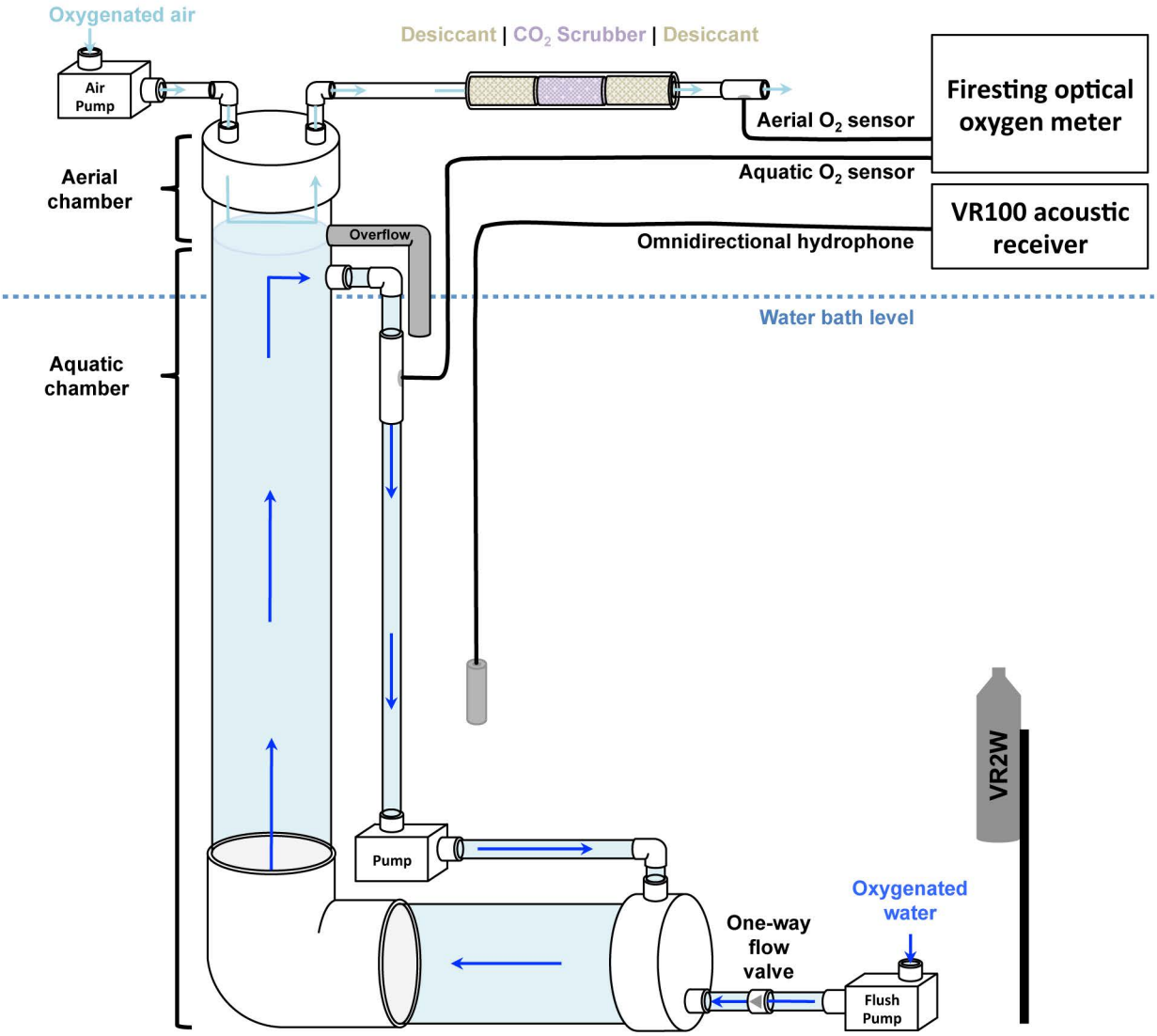

Figure S1. Schematic of bimodal respirometers designed to simultaneously measure pulmonary and cutaneous oxygen consumption by sea snakes (based on designs previously described by Dabruzzi *et al.* 2012), while also monitoring body acceleration using acoustic telemetry (VR100 and VR2W receivers). Four L-shaped respirometers (height 165 cm, width 80 cm) were constructed using transparent acrylic tubing (150 mm outer diameter) and opaque Polyvinyl chloride connector fittings. Respirometers were airtight and held a fixed amount of water (29.73 ± 0.61 L) with a fixed air space (1.05 ± 0.03 L) at the top to capture movements related to diving and surfacing. Chambers were large enough to allow snakes free movement, but small enough to accurately quantify $\dot{V}o_{2cut}$, with negligible gas exchange across the air-water interface.

