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Salish Sea Ecosystem Conference

2022 Salish Sea Ecosystem Conference  
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## WATER CURRENTS AND THEIR EFFECT ON POSSESSION SOUND

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# Water Currents and Their Effect on Possession Sound

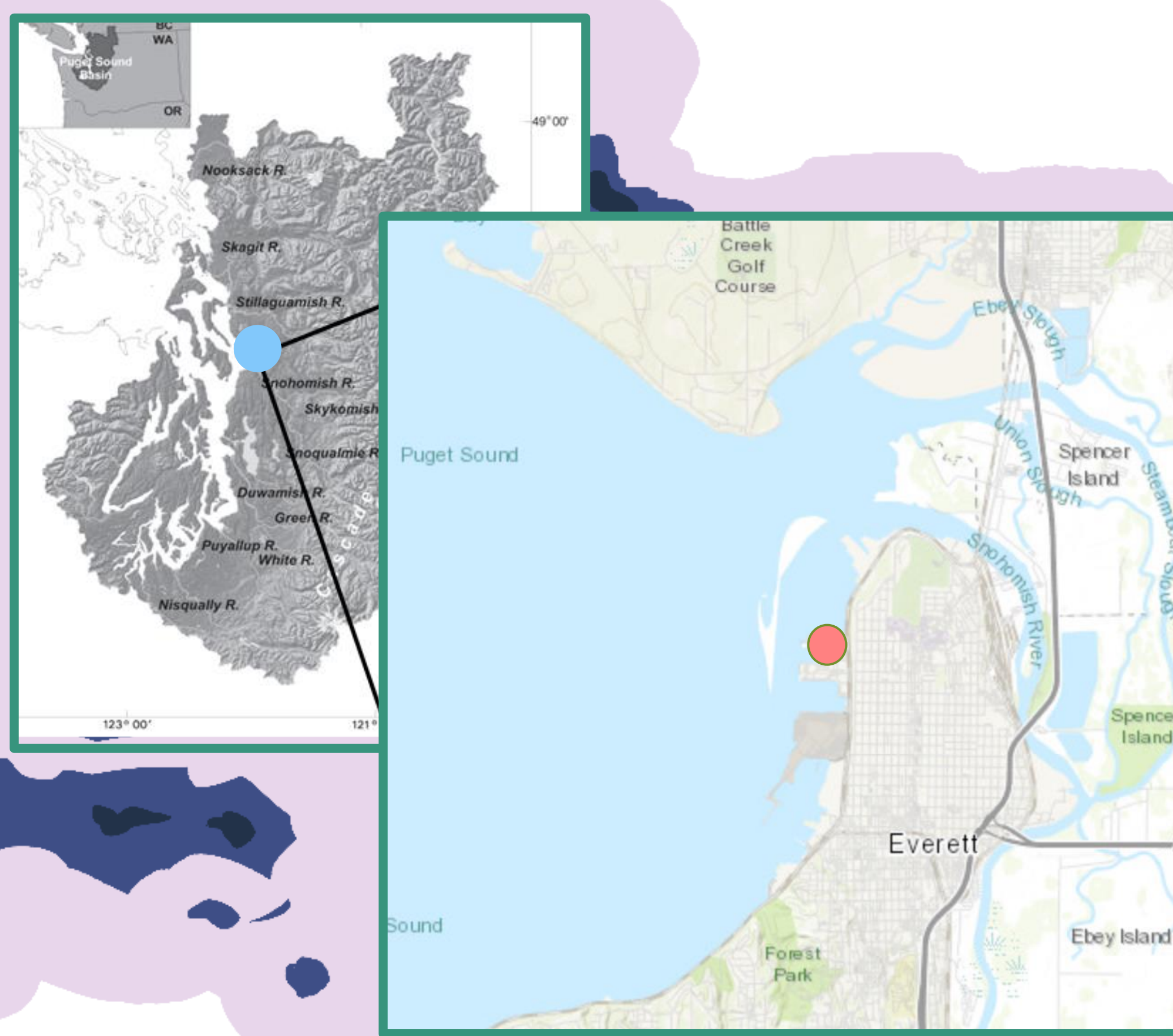
Ocean Research College Academy,  
Everett Community College

Nadia Brainerd

## Introduction

In any marine ecosystem, water currents are an important factor in both the biological aspects and the physical movements of a body of water. The focus of this study, the Possession Sound estuary in the Salish Sea, lies in an interesting area that is affected both by discharge from the Snohomish River and surrounding streams, and incoming ocean currents from the Pacific. Analysis of these currents helps build a picture of how they could be affecting other pieces of the ecosystem essential to organisms and physical processes in the estuary.

