The following supplement accompanies the article

Hunting behaviour of white sharks recorded by animal-borne accelerometers and cameras

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Supplement 1

Materials and methods

Tailbeat-speed relationship

To estimate swim speed during the confirmed (from video) and inferred (from acceleration) predation events, relationship between swim speed and tailbeat frequency was examined individually for sharks 5 and 7 that exhibited predation events. Although shark 8 also exhibited a potential predation event, this individual was excluded from the analysis due to the lack of speed measurements throughout the record. White sharks are negatively buoyant, and the tailbeat-speed relationships differed among descending, ascending, and horizontal swimming phases (i.e., swim speed was highest in descending phase at a given tailbeat frequency). Because the sharks swam upward during the last phase of most predation events (Table 1), only the tailbeat-speed relationship during ascending phase (defined as the phase with the rate of depth change of >0.1 m s^{-1} for >30 s) were used in this analysis. Mean swim speed and mean tailbeat frequency were calculated for each ascending phase ('sustained swimming' plot in Fig S1). In addition, swim speed and tailbeat frequency during burst swimming events (see below for the definition) were also plotted ('burst swimming' plot in Fig. S1). The plots were regressed using the ordinary least squares method.

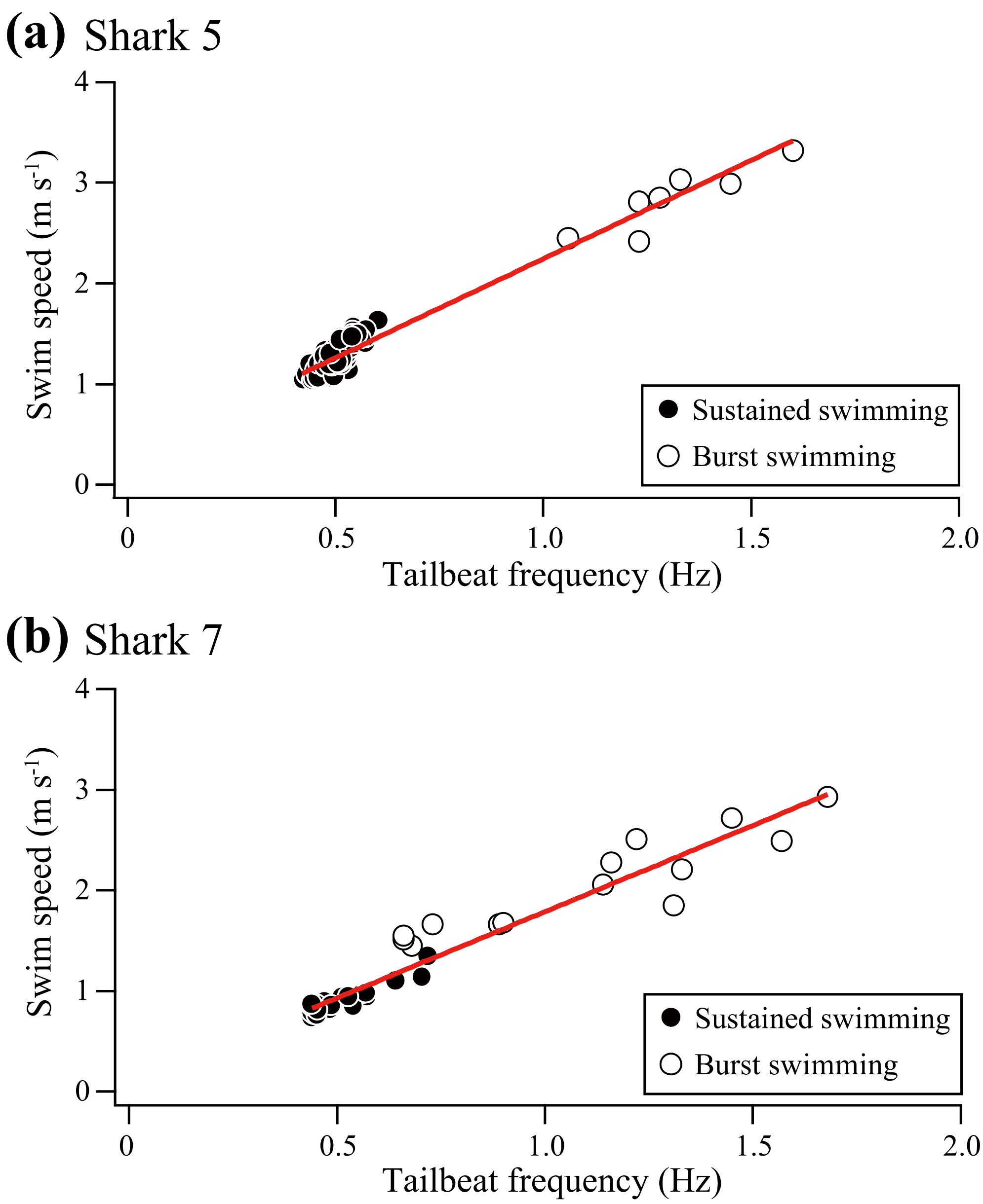

Fig. S1. Relationship between tailbeat frequency and swim speed, including the values for sustained swimming (filled circle) and burst swimming (open circle), during ascending phase of dives for (a) shark 5 and (b) shark 7. The best-fit regressions are:

(shark 5) speed = 1.96 × tailbeat + 0.28 (R^2 = 0.95).

