

Shoreline Armoring in the Puget Sound

Impacts on nearshore habitat in the Maury Island Aquatic Reserve

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What is shoreline armoring?

Shoreline armoring (e.g. seawalls, bulkheads) is put into place to prevent erosion and stabilize shorelines for commercial and residential development. A third of the shorelines in Puget Sound are armored. Shoreline armoring may cause adverse ecological impacts to nearshore ecosystems¹, including juvenile salmon².

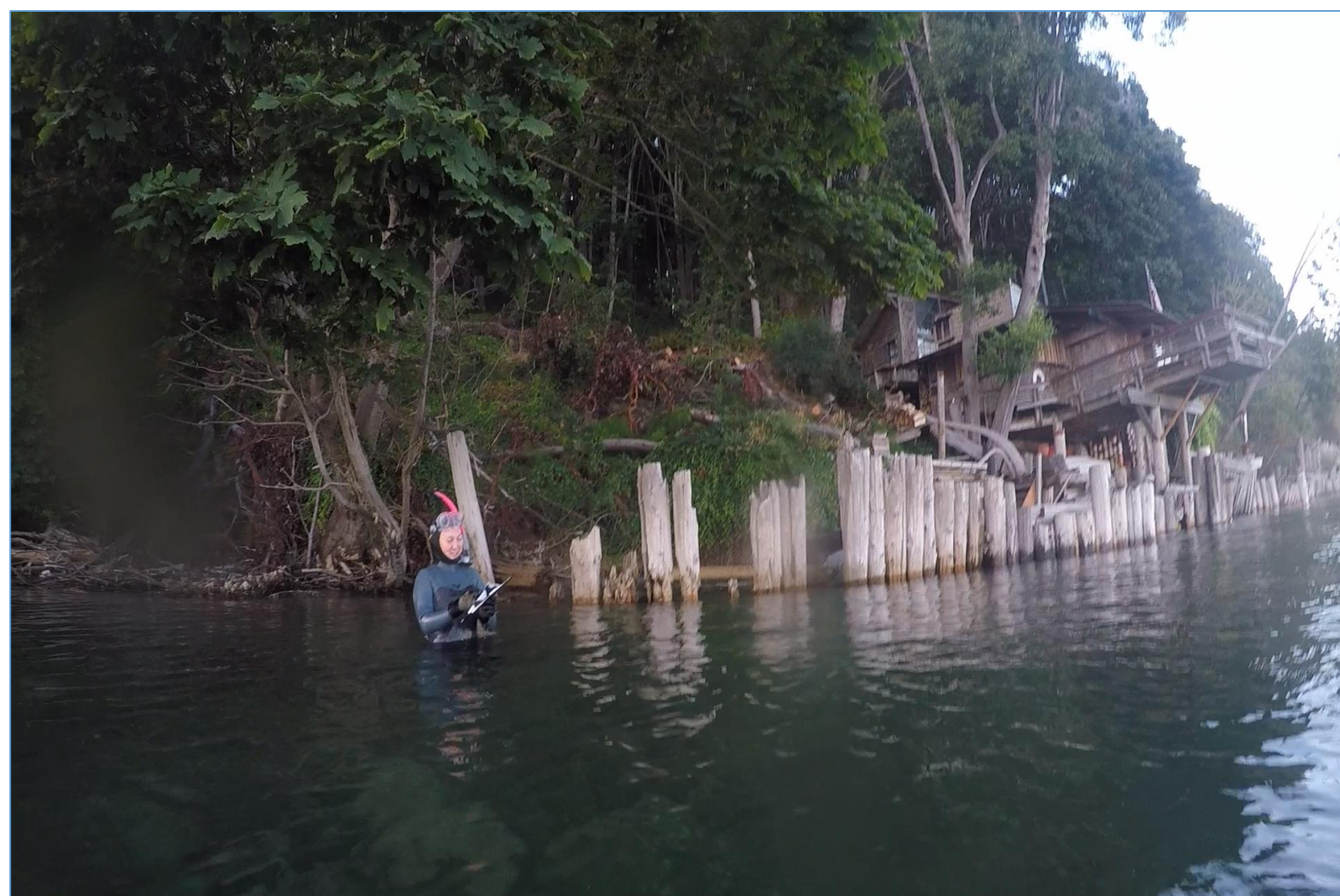
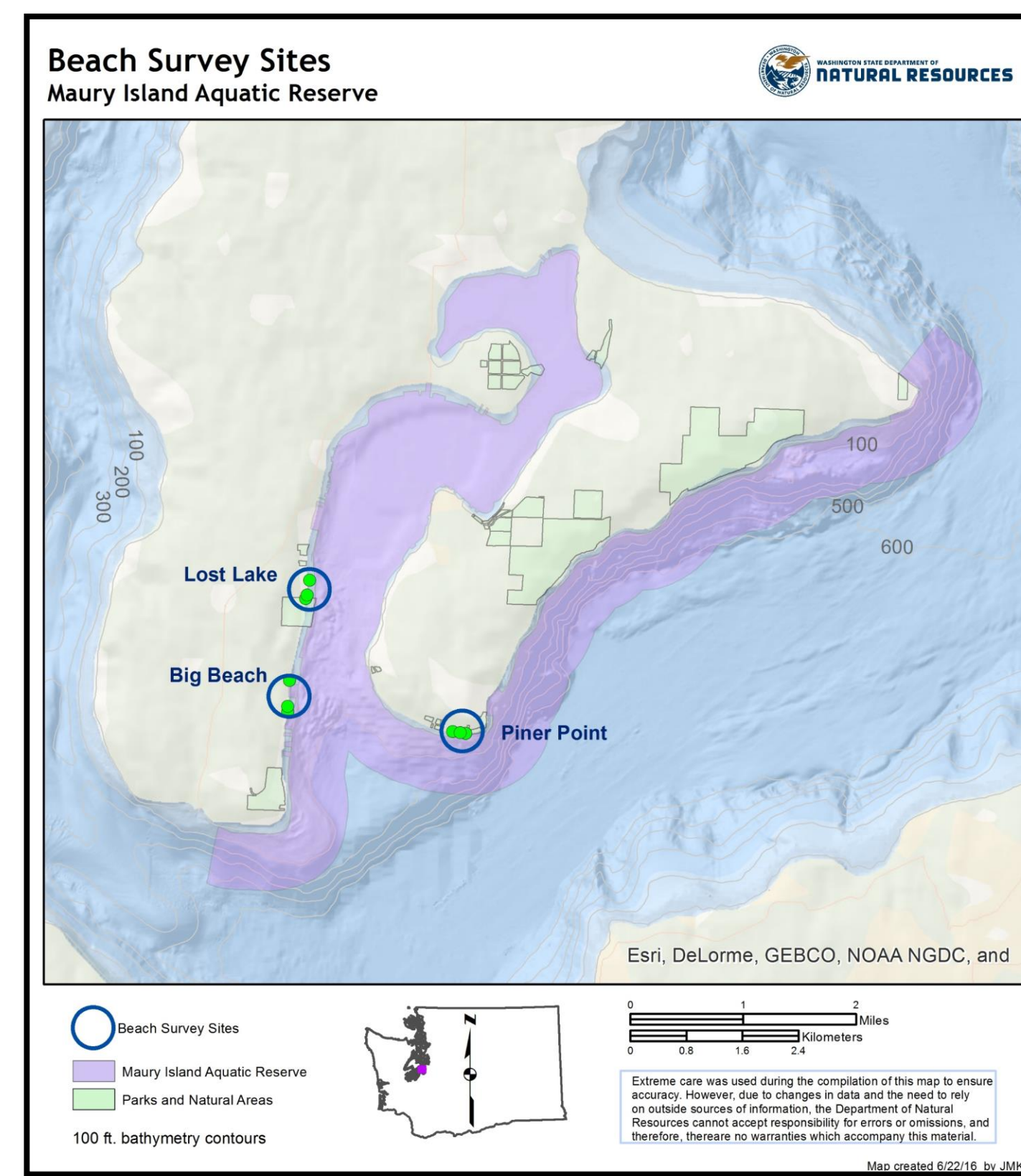


Figure 1. Volunteer recording fish during a snorkel survey along an armored shoreline at Piner Point, Maury Island, WA.

