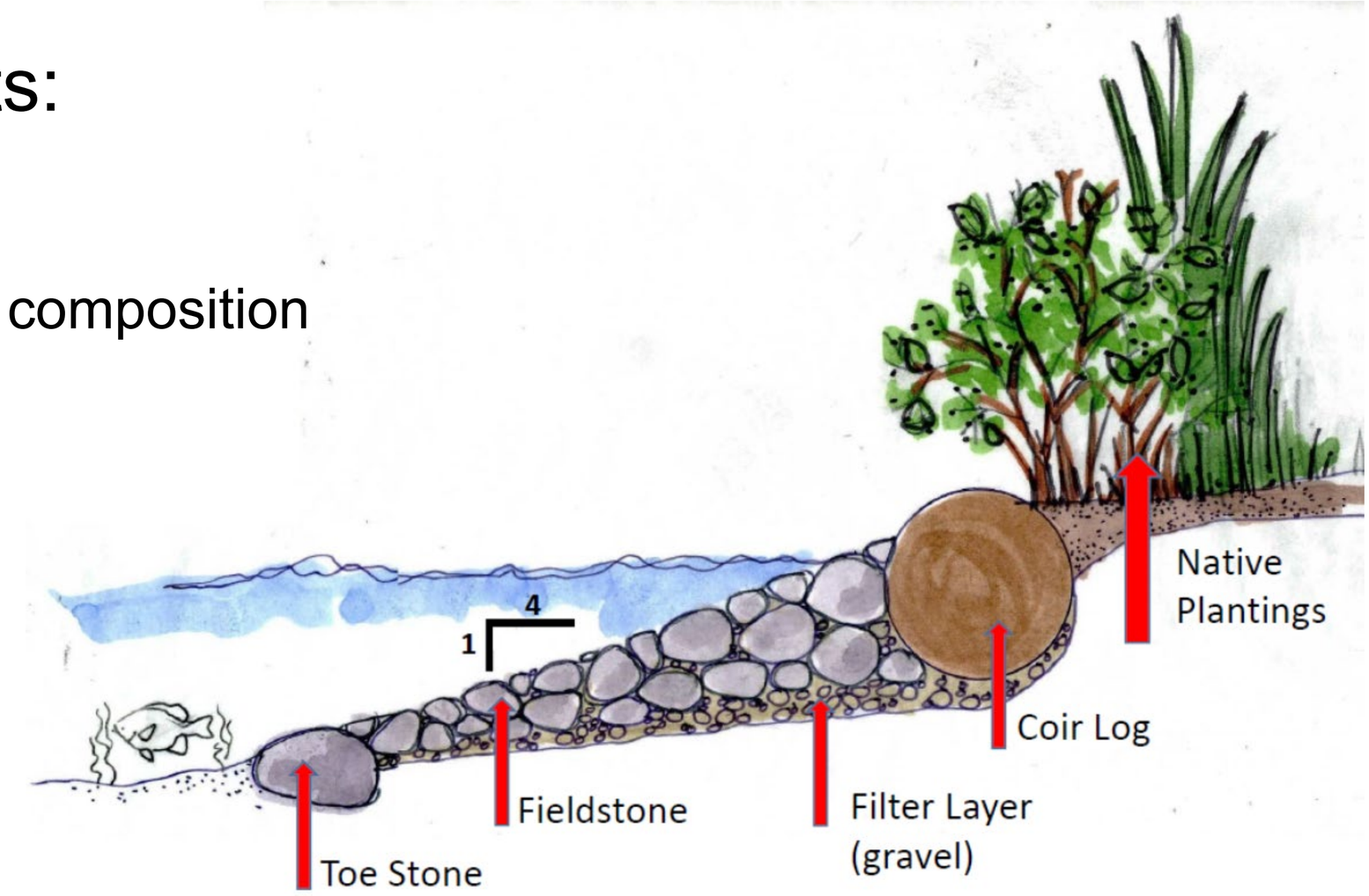
Associate Director

Tip of the Mitt Watershed Council

When Coir Logs Alone Aren't Enough

Key Components:

- Slope
- Toe stone
- Fieldstone size and composition
- Coir elevation
- Filter layer
- Native plants!



