Supplementary online information for

"Experimental estimation of ladder dredge efficiency for capture of European flat oysters over mixed sediment"

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Summary

Dredge efficiency data for a 1.2m wide ladder dredge catching European flat oysters (*Ostrea edulis*) were presented as a percentage caught of the available oysters that could be caught by a dredge pass. The study was to examine the effects of experimentally manipulated oyster density, distribution and ground type on the catch efficiency of this standard flat oyster ladder dredge. The percentage data were not normally distributed (Figure S1) and a number of models were explored to determine the most appropriate model choice and results.

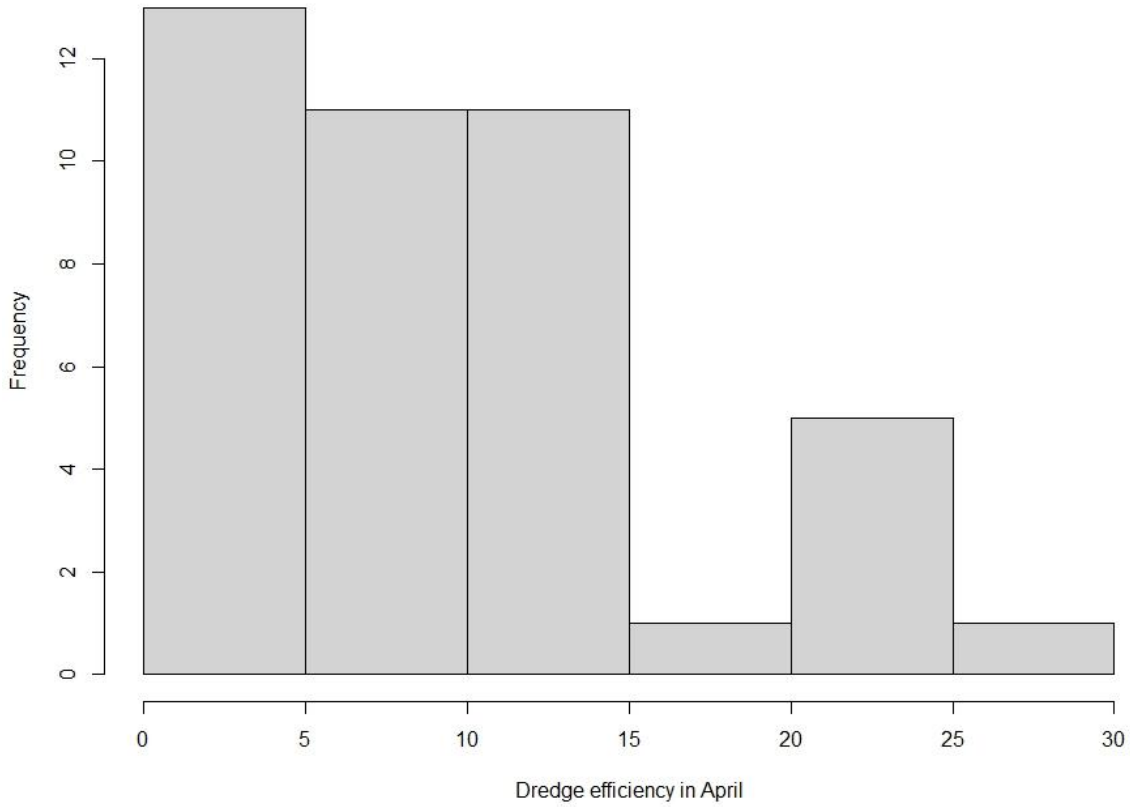

Figure S1. Frequency distribution of oyster ladder dredge catch efficiency data expressed as a percentage from experimental assessments carried out in April 2021. The data are not normally distributed but were normalised by an appropriate transformation –e.g. Square root of the arcsine of the catch efficiency expressed as a fraction (Figure S2).