(shark 7) speed = 1.72 × tailbeat + 0.07 (R^2 = 0.94).

Potential predation events

Based on the acceleration record during the confirmed predation attempt, similar events that potentially represent predation attempts were extracted from all acceleration records for eight sharks. As the initial screening process, burst swimming events, indicated by a sudden increase (set at >0.6 *g* based on visual inspection) in lateral acceleration above the sustained swimming level, were extracted. Both maximum lateral acceleration and maximum tailbeat frequency during the events had positively skewed distributions (Fig. S2). The values recorded during the confirmed predation attempt (3.7 *g* for acceleration and 3.2 Hz for tailbeat frequency) were in the upper tails of the distributions, indicating that predation events can involve exceptionally intensive activities. Based on distinct changes in the patterns of the distributions for both maximum lateral acceleration and tailbeat frequency, we assumed that potential predation events are represented by burst swimming events meeting two criteria: (i) the maximum lateral acceleration is >2.4 *g*, and (ii) the maximum tailbeat frequency is >2.6 Hz (Fig. S2).

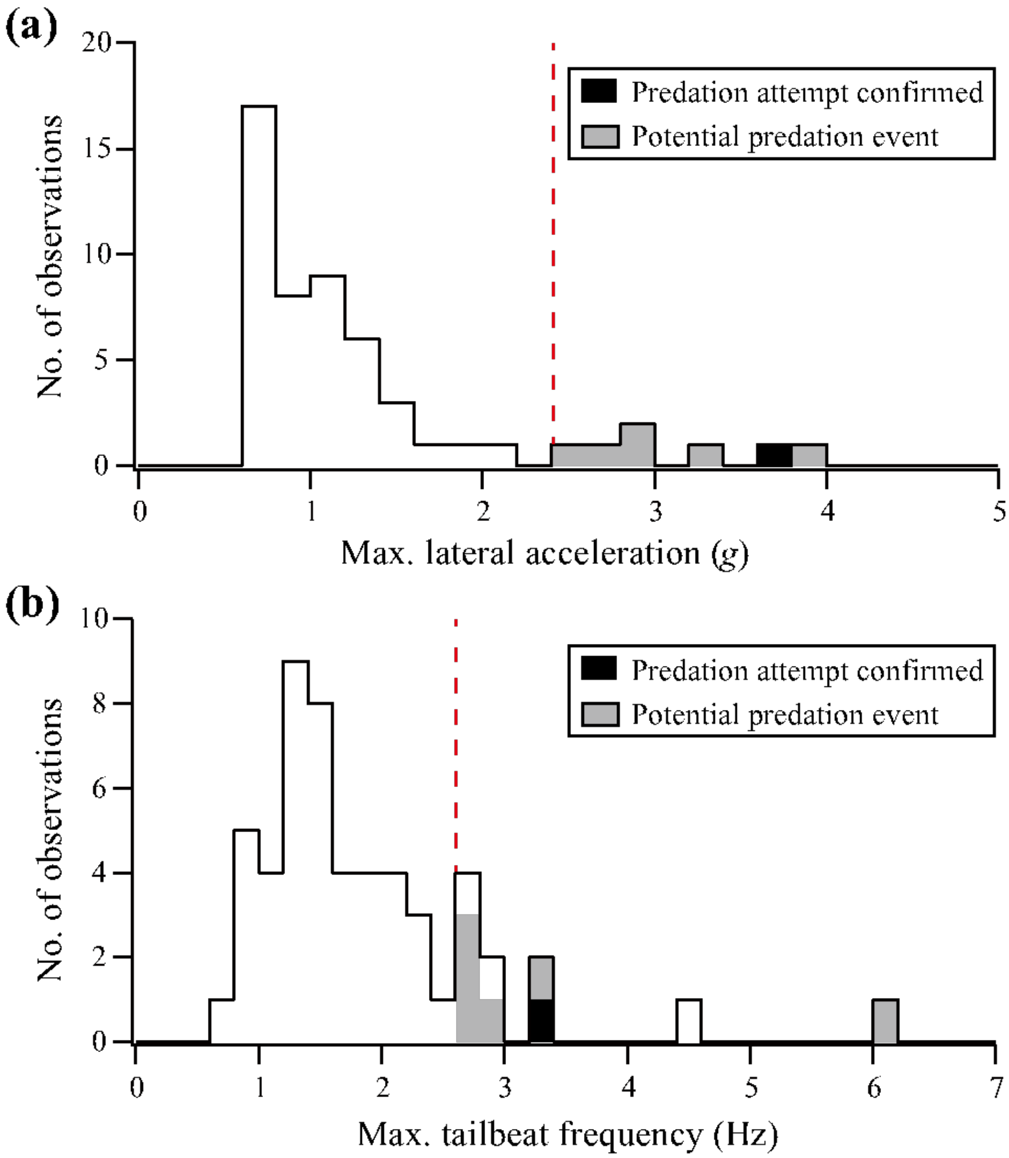

Fig. S2. Frequency distribution of (a) the maximum lateral acceleration and (b) the maximum tailbeat frequency during burst swimming events (maximum lateral acceleration of >0.6 *g*) for all eight sharks. Black bar represents the predation attempt confirmed by the video record. Based on distinct changes in the patterns of the distributions (red broken lines), we assume that potential predation events are represented by intensive burst swimming events with both lateral acceleration >2.4 *g* and tailbeat frequency >2.6 Hz (grey bar).