

Channel flow studies using driftwood density analysis in Elger Bay, Camano Island, WA

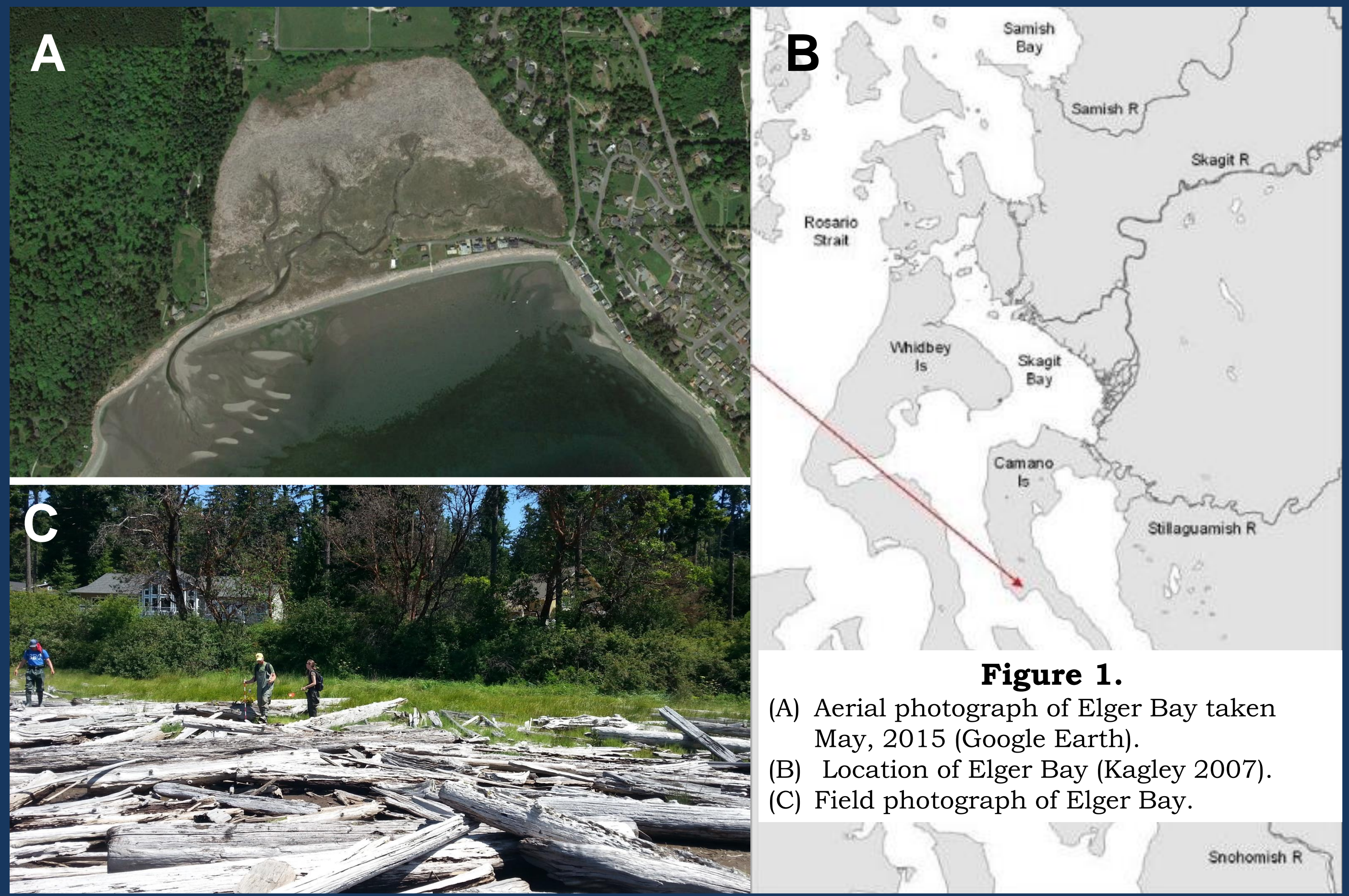