The basics

This study assesses differences between armored and natural shorelines in the Maury Island Aquatic Reserve (MIAR) based on key nearshore habitat features including:

- Terrestrial insect assemblages
- Forage fish spawning
- Shoreline vegetation
- Wrack cover and composition
- Fish assemblages



Data collection

Data was collected by citizen science volunteers between June-August 2017 at 3 sites in the MIAR (see map). Each site contains the following shoreline type:

1. Permanently armored
2. Natural
3. Armored, where armoring will be removed in 2018

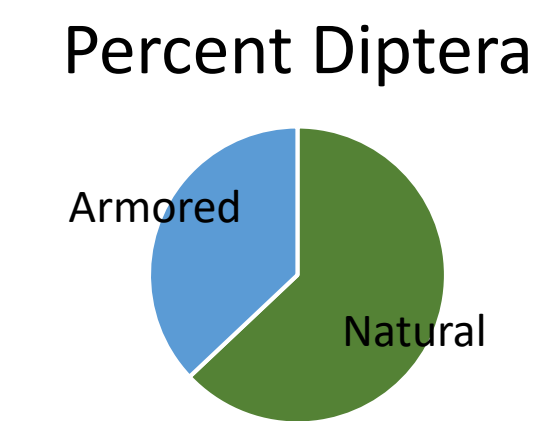
Key results

The results from this study establish a baseline of shoreline conditions at highly erosive, high-bank sites in the MIAR. Data from all three sites are collapsed into each figure.

Terrestrial insect assemblages

Terrestrial insect abundance and taxa richness was similar at armored and natural beaches (data not shown).

Diptera (flies) dominated species composition at all shoreline types, but was highest at natural shorelines (**Figure 2**). Diptera species are important prey for juvenile salmon³.



Forage fish spawning

Natural shorelines contained 98% of all sand lance eggs. The number of surf smelt eggs found at each shoreline type did not statistically differ (data not shown). Forage fish are important food for salmon³.

Shoreline vegetation

Natural shorelines had more overhanging trees and higher percent cover of overstory vegetation. Percent cover of understory vegetation was similar at armored and natural shorelines.