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Fieldstone

- Top layer acts like ball bearings
- 4H:1V Slope
- Organic debris fills in voids

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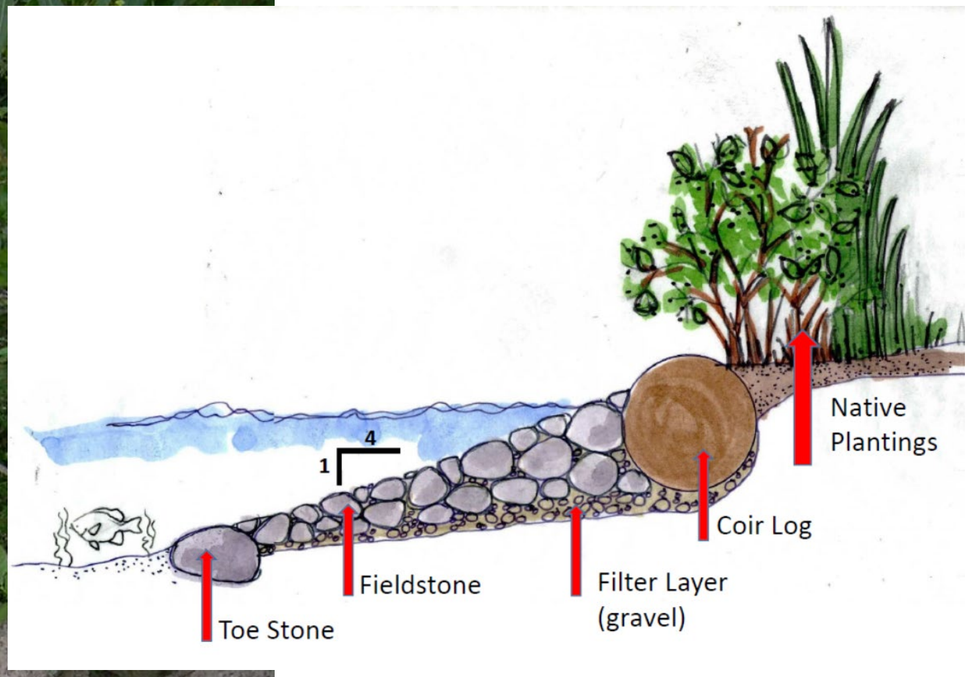

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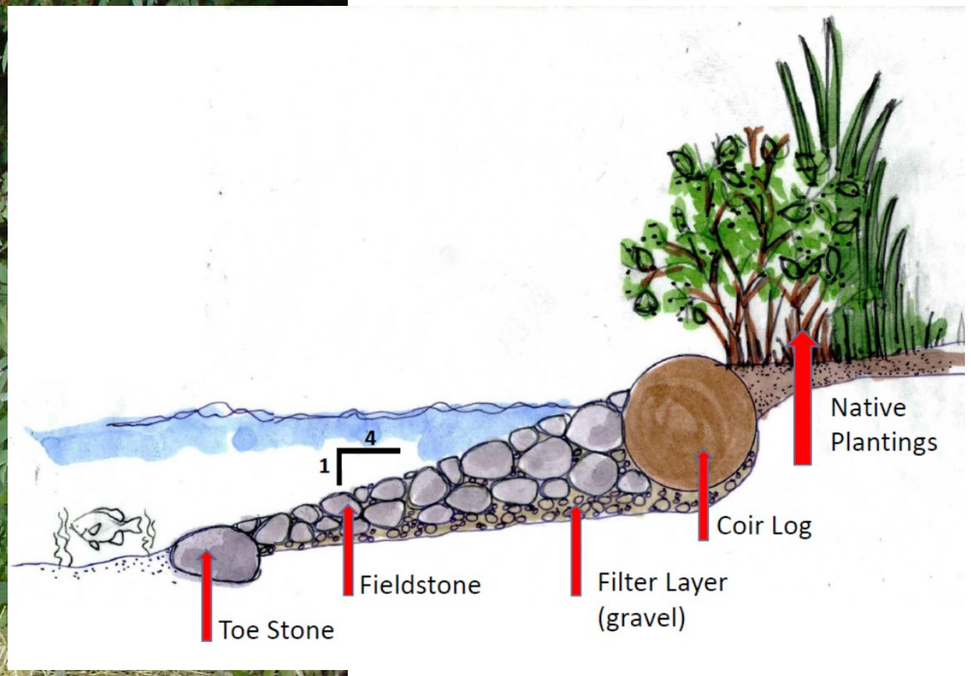

