Fig. S1. Typical movement of a crayfish during the tail-flip escape response. Movement is primarily backwards, in the positive y-direction, in response to shock stimulus (administered by wires at left).

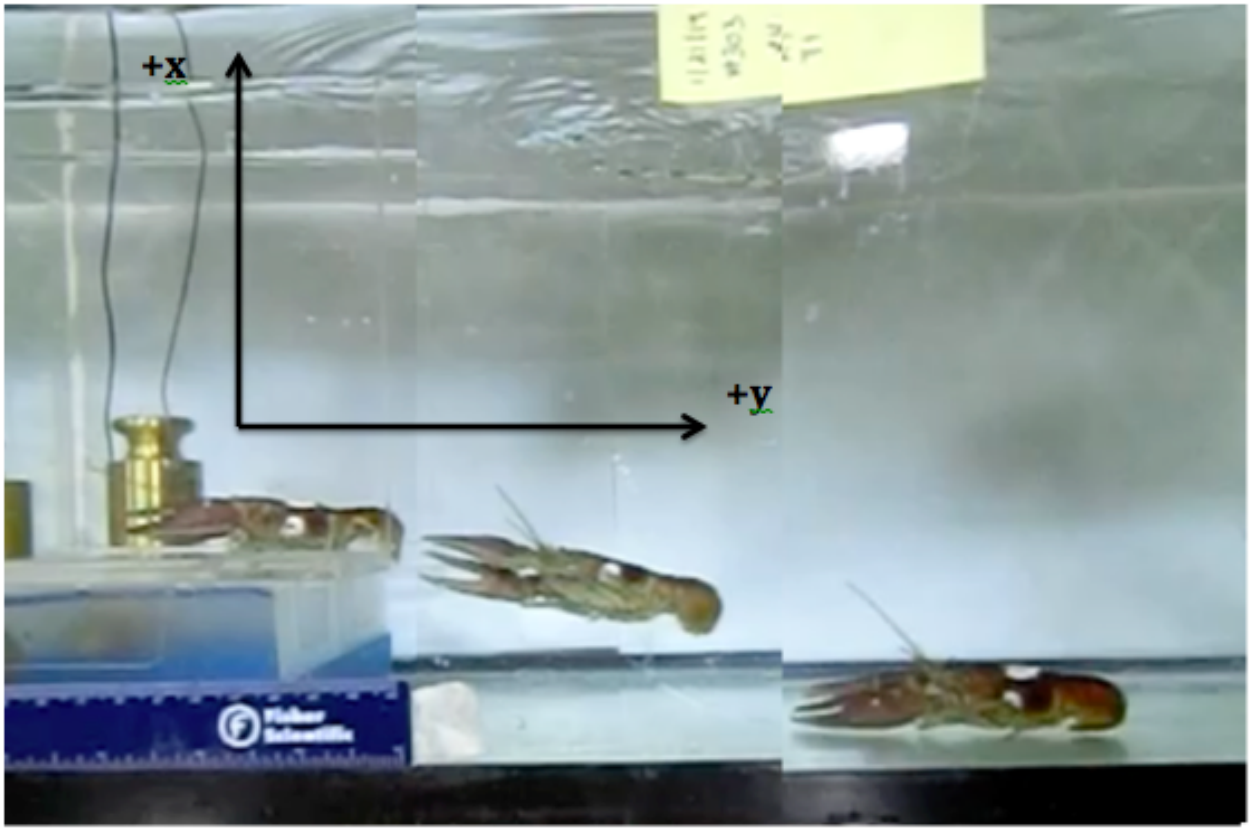


Fig. S2. Sexual dimorphism in rusty crayfish. All linear dimensions were divided by total length (TL). There were significant ($P < 0.05$) differences between sexes in (A) total length (TL), (B) body mass, (C) chelae length (CLL), (D) chelae width (CLW), (E) chelae depth (CLD), (F) first abdominal width (ABWF), (G) last abdominal width (ABWL), (H) abdominal height (ABH), (I) outer uropod length (U14L), (J) outer uropod width (U14W), (K) inner uropod length (U23L), and (L) inner uropod width (U23W). Differences were significant after the application of a FDR correction. Differences in telson length (TEL) and telson width (TEW) were not significant ($P > 0.05$). All P-values were obtained from a Wilcoxon rank-sum test with 43 males and 38 females, with the exception of body mass, which had 39 males and 36 females. See Fig. 1 for complete list of crayfish structures.

