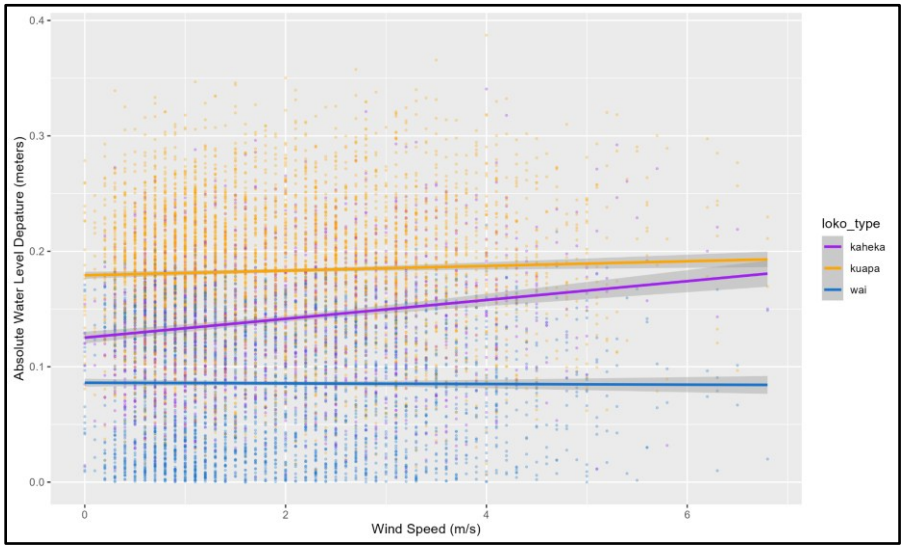
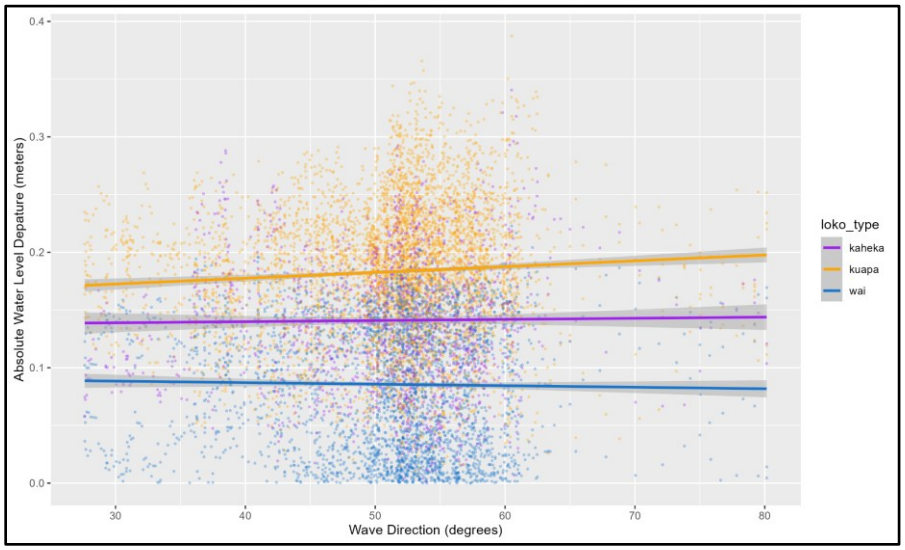
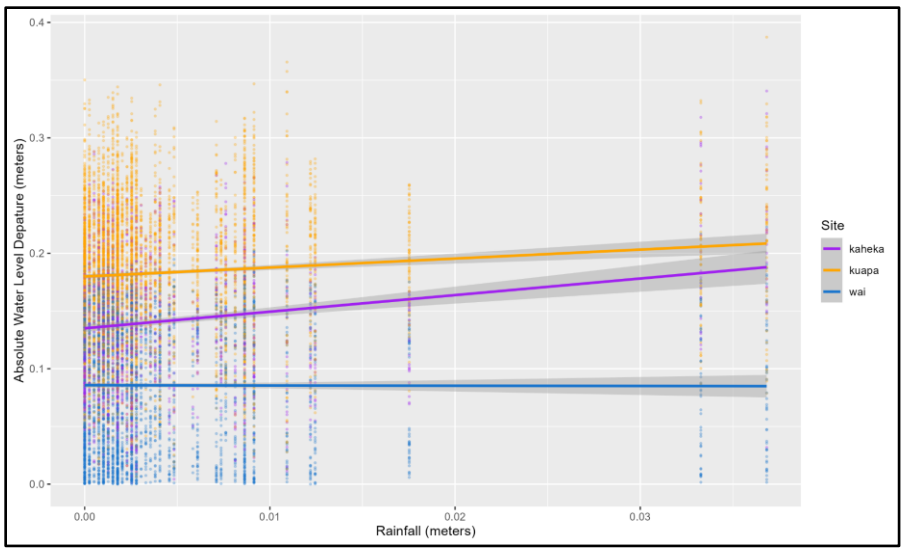
Supplementary Materials