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Intermediate Lake

Antrim County, MI
November 2011

70 LF
7, 16″ diameter coir logs
Average stone diameter= 8″
Smallest stone diameter= 4″
Largest stone diameter= 12″
20-25 CY fieldstone
Fetch= 3 miles

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Concrete seawall to be removed

Dekraker:
SHORELINE RESTORATION PROJECT
FIGURE 3 OF 5: Photo
WATER BODY: Intermediate
COUNTY: ANTRIM
CITY: Bellaire
STATE: Michigan
APPLICATION BY: Tip of the Mitt Watershed Council
DATE: 8-23-11

November 2011

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July 2019

October 2014

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Coir Log Location

July 2019

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Coir Log Location

July 2019

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Camp Pet-O-Se-Ga Shoreline Bioengineering Project

Shoreline Demonstration Project through the Certified Natural Shoreline Professional Training Workshop (June 2014)

Pickerel Lake

Emmet County, MI

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80 LF
3, 16″ diameter coir logs
2, 20″ diameter coir logs
1, 12″ diameter coir logs
Average stone diameter= 6.5″
Smallest stone diameter= 3″
Largest stone diameter= 12″
20-25 CY fieldstone
Fetch= 3 miles

Pickerel Lake

Emmet County, MI

2014

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Coir Log Location

Toe Stone Location
Coir Log Location

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Installation techniques may vary, but are not all equal!!!

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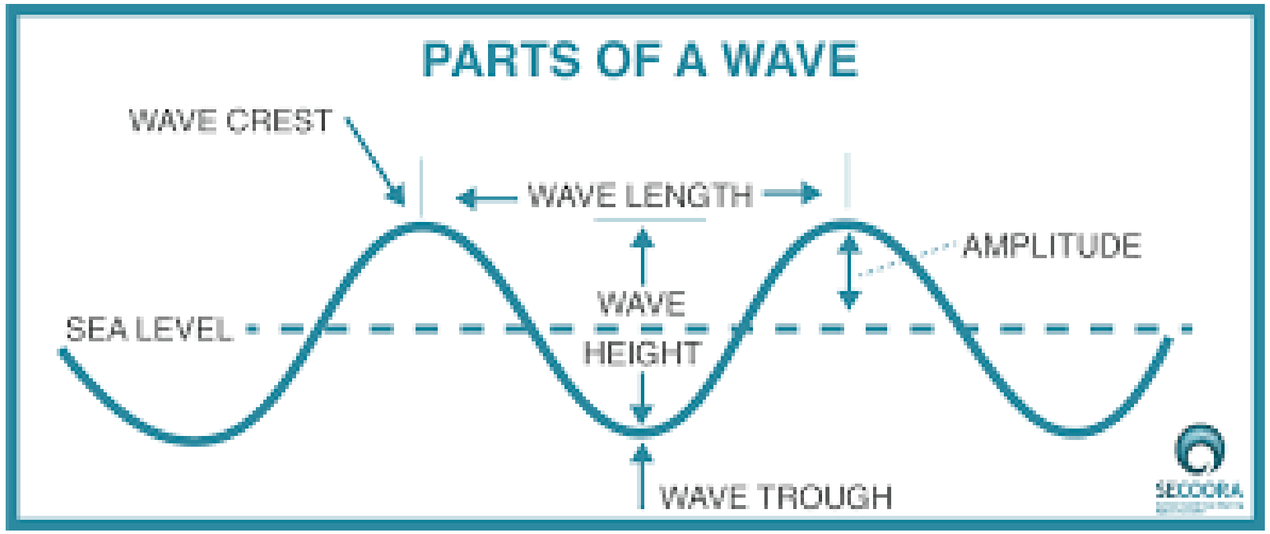
Fieldstone:
An Important Part of All High-Energy Shoreline Projects