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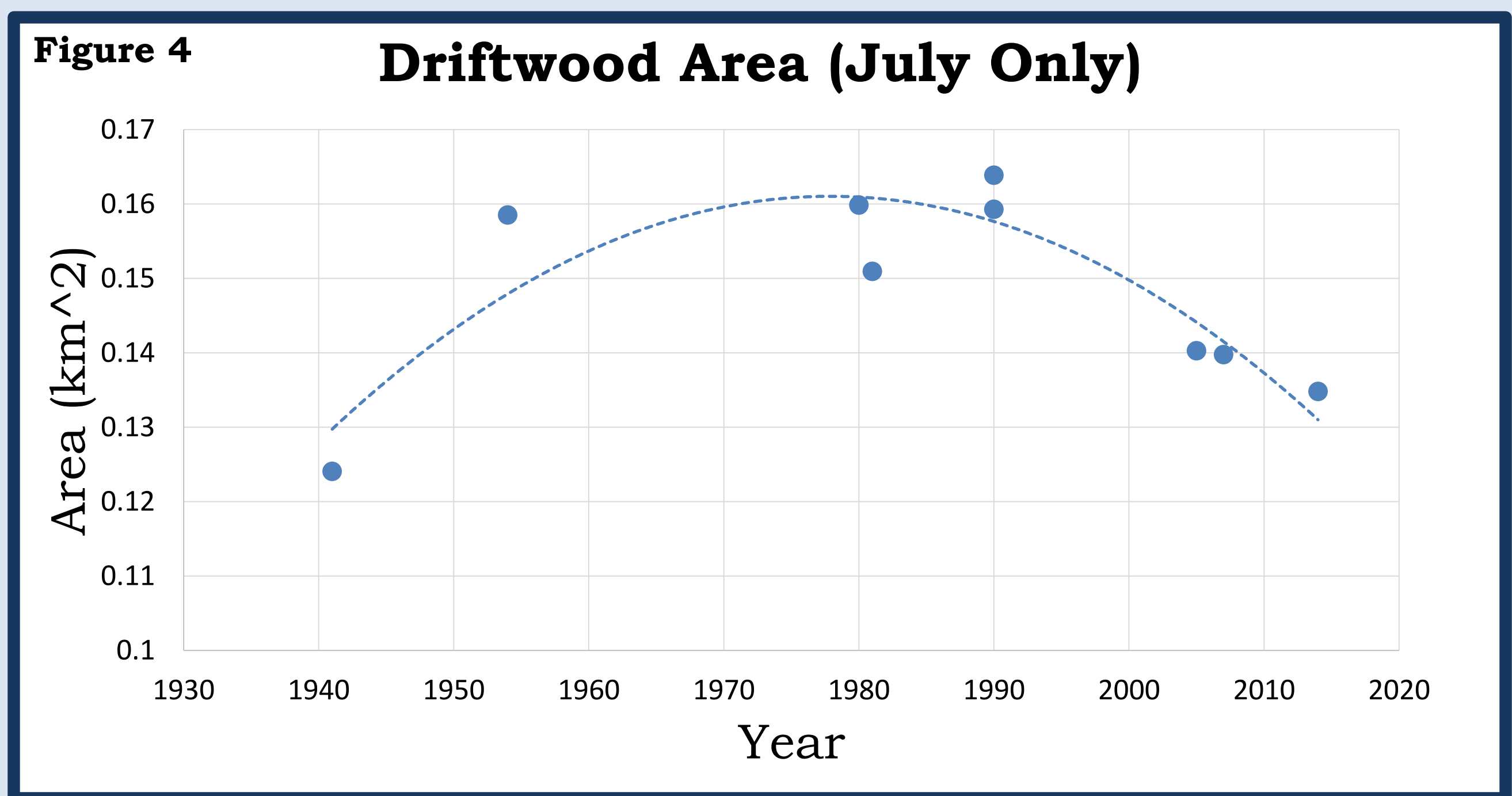