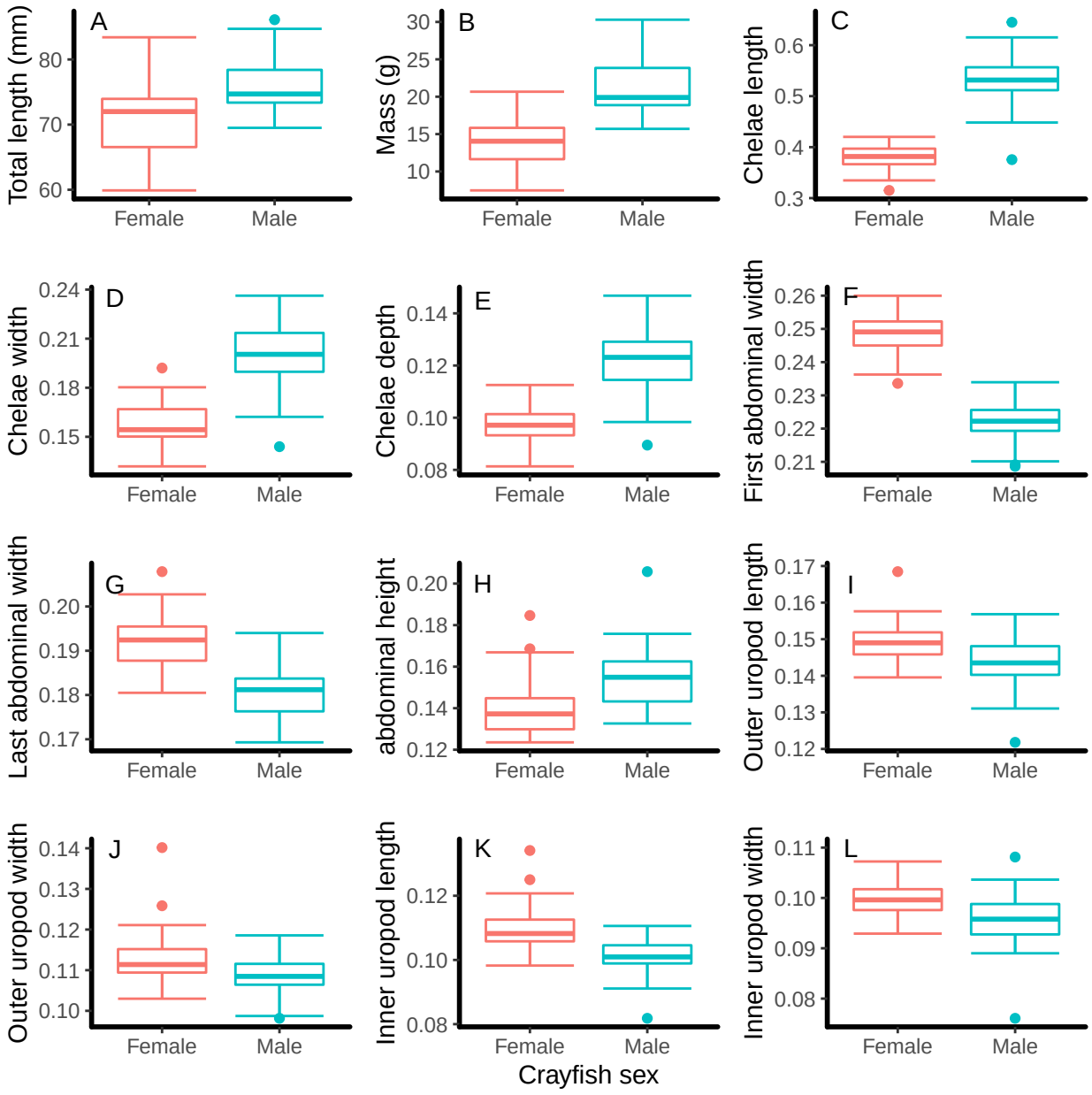


Fig. S3. The maximum escape velocity and acceleration during the tail-flip escape response across total length and body mass. For maximum escape velocity, total length (A) and body mass (B) were not significant predictors ($P > 0.37$). Furthermore, neither were significant predictors when only males and only females were analyzed ($P > 0.19$). For maximum escape acceleration, total length (C) was not a significant predictor ($P > 0.61$). Body mass (D) was almost significantly correlated ($P = 0.074$). However, once an outlying point was removed, this relationship was no longer almost