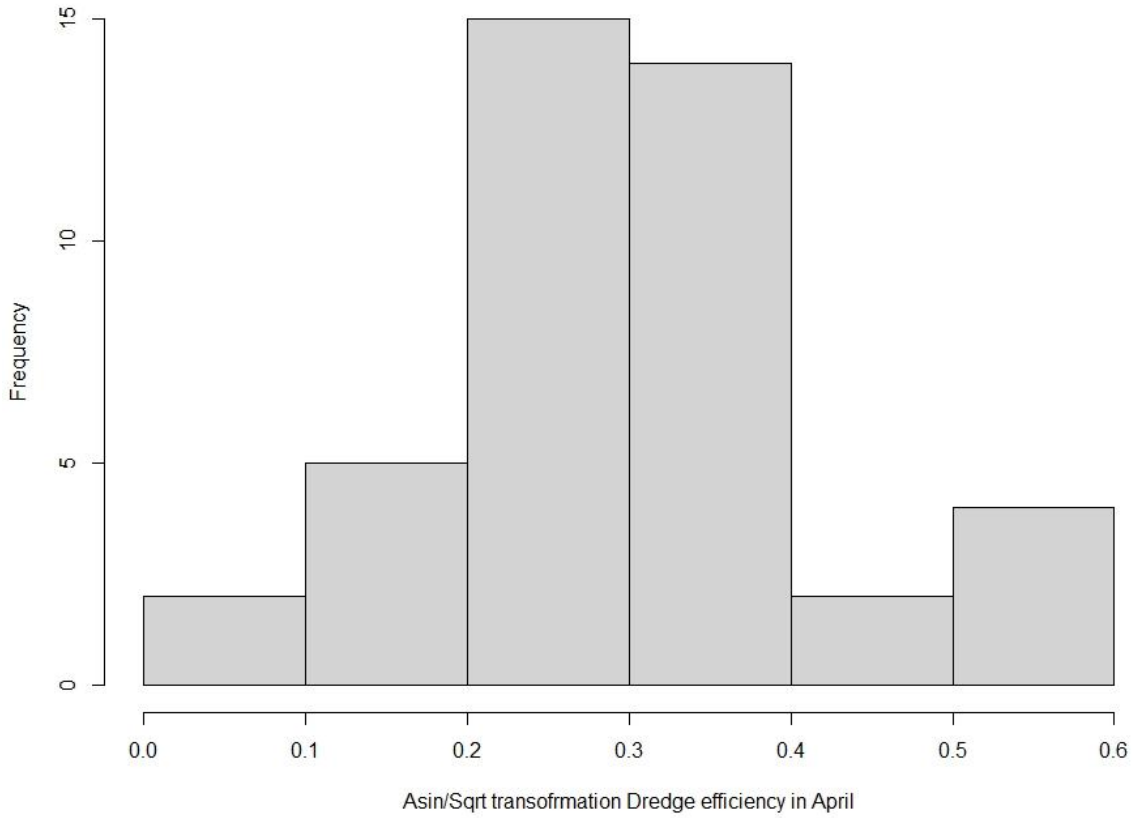

Figure S2. Frequency distribution of oyster ladder dredge catch efficiency data expressed as a the arcsine square-root transformation of a fraction of total oysters available to catch from experimental assessments carried out in April 2021. This distribution passes a Shapiro Wilks normality test (W = 0.9684, P = 0.2916).

Here we present four alternative model choices for analysing our data, including the interaction between oyster distribution and ground type presented only from the larger data set from the April 2021 period (Figure 3 in the main manuscript). Each model is a general or generalised linear model of either dredge efficiency expressed as a percentage assuming normal errors (model 1), an analysis of arcsine square-root transformation of dredge efficiency when expressed as a fraction assuming normal errors (model 2), a generalised linear model of catch efficiency expressed as a percentage assuming binomial errors (model 3) and finally a generalised linear model of catch efficiency expressed as a percentage assuming quasibinomial errors to control for overdispersion in model 3 (model 4).

There are no qualitative differences in the conclusions as reached with any four of the models (Table1). Each model started with a maximal model approach of interaction terms between each of oyster density, ground type and oyster distribution. Each model determined the same minimum adequate model and retained only the interaction between oyster distribution and ground type, and the main effect of oyster density.

Table S1. General linear model results of dredge efficiency data expressed either as percentage or fraction of maximum potential oyster catch with different data transformations, error assumptions or overdispersion corrections. All models obtained the same minimum adequate model where there was an interaction between ground type and oyster distribution, but only a main effect of oyster density. There are no qualitative differences between the conclusions reached from the four models when interpreting the results presented in Figure 3 in the main manuscript.

Model 1 – percentage efficiency data; normal errors						
	df	SS	MS	F	P	
Ground	2	184.46	92.23	4.27	0.02	
Distribution	1	575.35	575.35	26.69	9.7e-06	
Interaction	2	194.54	97.27	4.51	0.018	
Density(main)	1	203.74	203.74	9.45	0.004	
Model 2 – fraction efficiency data; Arcsine Square Root transformed; normal errors						
Ground	2	0.042	0.021	2.82	0.07	
Distribution	1	0.203	0.203	27.03	8.77e-06	
Interaction	2	0.067	0.009	4.47	0.018	
Density(main)	1	0.052	0.052	6.96	0.01	
Model 3 – percentage efficiency data; binomial errors – logit link						
	df	Deviance	Residual df	Residual Deviance	P (ChiSq)	
Ground	2	20.9	39	195.91	2.89e-05	
Distribution	1	66.93	38	128.98	2.82e-16	
Interaction	2	17.01	35	87.82	0.0002	
Density(main)	1	24.14	37	104.84	8.9e-07	
Model 4 – percentage efficiency data; quasibinomial errors – logit link; F test correction for overdispersion						
	df	Deviance	Resid. Df/deviance	F	P(F)	
Ground	2	20.9	39/195.91	4.27	0.02	
Distribution	1	66.93	38/128.98	27.36	7.97e-05	
Interaction	2	17.01	35/87.82	3.47	0.04	
Density(main)	1	24.14	37/104.84	9.86	0.003	