

**Table S3.** Description of measurements used in Table 2. Speeds, cutback angle and duration are recorded by the TraceUp™ device.

Speeds	Description
Mean session speed (m/s)	Mean surfer speed while surfing(not paddling or resting) of all waves surfed during one trip, or surf session.
Bottom turn initial speed (m/s)	Mean speed at start of bottom turn. Bottom turn described in Figure S1.
Cutback speed (m/s)	Mean speed during a cutback. Cutback described in Figure S1.
Performance Parameters	
yaw rate (rad/s)	Mean of cutback yaw angle/duration. Yaw orientation described in Figure S1.
roll rate (rad/s)	Mean of cutback roll angle/duration. Roll orientation described in Figure S1.
pitch rate (rad/s)	Mean of cutback pitch angle/duration. Pitch orientation described in Figure S1.
yaw power (W)	Cutback yaw power = $0.5 \cdot I\omega^2/t$ , where $I$ =surfer+board inertia from Table S1, $\omega$ =yaw rate, and $t$ =cutback duration.
roll power (W)	Cutback roll power = $0.5 \cdot I\omega^2/t$ , where $I$ =surfer+board inertia from Table S1, $\omega$ =roll rate, and $t$ =cutback duration.
pitch power (W)	Cutback pitch power = $0.5 \cdot I\omega^2/t$ , where $I$ =surfer+board inertia from Table S1, $\omega$ =pitch rate, and $t$ =cutback duration.
Total power (W)	Sum of cutback yaw+roll+pitch powers.
Total power/Inertia	Total cutback power divided by surfer+board inertia from Table S1. Used to normalize power with respect to surfer+board.
$C_p$	Cutback power coefficient, Total cutback power/mean session speed power. Where mean session speed power = $0.5 \cdot m(S_s)^2/t$ , and $m$ =mass of surfer+board from Table S1, $S_s$ =mean session speed, and $t$ =cutback duration. $C_p$ used to normalize total cutback power with respect to wave energy.
Trace cutback power	Dimensionless number (scale 0-10) assigned by TraceUp™ software rating how large or impressive the maneuver is. The algorithm used by Traceup was not disclosed.