significant ($P > 0.24$). Furthermore, neither total length or body mass were signficant predictors when only males and only females were analyzed, with or without the outlying point ($P > 0.588$).

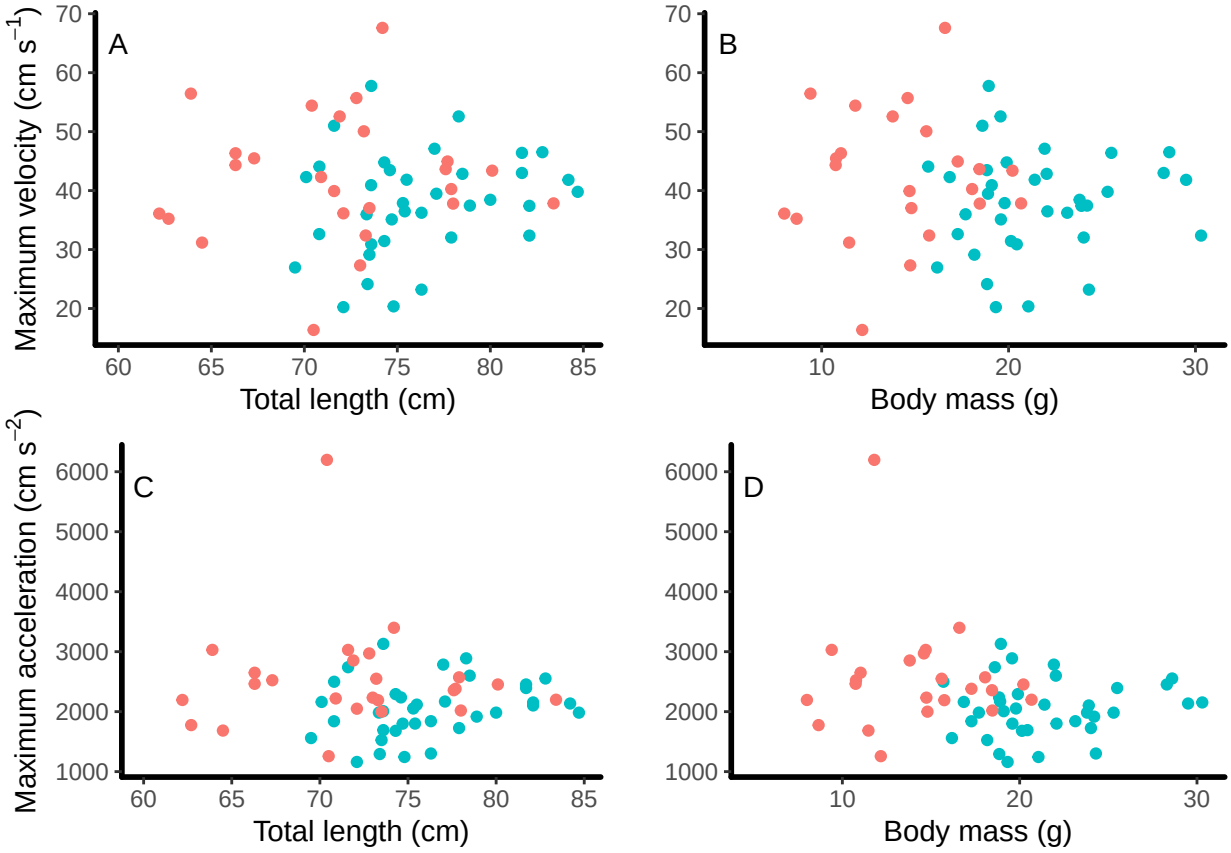


Fig. S4. The maximum total force generated during the tail-flip escape response across total length and body mass. Maximum force was not significantly correlated with total length (A) for all crayfish, males only, and females only ($P > 0.26$). Similarly, maximum force was not significantly significantly correlated with body mass (B) for all crayfish, males only, and females only ($P > 0.45$).