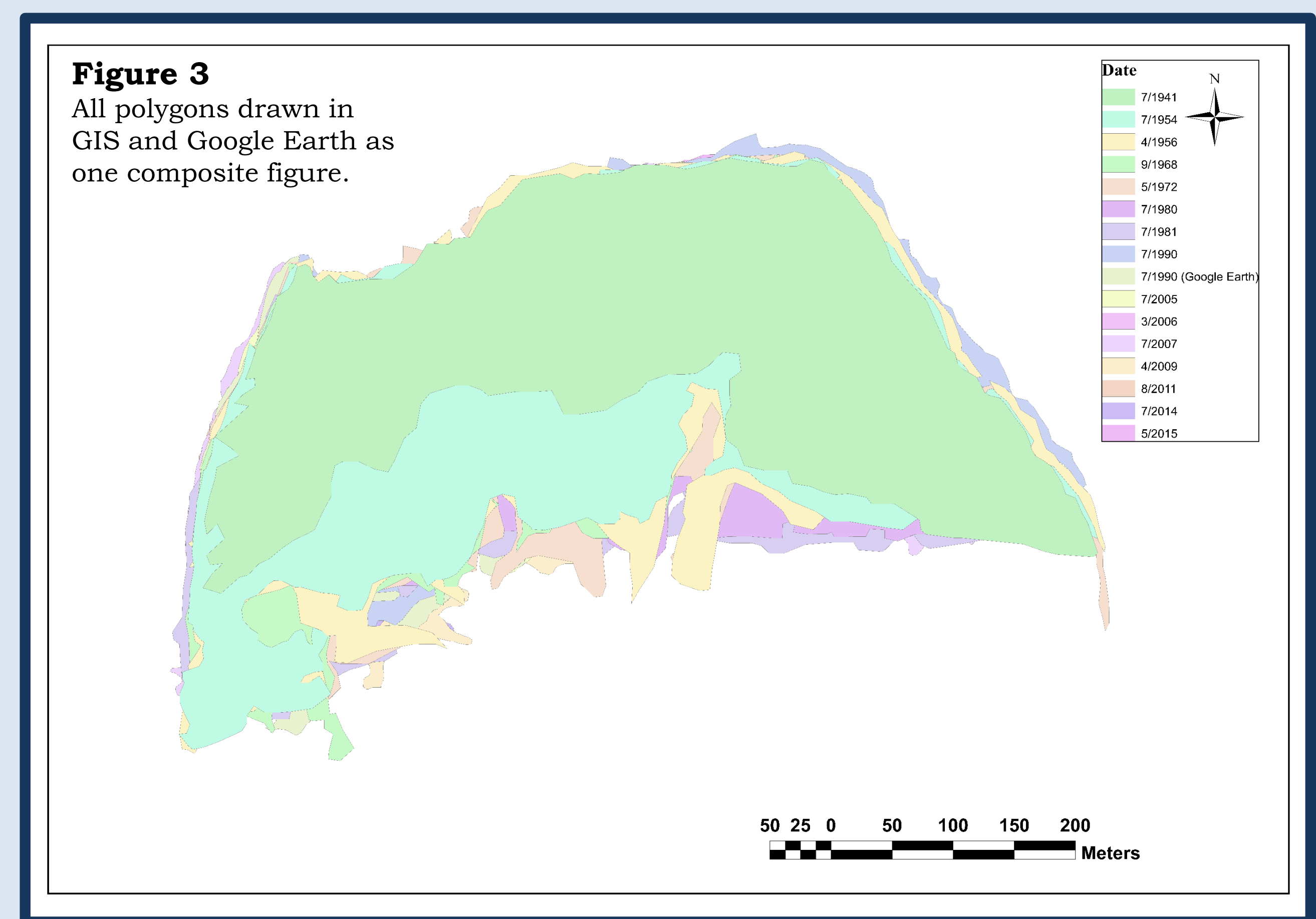
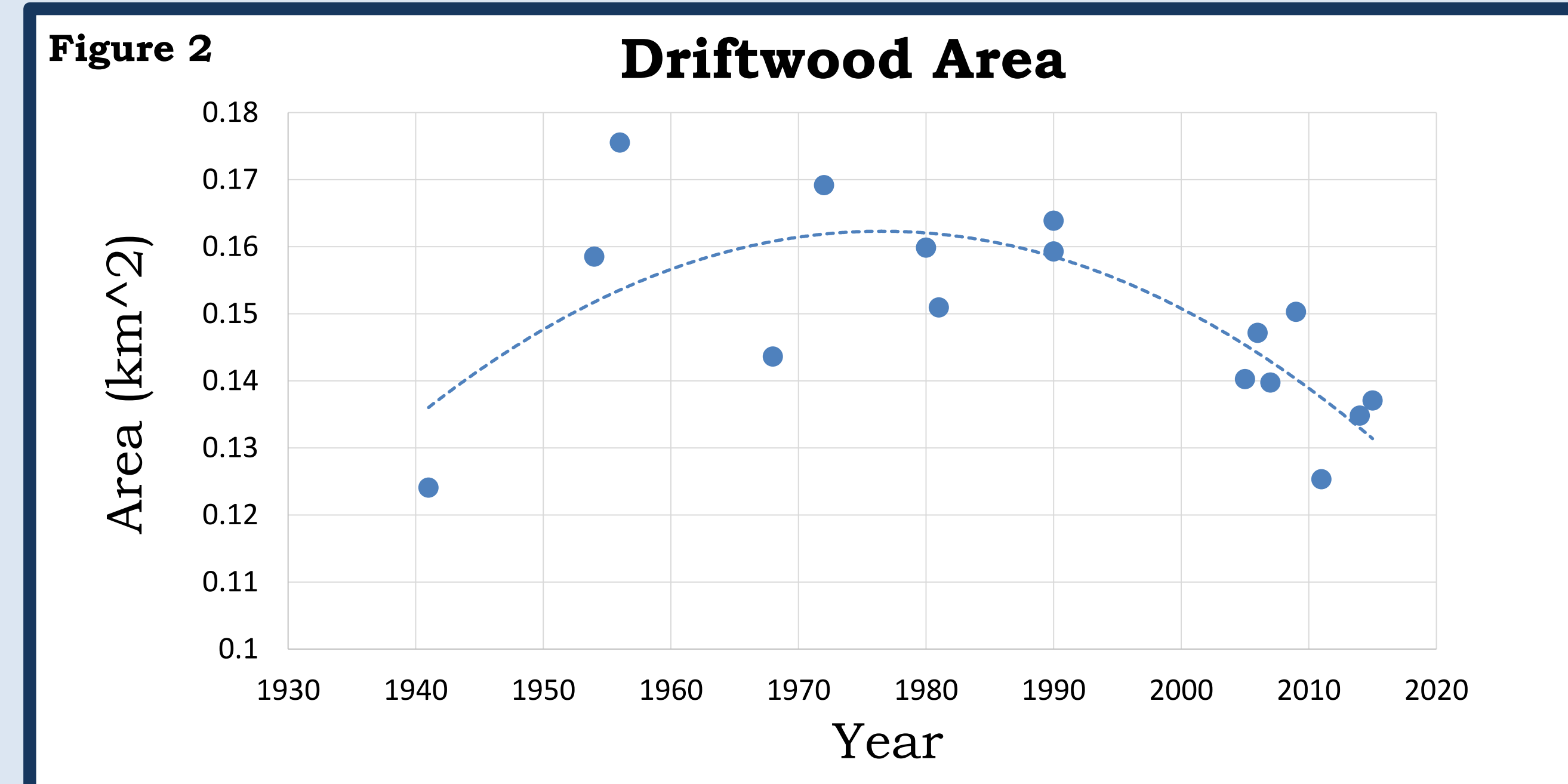
Introduction & Hypothesis

