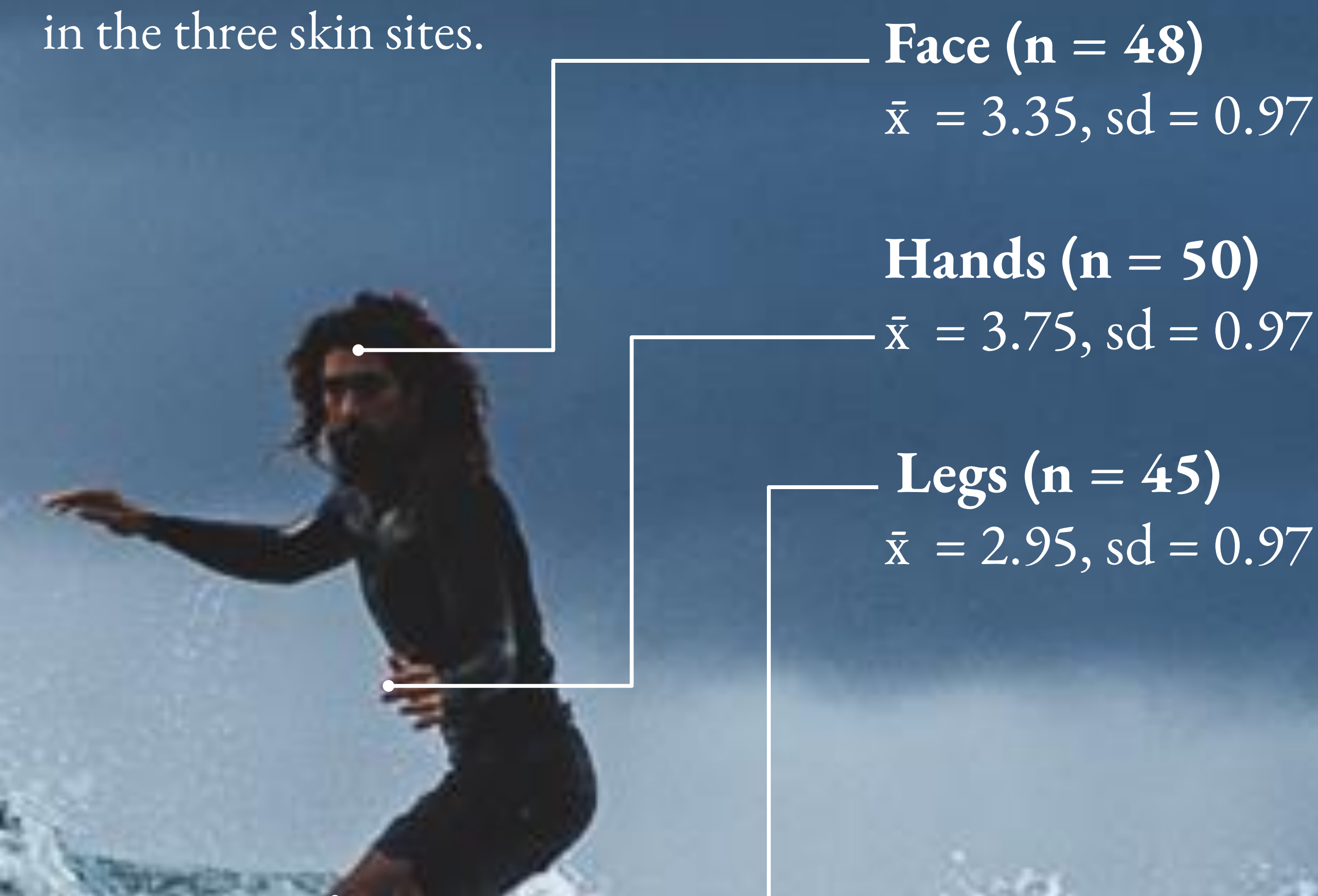


Diversity of skin MICROBIOMES in surfers



Figure 1. Mean and standard deviations in the three skin sites.



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Background

The skin microbiome is a composition of millions of bacteria, fungi and viruses in the skin.² Sensitive skin was found to have significantly lower microbiome diversity compared to non-sensitive skin based on Shannon's diversity index (SDI).³ A greater SDI means a higher diversity.⁴ The skin is the human body's largest organ composed of the most diverse skin sites which include the forearm, buttock and various parts of the hand.⁵ Study on 279 healthy humans in 22 different parts of the body shows a low diversity of microbiomes in the skin between 1 and 3 of the SDI.⁶

Hypothesis

The diversity of microbiomes in a surfer's skin three skin sites of face, hands and legs increases the more often they surf.

