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Effects of dams on downstream molluscan predator-prey interactions in the Colorado River estuary

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Electronic supplementary material S1. Subsampling of the Colorado River estuary**molluscan community**

Subsampling was conducted when counts for a given species exceeded 150 specimens in a sample. Prior to subsampling, samples were sorted by species and counted. Subsampling was conducted by gently mixing specimens of the species of interest in a tray until specimens were distributed randomly according to size. The tray was then divided into four sections and one section was randomly chosen for measurement. This process was repeated if the subsample still exceeded 150 specimens. Only subsampled specimens were used to determine counts of drilled and undrilled specimens and only these specimens were measured to evaluate the potential for size bias in predator selection of prey. Five species were subsampled: *Mulinia modesta*, *Nassarius moestus*, *Cerithideopsis californica*, *Anomia peruviana*, and *Melampus olivaceus* (S1 Table 1). Of these species, three (*Cerithideopsis californica*, *Anomia peruviana*, and *Melampus olivaceus*) were not drilled by the naticid predator.

Using the subsamples described above, we estimate the drilling frequency of the full data set of *Mulinia modesta* at all three sites and *Nassarius moestus* at Isla Montague and Las Isletas.

The full data set is assumed to be a finite population of size N with drilling frequency DF, which is estimated from a random subsample of n specimens where $n < N$. The estimate of DF using the subsample has a confidence interval around the true DF in the population: $(df - z \cdot \sqrt{c \cdot df \cdot (1 - df)/n})$, $df + z \cdot \sqrt{c \cdot df \cdot (1 - df)/n}$, where z is a z-score, df is the drilling frequency for the subsample, and $c = (N - n)/(n - 1)$ is a finite population correction factor. In all cases, the confidence intervals were small, demonstrating little effect of subsampling on estimated drilling frequencies (S1 Table 2). These results agree with previous reports in the literature that 25–30 individuals can provide accurate estimates of drilling frequencies [1].

S1 Table 1. Counts of individuals from complete samples (raw counts) and subsamples.

	Isla Montague		Las Isletas		Campo don Abel	
	Raw Count	Subsample	Raw Count	Subsample	Raw Count	Subsample
<i>Mulinia modesta</i>	4652	194	3962	245	627	251
<i>Nassarius moestus</i>	692	281	539	311	241	241
<i>Cerithideopsis californica</i>	1402	297	11	11	9	9
<i>Melampus olivaceus</i>	182	105	0	0	0	0
<i>Anomia peruviana</i>	0	0	165	95	1	1

S1 Table 2. Confidence intervals (95% CI) on drilling frequencies (df) for subsampled species.

	Isla Montague		Las Isletas		Campo don Abel	
	df	95% CI	df	95% CI	df	95% CI
<i>Mulinia modesta</i>	0.129	±0.024	0.184	±0.024	0.179	±0.019
<i>Nassarius moestus</i>	0.025	±0.007	0.077	±0.010	-	-

References

1. Kowalewski M. 2002 The fossil record of predation: An overview of analytical methods. *Paleontol. Soc. Pap.* **8**, 3–42.