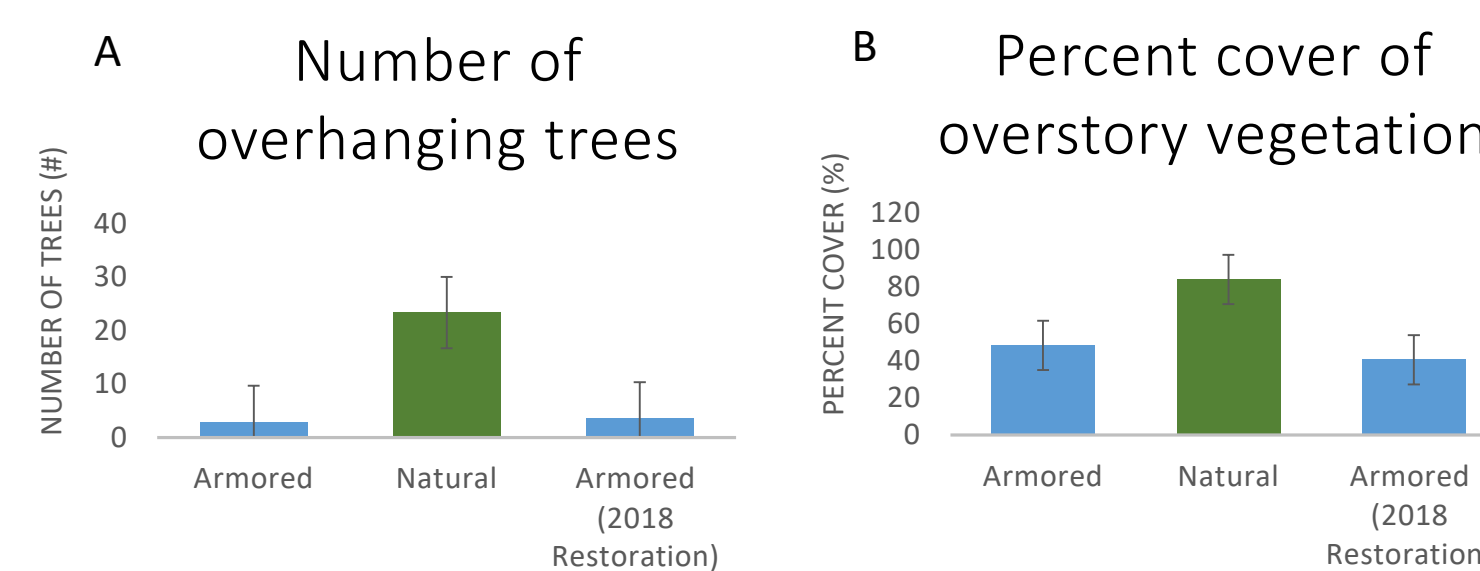


Figure 3. More overhanging trees (A) and overstory vegetation (B) at natural shorelines.

Wrack cover and composition

Natural shorelines had more terrestrial and eelgrass wrack cover. An upper wrack line and logs were present at natural shorelines.