Methods

Of the 505 samples in the Surfer Microbiome Project by Dr. Kapono through QIITA, there were 143 human skin samples from different sites: face, hands and legs. This subset includes 98 males, 38 females and 7 unspecified participants. Python 3.9.7, analysis of variance (ANOVA) and post hoc Tukey's Honest Significant Difference (HSD) were used to analyze and test differences between groups.

Results and Discussion

ANOVA Analysis of SDI per Body Site

Figure 1: ANOVA testing between body sites revealed significant variation among face ($\bar{x} = 3.35$), hands ($\bar{x} = 3.75$), and legs ($\bar{x} = 2.95$) ($p = 0.008$).

Further analysis with Tukey's HSD indicated a significant difference between hands and legs ($p = 0.005$).

Distribution of Participants by Surfing Region

Figure 2: Among the 143 participants, 54% ($n = 77$) surf in the Pacific Ocean, primarily from the USA while 46% ($n = 66$) surf in the Atlantic, representing participants from Ireland, the UK, Morocco, and Denmark.

Relationship of SDI and Count of Species

Figure 3: A positive relationship exists between the Number of Species and SDI. Mean SDI values range from 3.18 to 4.46 with a total mean SDI of 3.36.

ANOVA Analysis of SDI between Surfing Frequencies

Figure 4: Mean SDI between surfing frequencies range from 3.18 to 4.46 with an overall mean of 3.36. ANOVA testing of SDI by surfing frequency showed no significant difference ($p = 0.187$).

