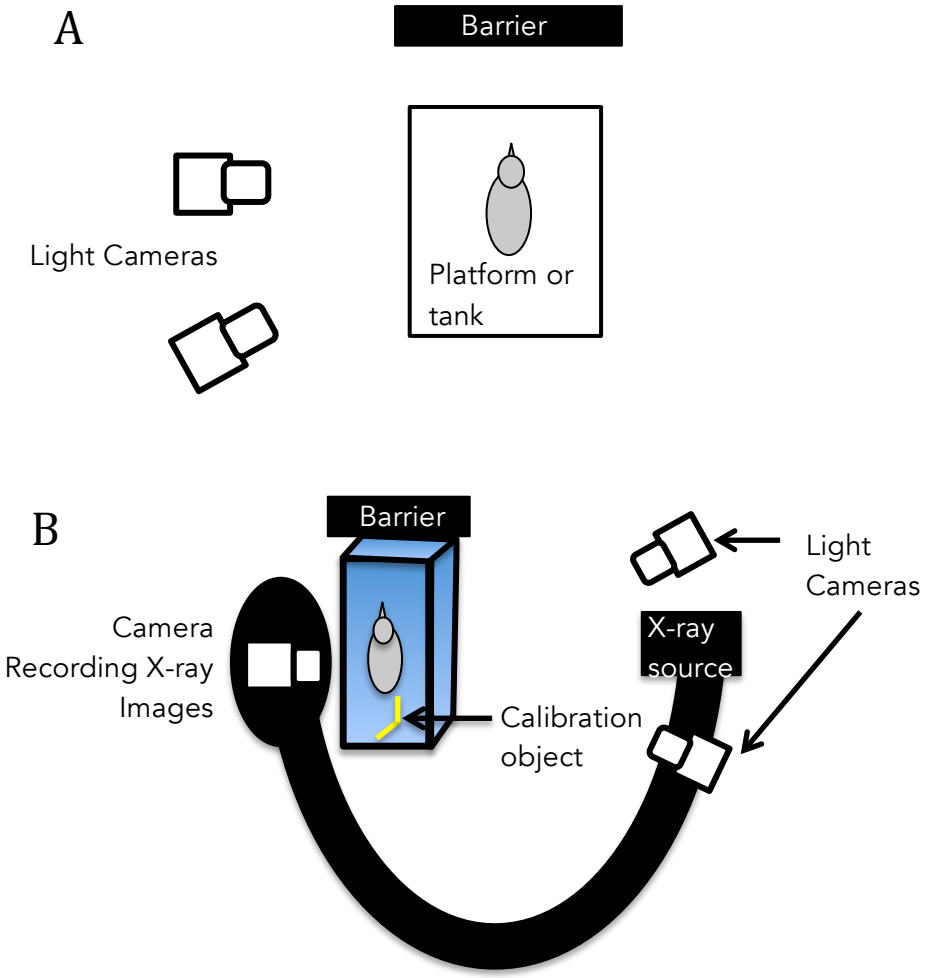


Figure S1. Methods for recording joint angle changes during aquatic and terrestrial takeoffs. (A) Light video camera only setup. This setup was used to measure ankle and MTP joint movement. Ducks were recorded at 250 fps as they took off from platform or tank over a barrier. (B) X-ray video setup used to measure hip and knee joints. For terrestrial takeoffs, ducks took off from a platform and hip and knee were measured from X-ray video. For aquatic takeoff, ducks took off from a tank. Hip angles were measured from the X-ray video. Knee angles were calculated using a 2D light and X-ray setup.