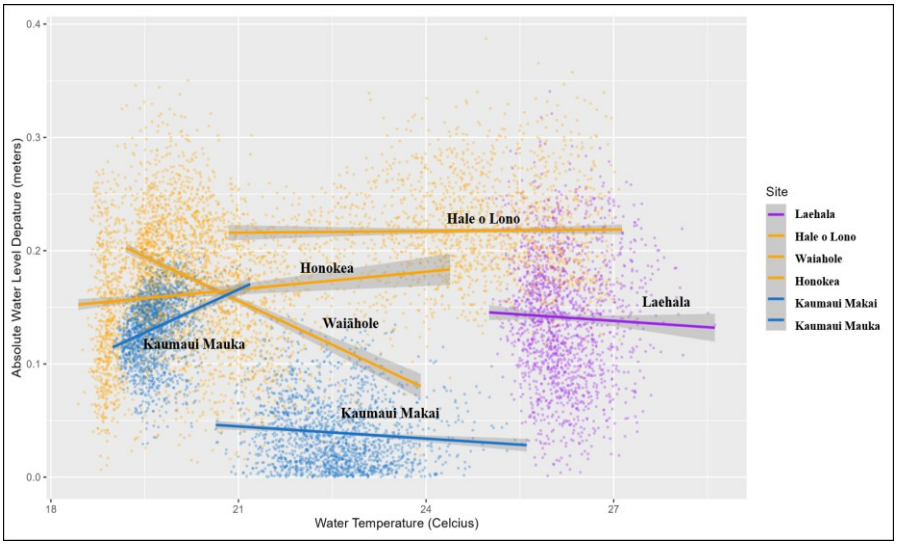
Supplementary Figure 1. This regression also illustrates Model 1, particularly the relationship between wind speed and the absolute water level difference between the NOAA-verified data and the loko iʻa. The kāheka (purple) again showed a strong positive relationship, stating that as wind speed increased, so did the departure in the water level. The loko kuapā also showed a slight positive relationship to an increasing wind speed.



Supplementary Figure 2. This regression illustrates the Model 1 relationship between wave direction and the absolute water level difference between the NOAA-verified data and the loko iʻa. The loko kuapā (orange) has a noticeable positive relationship, stating that as the wave direction became more eastward (towards 90 degrees), there was an increase in the water level departure. The kāheka and loko wai do not show any distinctive positive or negative relationships.



Supplementary Figure 3. This regression represents the Model 1 relationship between rainfall and the absolute water level difference between the NOAA-verified data and the loko iʻa. The kāheka (purple) and loko kuapā (orange) showed a positive relationship, stating that the water level departure increased as rainfall increased. The loko wai (blue) showed no relationship between water level departures and rainfall.