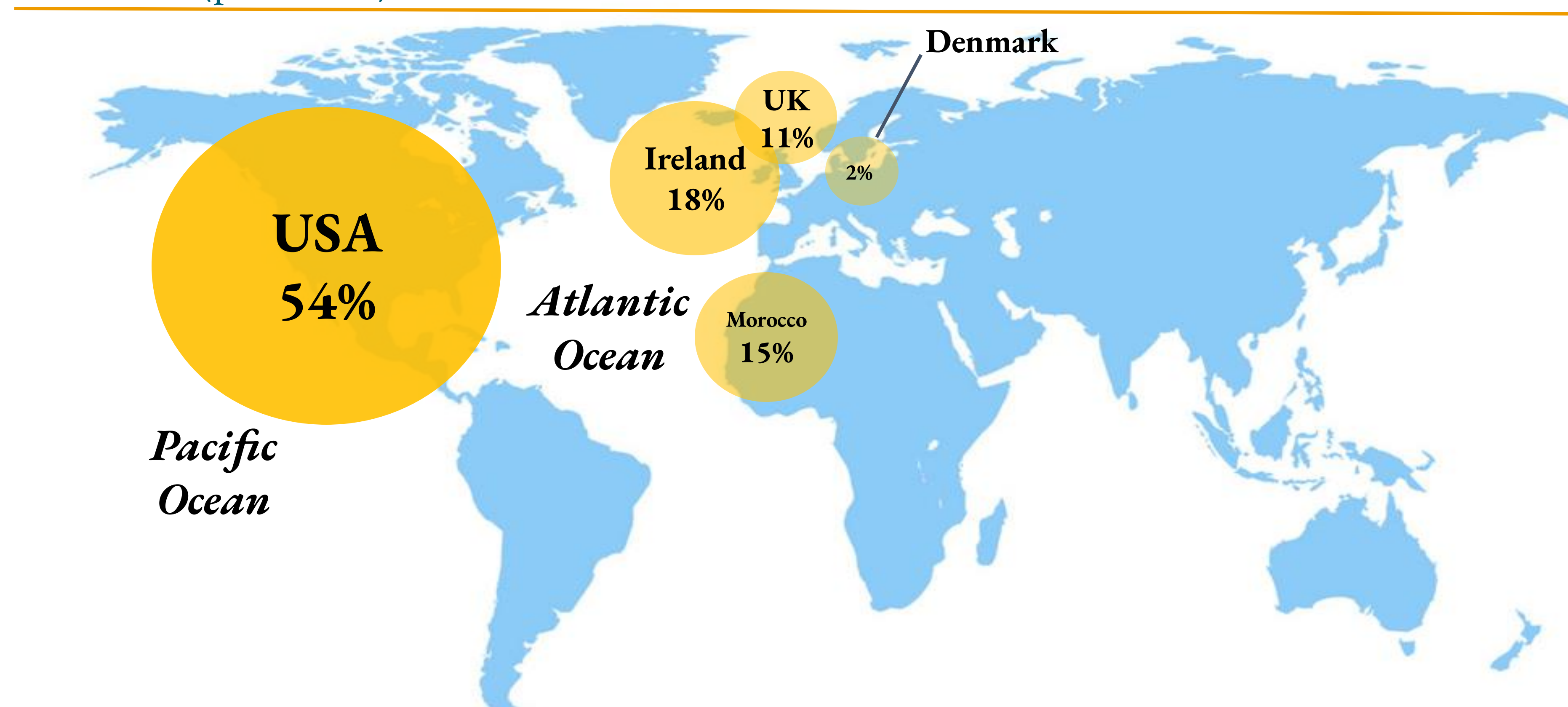


Figure 2. Distribution of surfers between the Pacific and Atlantic Ocean.

Conclusion

Higher surfing frequencies does not significantly impact the diversity of microbiomes in the skin.

Limitations and Recommendations

Additional analysis could focus on an indicator bacteria, surfer skin sensitivity and their microbiomes, etc. Further study could also consider the collection of a larger cohort, definition of frequency, testing in a longer period of time, testing before and after surfing. Further analysis can be done to look at results by segmenting data based on race, sunscreen application, shower and soap application, age, and use of wetsuit.

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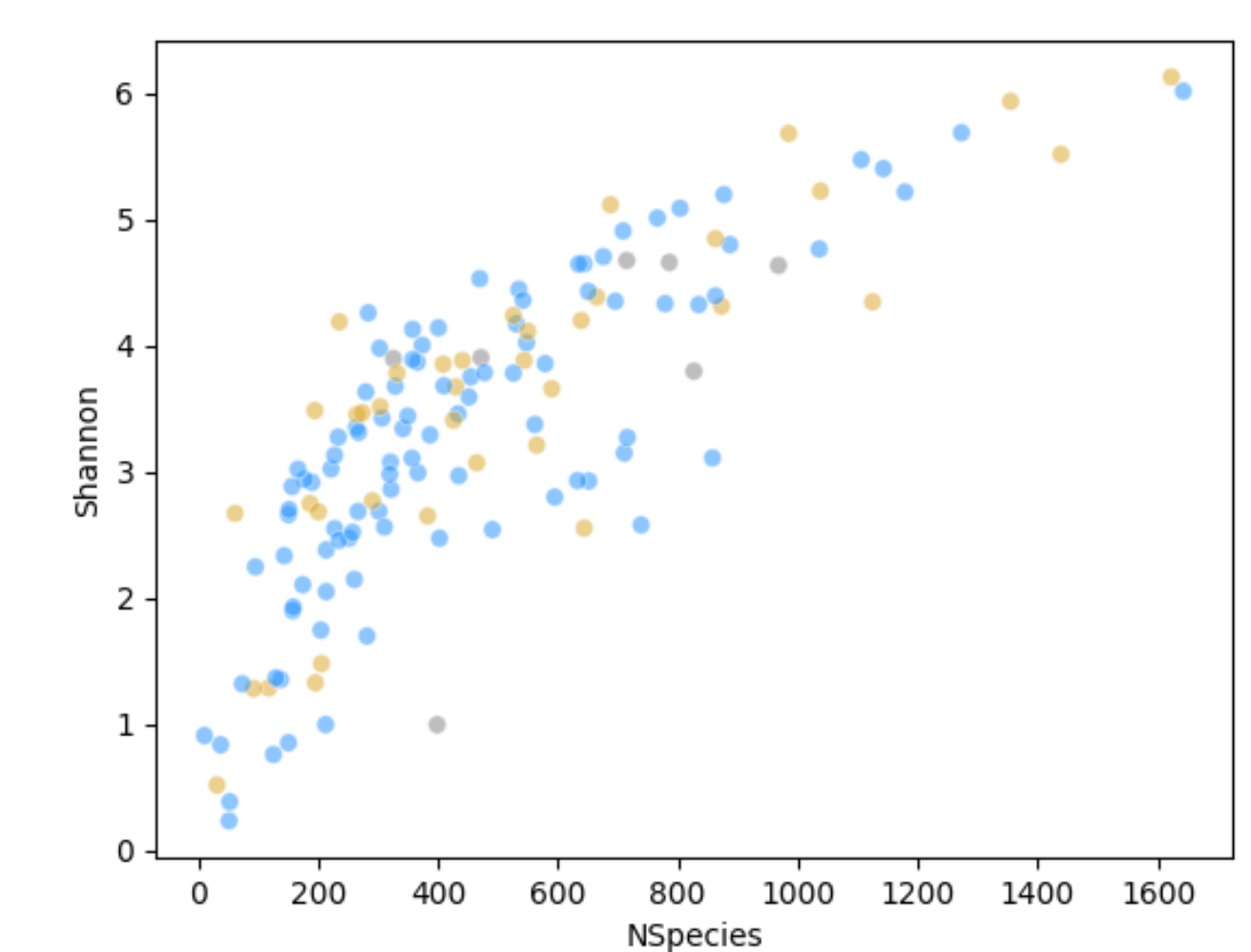