## Study Site



**Fig. 2** Map showing Puget Sound (top) with Possession Sound marked by a blue circle. The close up of the Snohomish River Estuary system in Possession Sound (bottom) shows the ADCP location marked by an orange circle.

## Methods

Used an Acoustic Doppler Current Profiler (ADCP) deployed ~2m below the surface, to collect water current data in Possession Sound Washington. The data was collected over the course of several months in 2017, 2020, and 2021. This was compiled and graphed through R studio and Excel.

## ORCA

The Ocean Research College Academy is a dual enrollment program where high school juniors and seniors experience innovative, interdisciplinary and student-centered learning. A longitudinal study of the local estuary forms the backbone of the first-year experience, and leads students to conduct independent research in their second year of the program. ORCA has received grants for a research lab, research vessel, and summer research funded by the National Science Foundation.

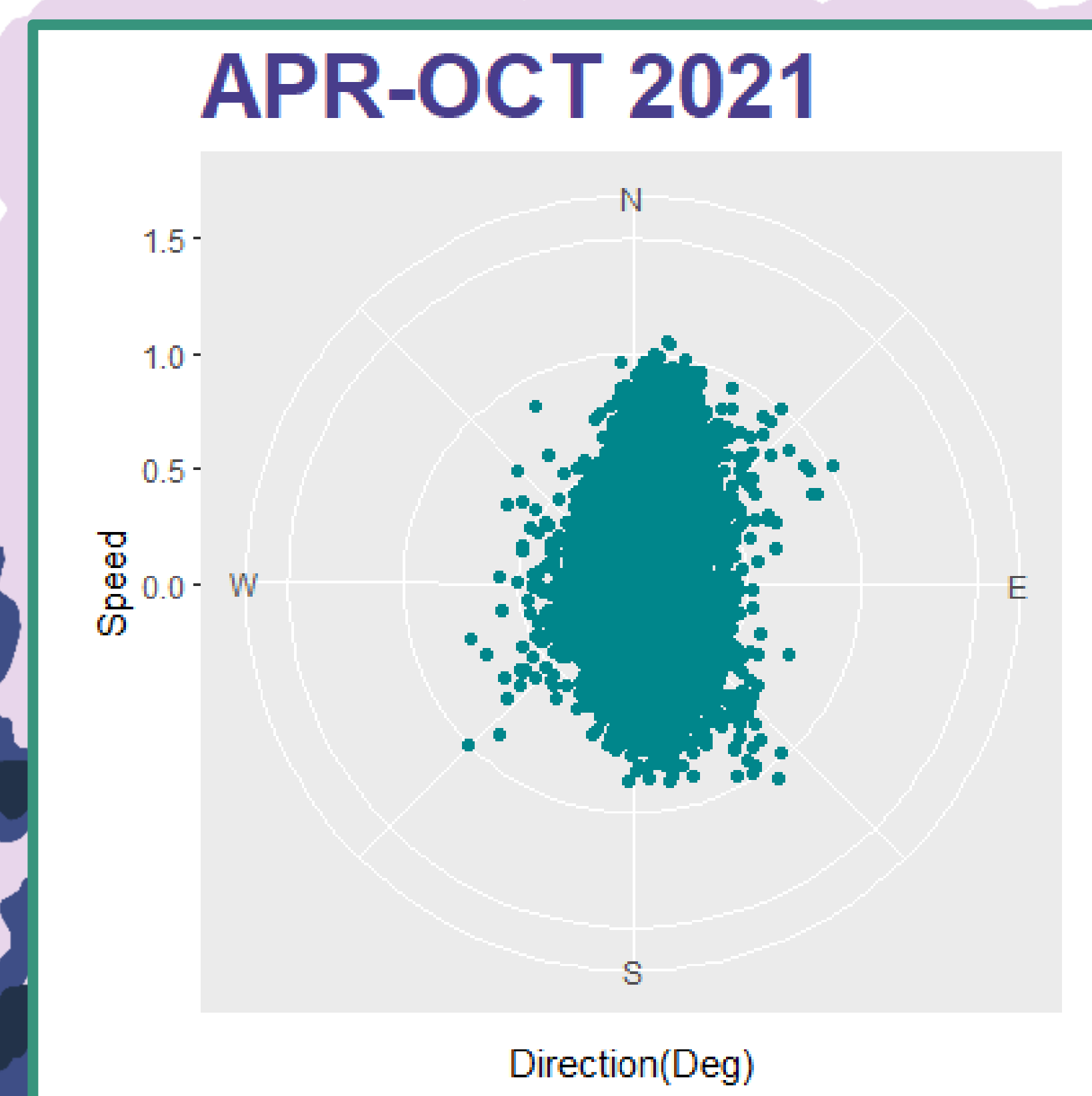


NSF Award #1801658

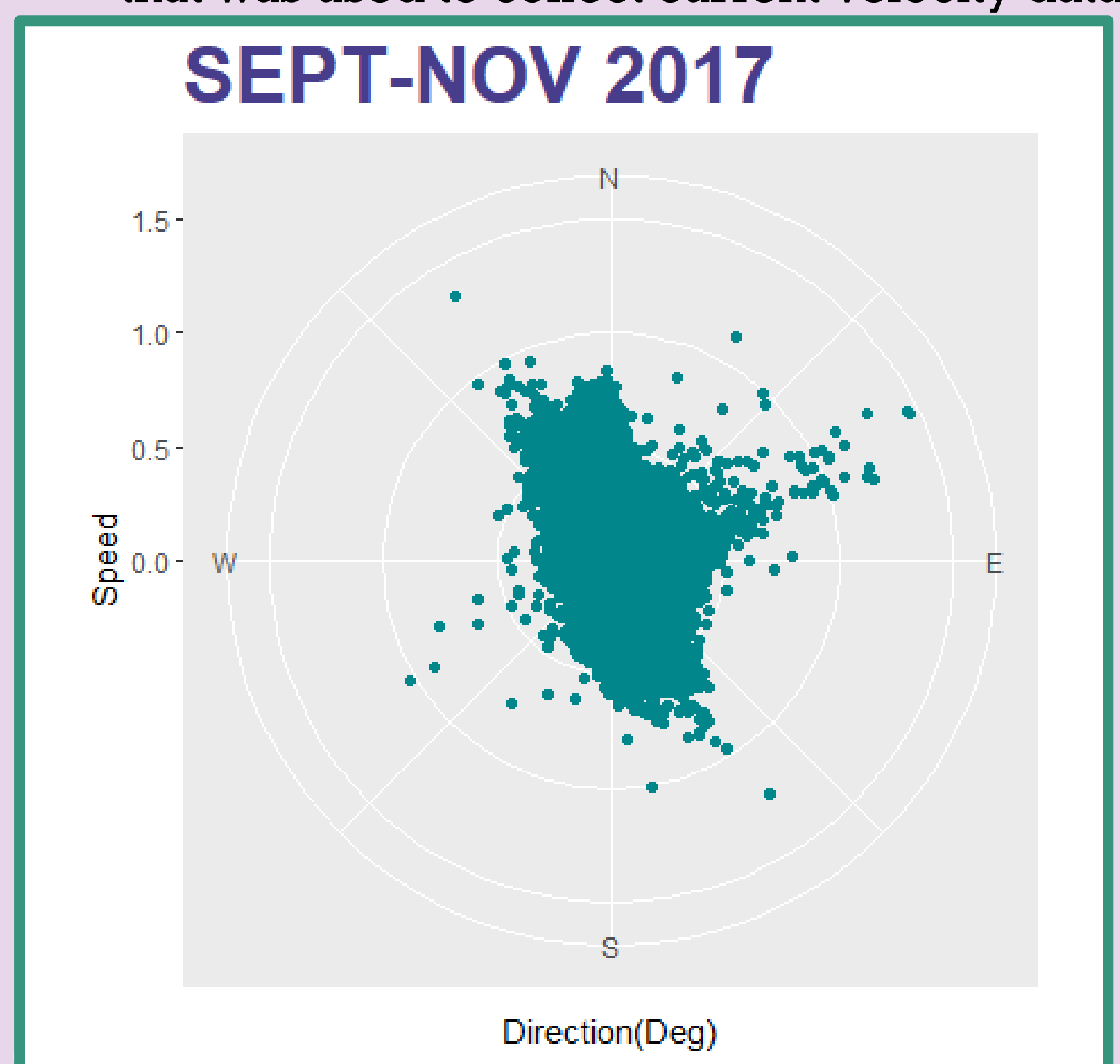


## Results

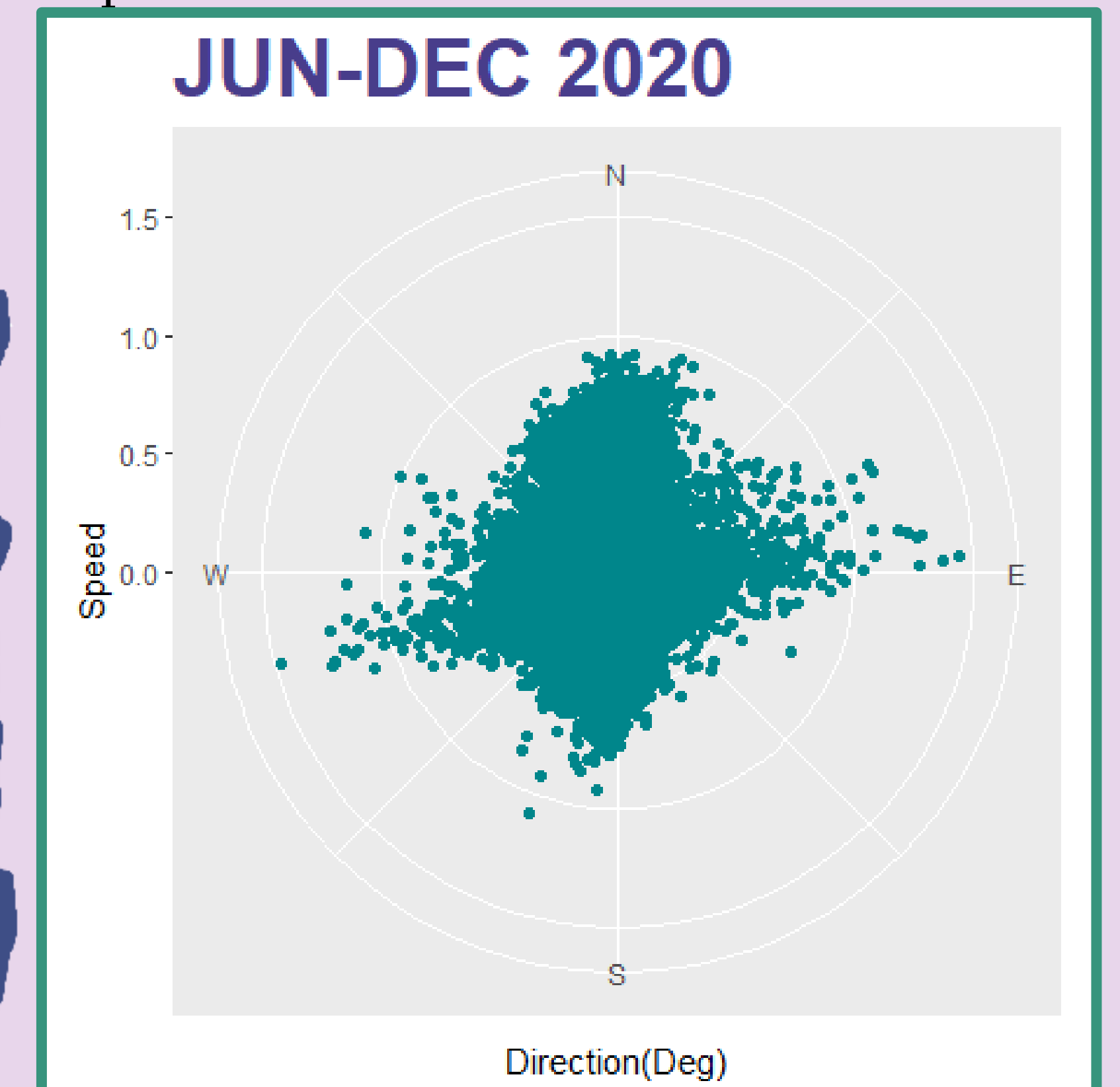
Through graphing and analysis of the ADCP data there were several trends that became apparent. The most noticeable of which being that the currents tended to go either north or south which was true for all the years observed. The second trend was only seen in 2017 (Fig. 3) and 2020 (Fig. 4) where the east and west currents were shown to be faster more often than the north and south currents.



**Fig. 5-** Polar dot plot of water velocity data from April - October of 2021



**Fig. 3 -** Polar dot plot of water velocity data from September - November of 2017



**Fig. 4 -** Polar dot plot of water velocity data from June - December of 2020

## Conclusions

In this sheltered section of Possession Sound currents tend to move north or south more often than east and west. The east and west currents, however, can be much faster than the north and south currents. The common north and south currents could be as a result of discharge from the Snohomish River and incoming ocean currents that occur in a salt wedge estuary such as this. The fast east west currents could be caused by bathymetry of the coastline. More research is needed to determine cause.



**Fig. 1 -** Photo of someone holding up the ADCP that was used to collect current velocity data