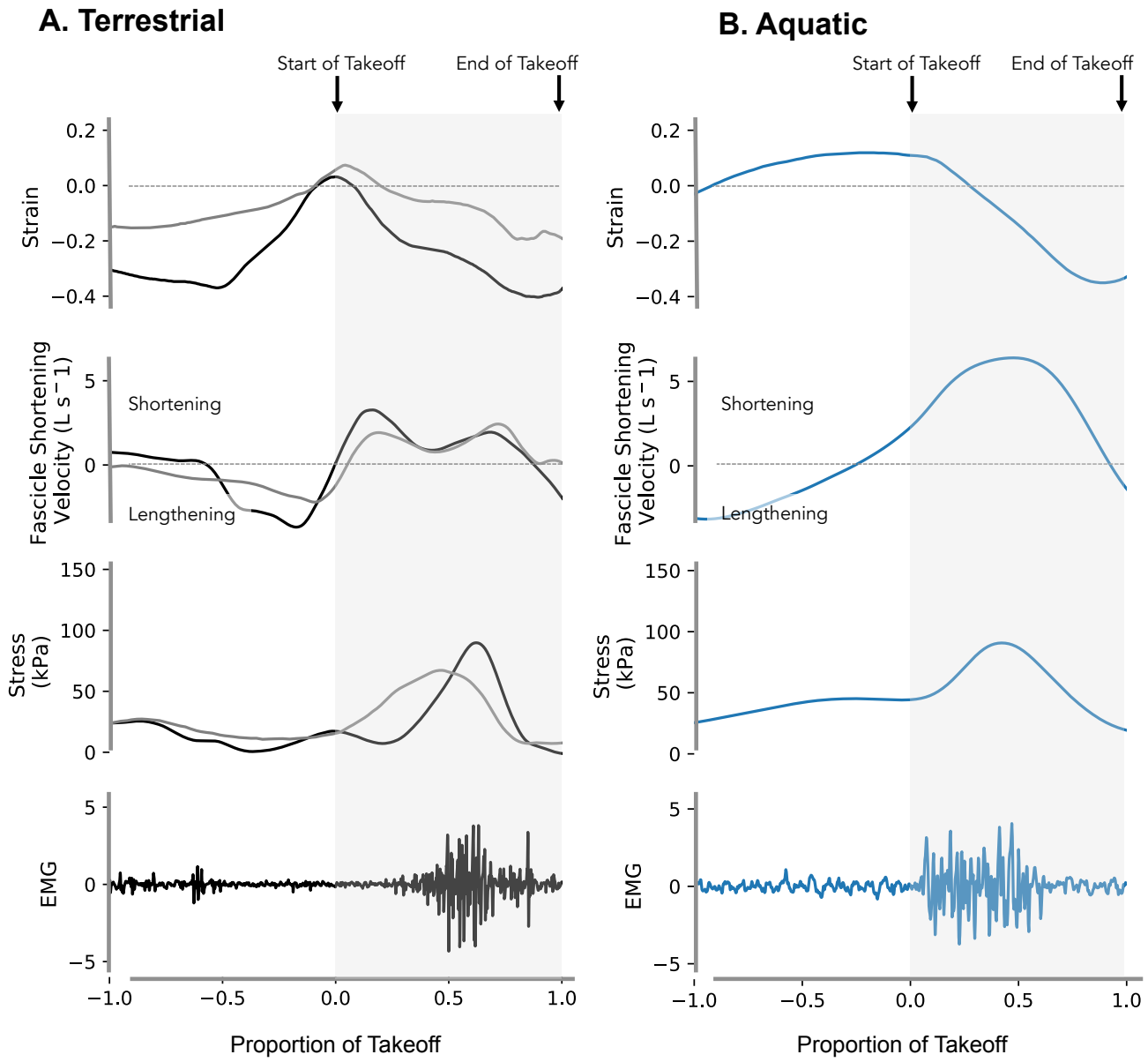


Figure S2. Example fascicle strain, shortening velocity, muscle stress, and EMG recorded from the LG of one duck during an (A) terrestrial (black) and (B) aquatic (blue) takeoff. Example fascicle length, fascicle velocity, and stress during terrestrial takeoff are shown for a second individual (gray) to illustrate the variation in timing of force production. Data are plotted against the proportion of takeoff, with the start and stop times of takeoff determined from kinematics (see methods for more detail). The gray box indicates the takeoff power stroke. Negative velocity indicates muscle lengthening and positive velocity indicates muscle shortening. Pennation angle data were not available for these animals; however, average patterns across ducks, including for pennation angle, are shown in Fig. 4.