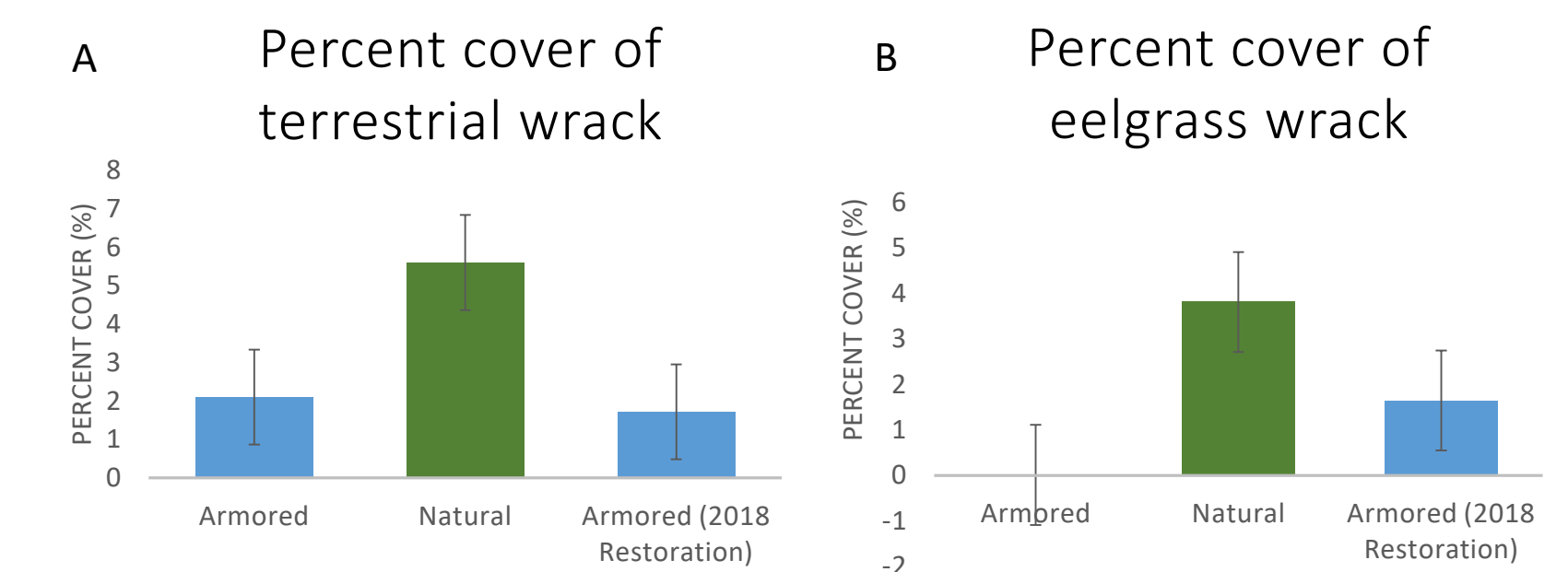


Figure 4. Terrestrial (A) and eelgrass (B) wrack cover were higher at natural shorelines.

Fish assemblages

Natural shorelines had more fish and higher taxa richness, although sample sizes were low.

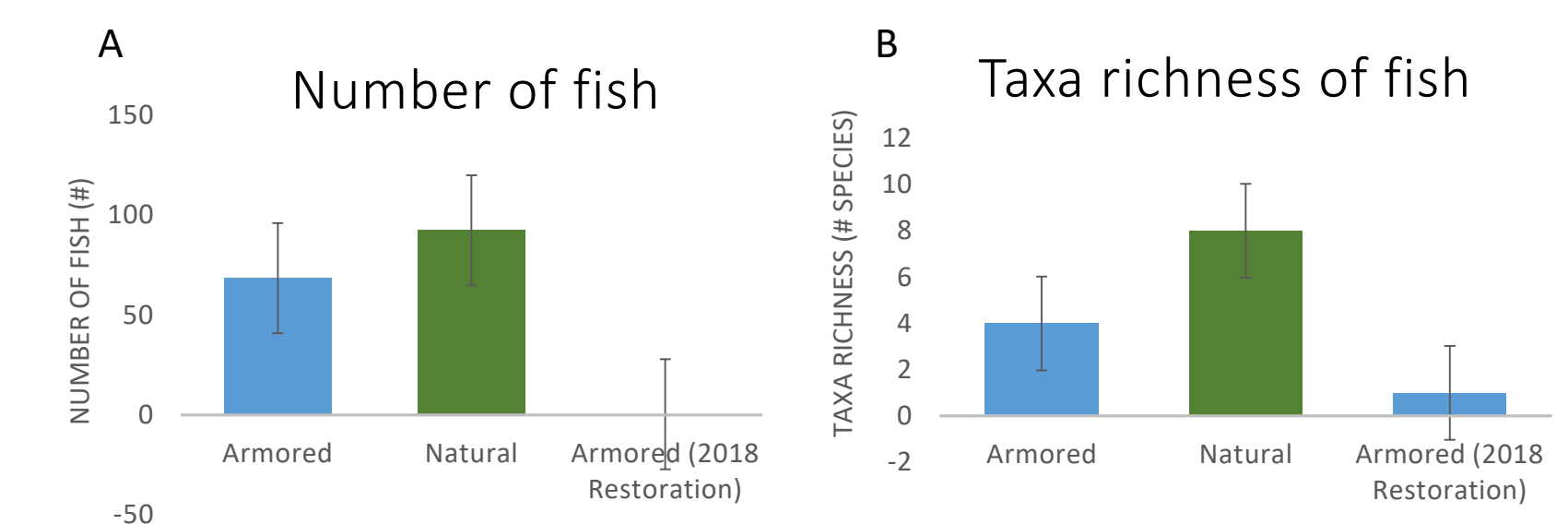


Figure 5. More fish (A) and higher taxa richness (B) at natural shorelines.

Summary and future work

Shoreline armoring reduced shoreline vegetation and altered terrestrial insect composition, wrack composition, and fish assemblages. Future studies will compare these results to data collected after armoring removal in 2018.

Citizen science at work

This study is an example of how citizen scientists, non-profits, and governmental organizations can work together to collect high quality data. The Vashon Nature Center and citizen scientist volunteers used standardized protocols from the Washington Sea Grant's Shoreline Monitoring Toolbox⁴.

REFERENCES

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