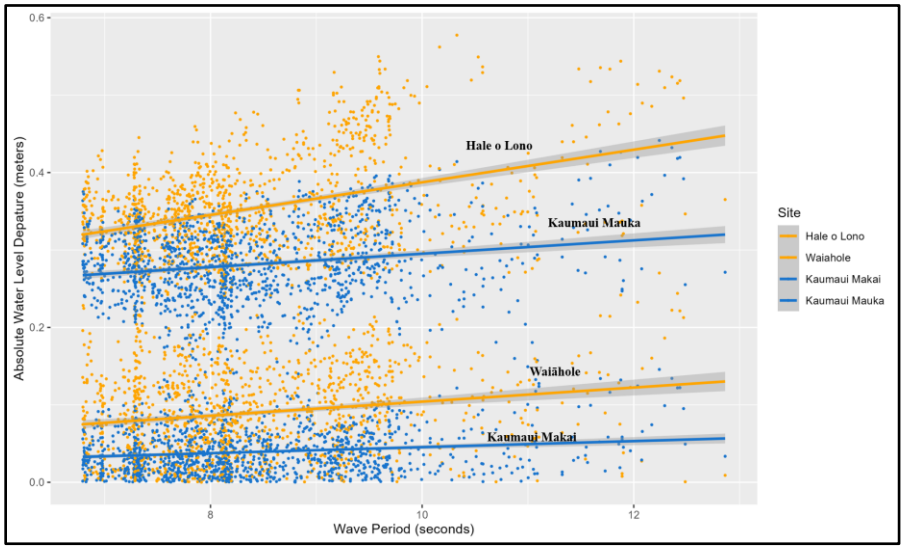
Supplementary Figure 4. This regression represents the Model 2 relationship between water temperature and the absolute water level difference between the NOAA-verified data and the loko iʻa. Model 2 grouped the data by individual loko iʻa type. Waiāhole loko iʻa experienced a strong negative relationship between water temperature and water level departure. Kaumaui Mauka and Honokea experienced strong to moderate positive relationships between these two variables.

Table 7. Coefficients from the mixed-effects Model 3 show the relationship between environmental predictors and absolute water level difference. Average water temperature had the strongest positive effect, followed by wave height, and air temperature.

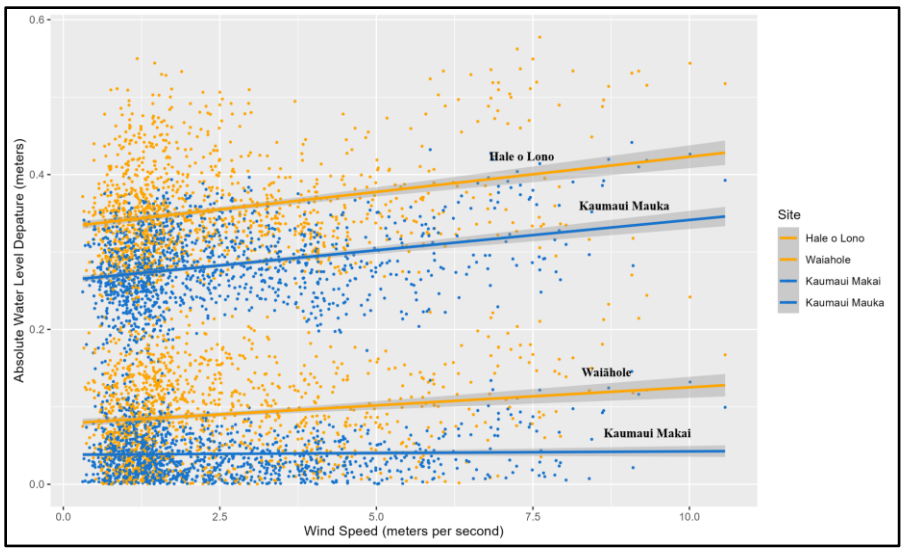
	Group	Variance	Standard Deviation
	Loko Type	0.0000423	6.48500E-03
	Residuals	0.016410	0.1281170

Fixed Effect	Estimate	Standard Error	P-value	Percentage
Intercept	1.91E-01	5.16E-03	0.00117 **	19.08%
Water Temperature	4.67E-02	2.08E-03	< 2e-16 ***	4.67%
Significant Wave Height	2.79E-02	1.84E-03	< 2e-16 ***	2.79%
Air Temperature	-5.41E-03	1.87E-03	0.00388 **	-0.54%