- In order to determine rock size, first must know:
  - **Fetch**
  - **Wind Speed***
- Fetch + Wind Speed determines **significant wave heights**



Average Sustained Over-Water Wind Speed (MPH)

Fetch (Miles)	10	20	35	50
1.0	0.30	0.60	1.05	1.50
2.0	0.40	0.85	1.45	2.15
5.0	0.70	1.35	2.35	3.30
10.0	0.90	1.90	3.30	4.75
15.0	1.20	2.35	4.10	5.80
20.0	1.35	2.70	4.70	6.75

Significant Wave Height

*In Northern Michigan, we have determined that significant wave heights generated by wind speed of 35 MPH is an appropriate estimate

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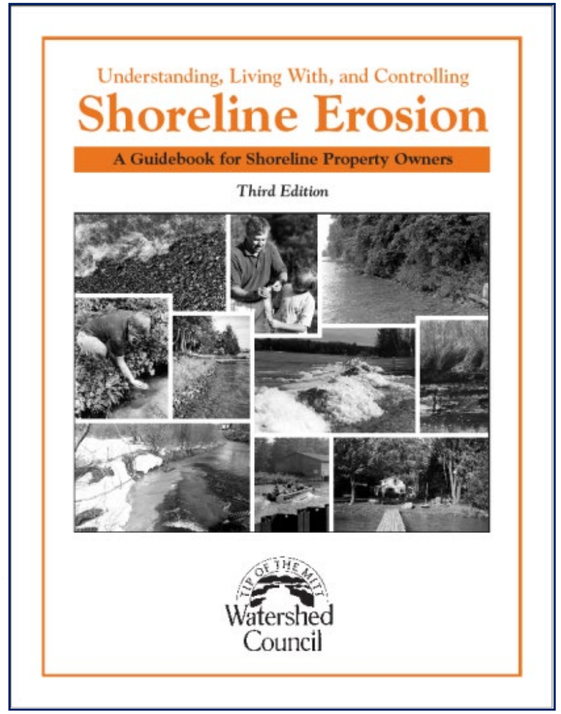
Fieldstone:
An Important Part of All High-Energy Shoreline Projects

- Key Considerations:
  - Size:
    - Determine the Median Size
    - Largest: multiply median size by 1.5 to determine the maximum
    - Smallest: multiply median size by .5 to determine
  - Overall volume
    - 50% median
    - 25% largest
    - 25% smallest

Significant wave height (feet)	Rock Weight (Pounds)	Rock Diameter (Inches)
0.5	1	2.0
1.0	10	4.5
1.5	20	6.5
2.0	50	9.0
2.5	100	11.0
3.0	160	13.0
4.0	390	18.0
5.0	750	26.0
7.0	2,100	48.0

Table 2: *Recommended median rock sizes for various significant wave heights.*



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Save the Date!

Lake Charlevoix
Natural Shoreline Contractor Training Workshop
Tourist Park, East Jordan
August 23 and 24, 2022

Thank You!

Jennifer Buchanan
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