- Elger Bay is a vegetated saltmarsh on Camano Island, WA. No freshwater streams enter the marsh but there is runoff from surrounding hills ("Elger Bay").
- From historic imagery, we know that the bay has contained large amounts of driftwood since at least 1941.
- MacLennan (2005) hypothesized that the bay has been emptying of stored driftwood since the 1970's.
- With our study we hoped to test this hypothesis and determine if changes in driftwood extent occurred seasonally. We had insufficient imagery to test the seasonality but were able to test the primary hypothesis.



Background

- Driftwood commonly accumulates in the upper intertidal zone of beaches and salt marshes (MacLennan 2005).
- From our fieldwork we know that the driftwood in Elger Bay is both anthropogenic and natural in origin. Much of the anthropogenic wood is apparently from logging.
- Characteristics of anthropogenic logs include boom holes, bolts, and notches (Fig. 5). The natural logs may have been felled by wind-throw, beaver felling, or disease (MacLennan 2005).
- Logging on Camano Island is a possible source of driftwood for the bay, but the logs did not necessarily come from Camano itself.
- Logging on Camano Island began in 1855 and continued until 1952, however most notable logging ended in 1921 when the last stand of old growth was cut. In 1902 a shingle mill was built near Elger Bay, producing about 30,000 shingles a day (Osmund 1964).



Methods

Field Methods

We chose four South to North-running transects along the bay and made observations along them. We recorded log characteristics that suggested anthropogenic or natural origins, marked a GPS point when we noticed a change in driftwood density, coloration, or sturdiness, measured log size, and recorded vegetation type. This preliminary field work did not ultimately impact the results shown here, but provided us with a context for our work and hypotheses.

Lab Methods

Data analysis was done primarily in ArcGIS, Google Earth Pro, and Matlab. We compiled historic aerial images (see timeline below), imported them into ArcGIS and traced polygons representative of the area covered by driftwood logs (Fig. 2). For more recent images we used Google Earth Pro to create polygons and then imported them into ArcGIS. We then graphed our data and used Matlab to determine best-fit models showing how driftwood extent changed through time.

Discussion and Results

Qualitative analysis of the driftwood revealed that (Fig. 3):

- Driftwood is consistently being lost from the easternmost lobe, while the westernmost lobe and center lobes consistently show growth.
- Driftwood was lost from the back of the marsh, suggesting that the driftwood is mobile throughout the marsh, not only in the front as we expected.

Qualitative analysis of the data revealed that (Fig. 2,4):

- A parabolic model was the best fit for the data. This suggests that the total area of driftwood increased, reached a maximum, and has decreased since. Our model had a maximum of driftwood at 1976.5023 ± 3.8136 years. This gives us a maximum between 1970.5064 and 1982.4980.
- Our actual data shows a maximum in 1956.
- A parabola was also the best fit for the data when seasonality was taken into consideration by only using data from July imagery. This model had a maximum driftwood at 1977.8766 ± 2.4002 years. This gives us a maximum between 1975.4754 and 1980.2768 when seasonality is accounted for.



Acknowledgements

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