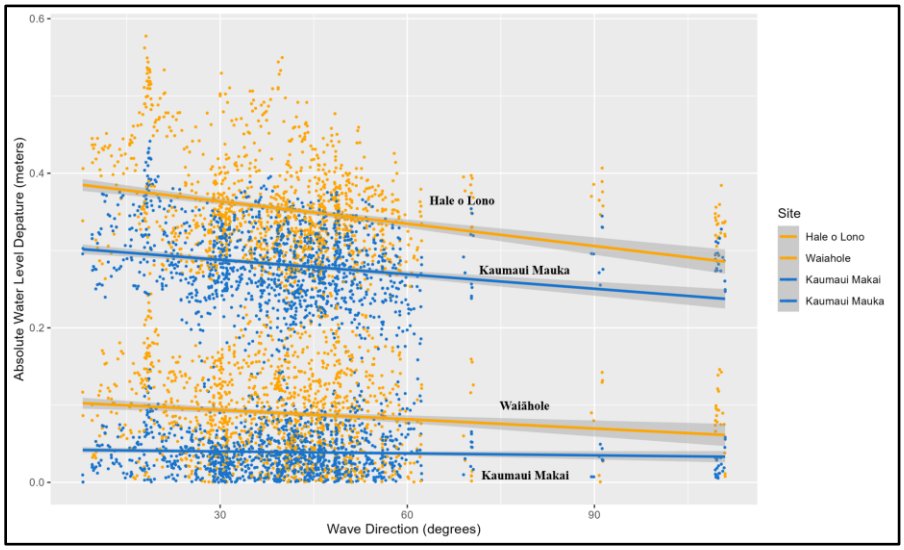
* Number of asterisks show values variables that are statistically significant.



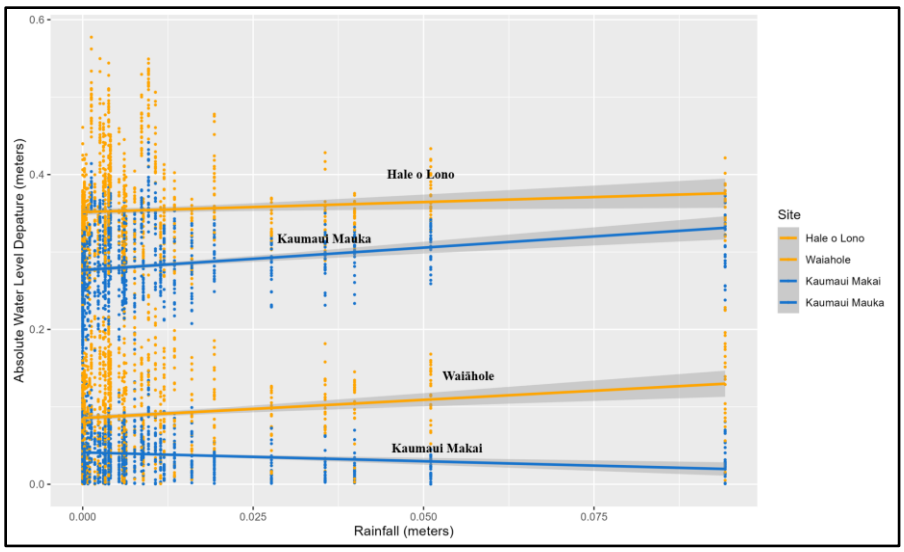
Supplementary Figure 5. This regression represents the Model 4 relationship between wave period and the absolute water level difference between the NOAA-verified data and the loko iʻa. The loko iʻa saw a moderate to slight positive relationship as the wave period increased. Hale o Lono had the strongest relationship with an increased wave period, causing a more significant water level departure.



Supplementary Figure 6. This regression represents the Model 4 relationship between wind speed and the absolute water level difference between the NOAA-verified data and the loko i‘a. As wind speed increased, all the sites saw a slight to moderate positive relationship. Kaumaui Makai was the only site not significantly influenced by wind speed.



Supplementary Figure 7. This regression represents the Model 4 relationship between wave direction and the absolute water level difference between the NOAA-verified data and the loko i‘a. As wave direction became more north (0 degrees), water levels were seen to depart greater—all the loko i‘a except Kaumaui Makai experienced this relationship with wave direction.



Supplementary Figure 8. This regression represents the Model 4 relationship between rainfall and the absolute water level difference between the NOAA-verified data and the loko iʻa. As rainfall increased, some loko iʻa saw water level departures increase and decrease. Kaumaui Mauka and Waiāhole saw moderate positive relationships, while Hale o Lono has a slight relationship. On the other hand, Kaumaui Makai experienced a slight negative relationship as rainfall increased.