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TITLE: Effects of seismic energy releases on the survival and development of zoeal larvae of dungeness crab (Cancer magister)

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ABSTRACT:

In blind, controlled field experiments, early Stage II zoeae of Dungeness crab (Cancer magister DANA) were exposed to sounds from single discharges of a 13·8-litre array of seven air guns. Their survival and development were followed during subsequent laboratory culture. Immediate mortality was low (0 to 2%) and showed no significant difference between control and exposed larvae (? > 0·05). Across all treatments and blocks of the experiment, survival to the molt to Stage III averaged 88·8%. The conditional Stage IV survival rate averaged 69·8%. The times to the molts to Stage III and Stage IV averaged 14·4 and 34·9 days, respectively. For immediate and long-term survival and time to molt, the field experiment revealed no statistically significant (? > 0·05) effects on zoeae for exposures as close as I m from the array, nor for mean sound pressure as high as 231 dB re 1 ?Pa and cumulative energy density up to 251 J/M2. Post hoc power calculations showed that any reduction in zoeal survival as a result of sound exposure was less than 7% for survival to Stage III and less than 12% for Stage IV conditional survival (1-? = 0·90, ? = 0·05 one-tailed). The sound exposures in our study were at the maximum levels likely to be experienced by a zoea during an actual survey.

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