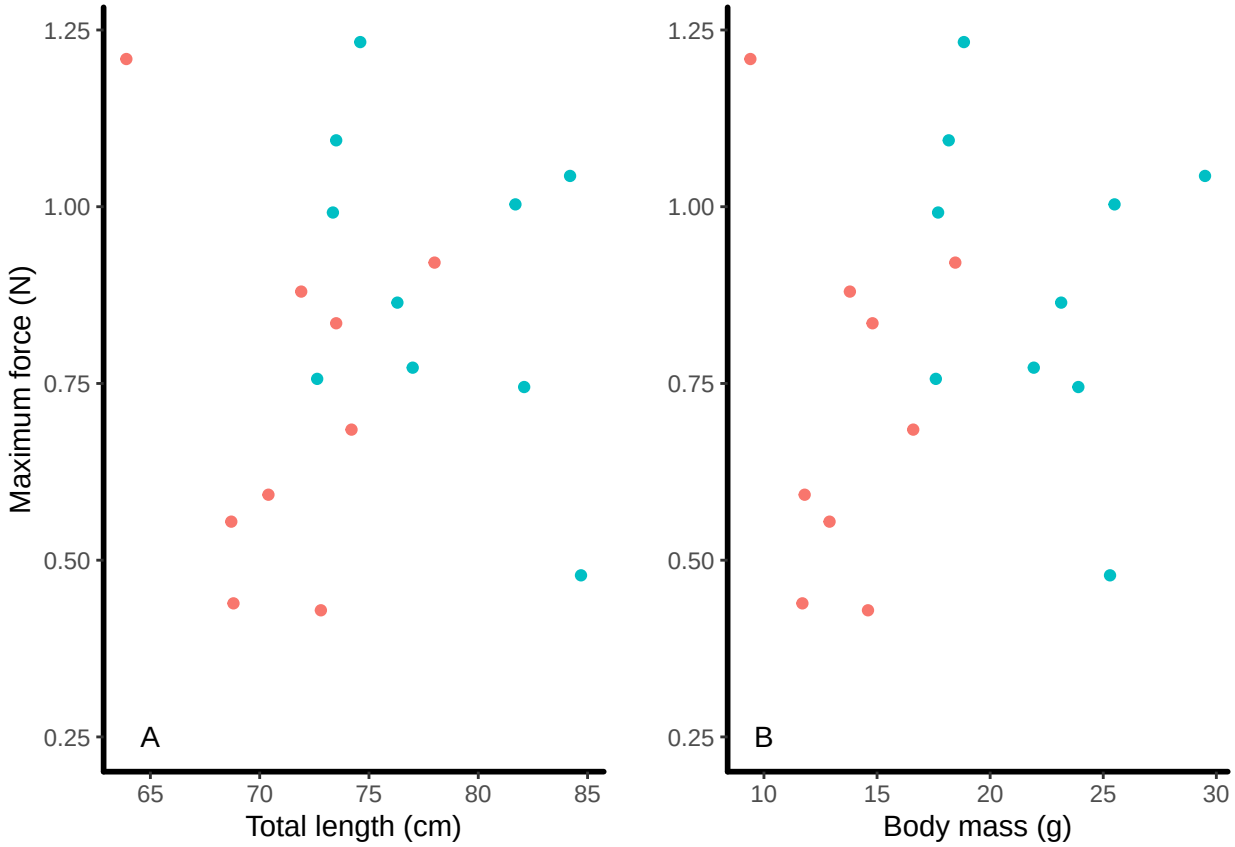
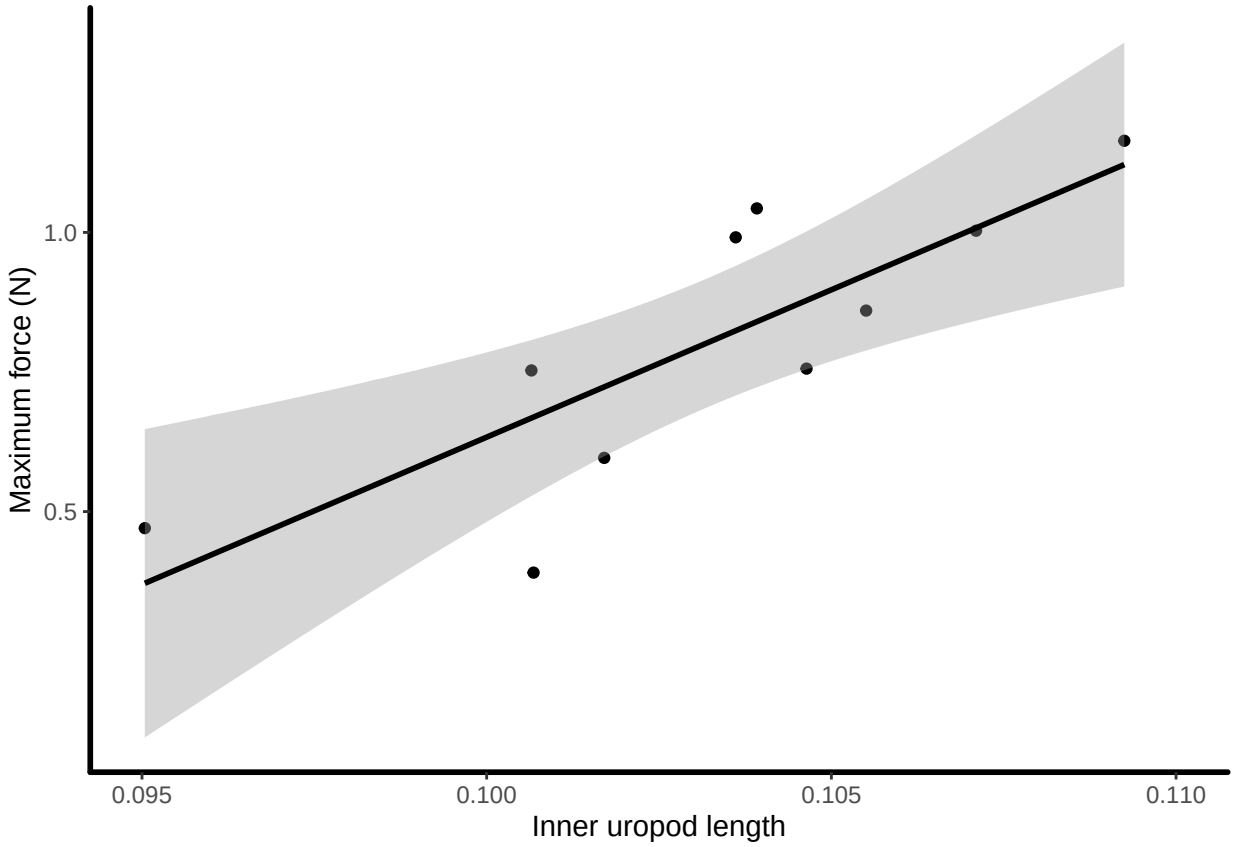


Fig. S5. Inner uropod length predicts maximum total force (N) generated during a tail-flip escape response by male rusty crayfish. The positive association between the size-adjusted length of the inner uropod to the maximum total force (N) for males ($P < 0.001$) is shown with 95% confidence interval (shaded region). By contrast, for females, no significant relationship existed between inner uropod length and maximum total force ($P > 0.1$).



Movie 1. Tail-flip sequence recorded during volumetric (3D) PIV. Note ventral movement of pleopods prior to tail flexion.

Movie 2. Fluid velocity generated during the crayfish tail flip as determined by planar (2D) PIV.

Movie 3. Qualitative visualization showing the horseshoe-shaped vortex formed and shed during the tail flip.