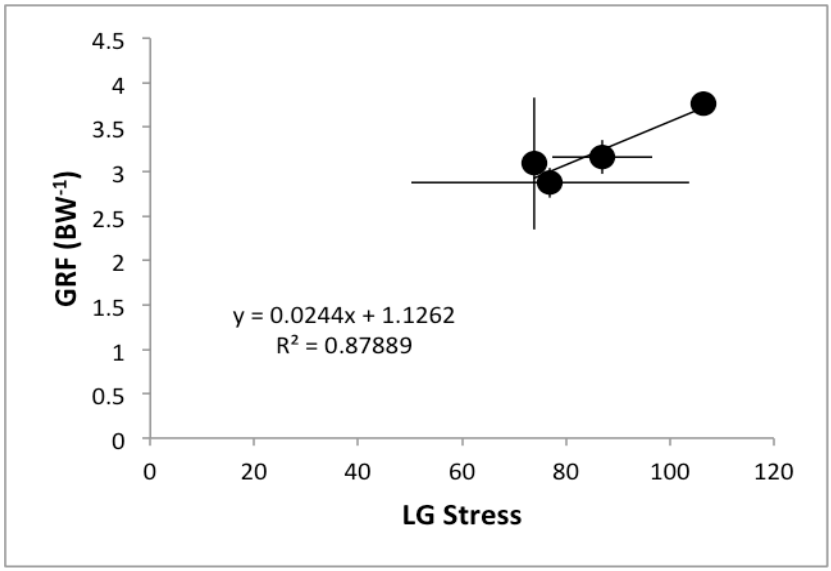
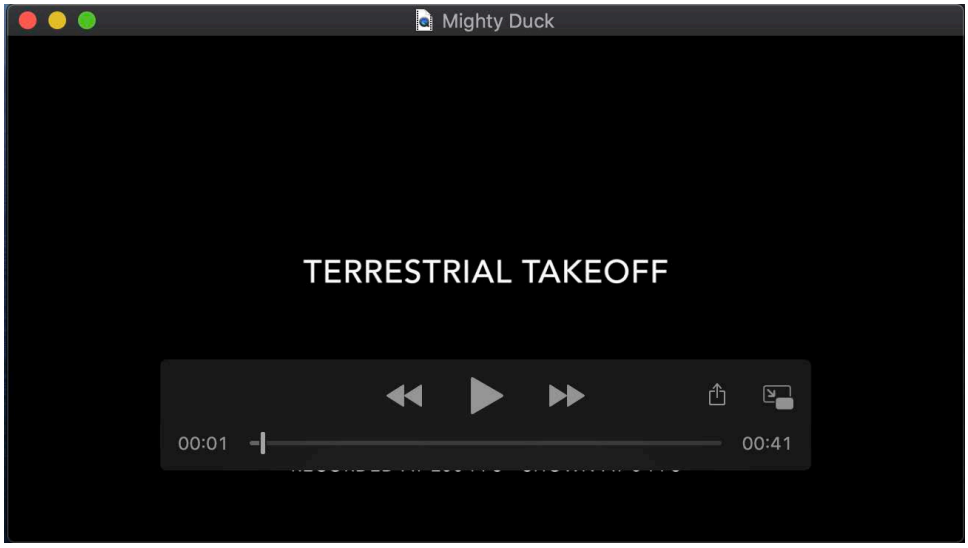


Figure S3. Preliminary force plate analysis results. Ground reaction force (GRF) vs. LG stress measured during terrestrial takeoffs (N=4 animals, n=10 trials). Points are individual averages. GRF was measured as the vector sum of vertical and fore-aft forces (mediolateral forces were assumed to be negligible). Stress was calculated as described in the Methods section. The magnitude of GRF was normalized by body weight (BW). The mean of the individual averages for peak GRF was 3.2 ± 0.2 BW^{-1}. The corresponding stresses were 86 ± 7 kPa. The ratio of LG force (N) to GRF (N) was 0.59 ± 0.07. Despite a relatively strong correlation (r^2=0.88), there was not a significant relationship between LG stress and GRF (p=0.06).



Movie 1. Example terrestrial and aquatic takeoff in light video setup (Fig. S1). Note: two cameras were used at oblique angles to provide 3D kinematics and so may not be perfectly perpendicular to the animal's motion.

Table S1. Animal information & experimental use

	Sex	Origin	Body Mass (kg)	LG Mass (g)	LG PCSA (cm^2)	Light Kinematics	X-ray Kinematics	Fascicle Length	LG Force	Pennation Angle	EMG
1	F	Wild	0.868			T(3), A(3)					
2	F	Wild	0.841	3.75	1.76	T(3), A(3)		T(2), A(3)		T(2), A(3)	T(2)
3	M	Wild	1.03				T(2), A(2)				
4	M	Wild	1.005	5.01	2.48	T(3), A(3)	T(2), A(2)	T(3)	T(3)*	T(3)	T(3)
5	F	Wild	0.984	4.24	1.57			T(3), A(3)	T(2), A(3)	T(2), A(3)	T(1)
6	M	Farm	0.843			T(3), A(3)	T(2), A(2)				
7	F	Wild	0.712	2.72	1.05			T(2), A(2)			T(2)
8	F	Wild	0.88	4.32	1.89	T(3), A(3)		T(2)	T(3)	T(2)	
9	M	Farm	0.834	4.01	1.68			T(3), A(3)	T(3), A(3)	T(1), A(2)	T(3), A(3)
10	F	Farm	1.008	6.45	2.86			A(3)	A(3)	A(2)	A(3)
11	F	Farm	0.996	5.86	2.72				T(3), A(2)		
12	M	Wild	1.137	4.37	1.67			T(3), A(3)		T(3), A(3)	

T = terrestrial takeoff, A = aquatic takeoff
Numbers in parentheses indicate the number of trials.
* Timing only