Figure 3. Relationship between SDI and NSpecies

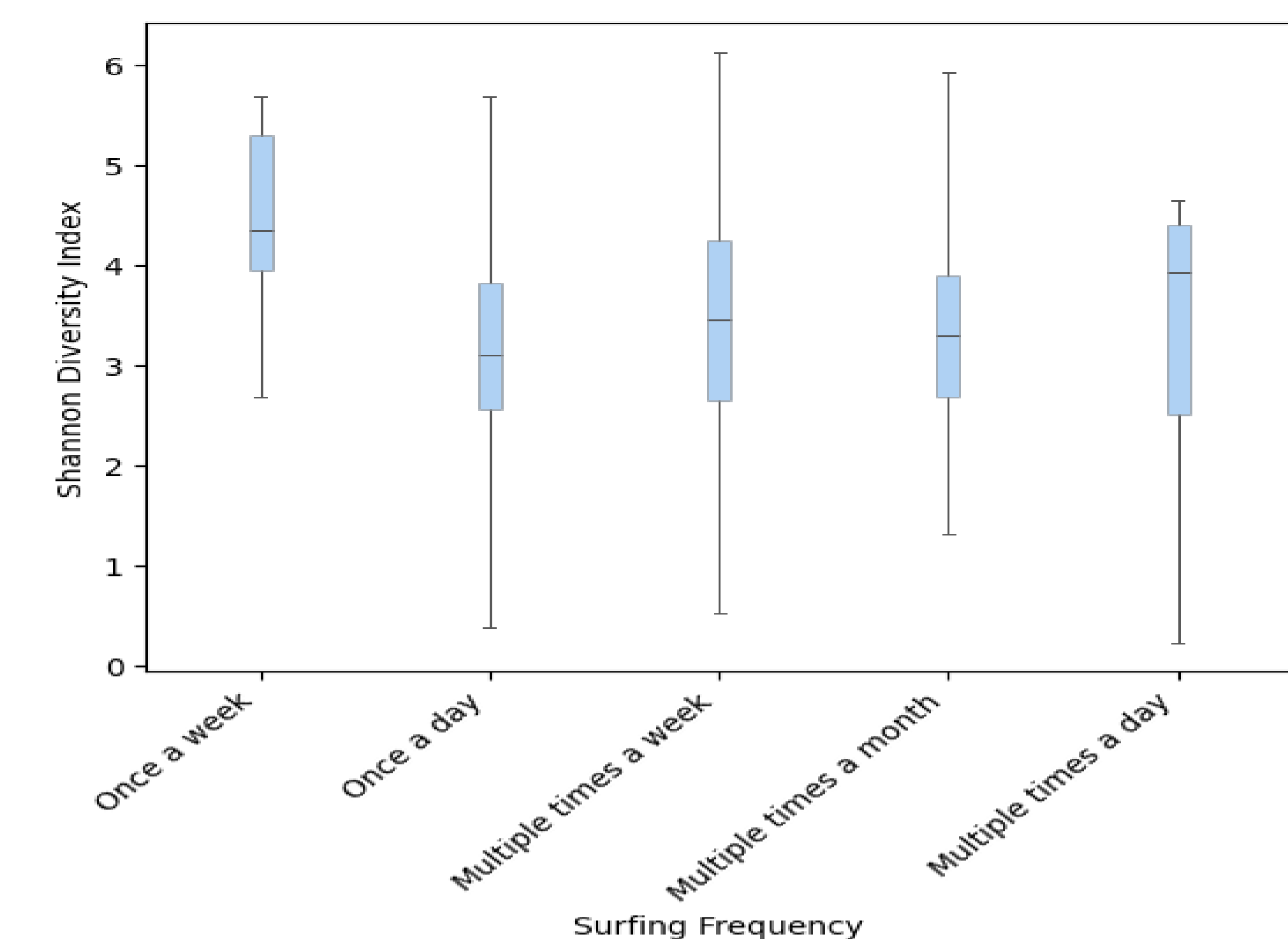


Figure 4. Mean SDI between surfing frequencies