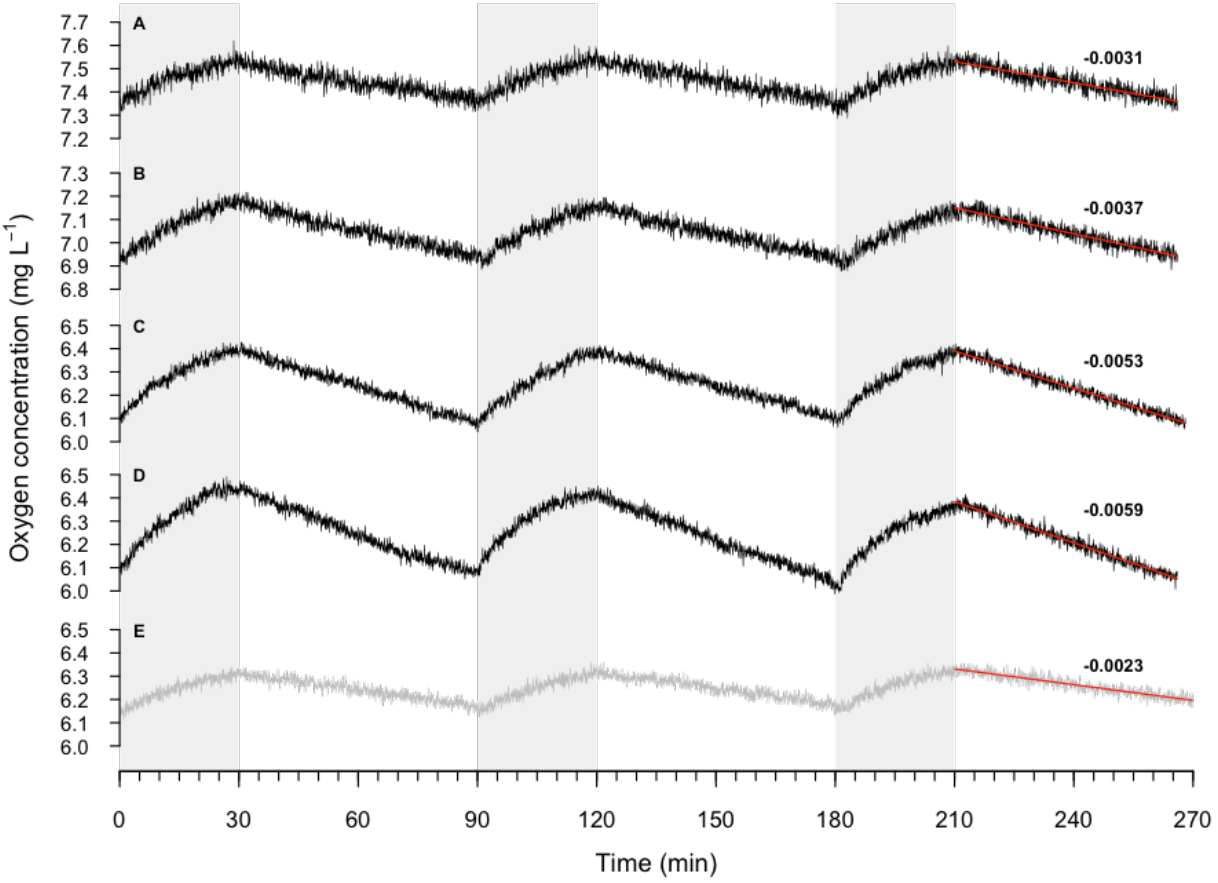

Figure S2. Raw oxygen traces for a representative sea snake illustrating the cutaneous oxygen consumption ($\dot{V}o_{2cut}$) at four temperature treatments (A) 21˚, (B) 24˚, (C) 27˚ and (D) 30˚C. Background (microbial) respiration was measured at all temperatures and subtracted from sea snake $\dot{V}o_{2cut}$; a representative background trace at 30˚C is presented (E). Grey shading represents periods when flush pumps were running. Red lines represent the measurements of change in oxygen concentration (ΔcO_2) measured during sealed cycles (Δt), as in equation 1 of the main text.

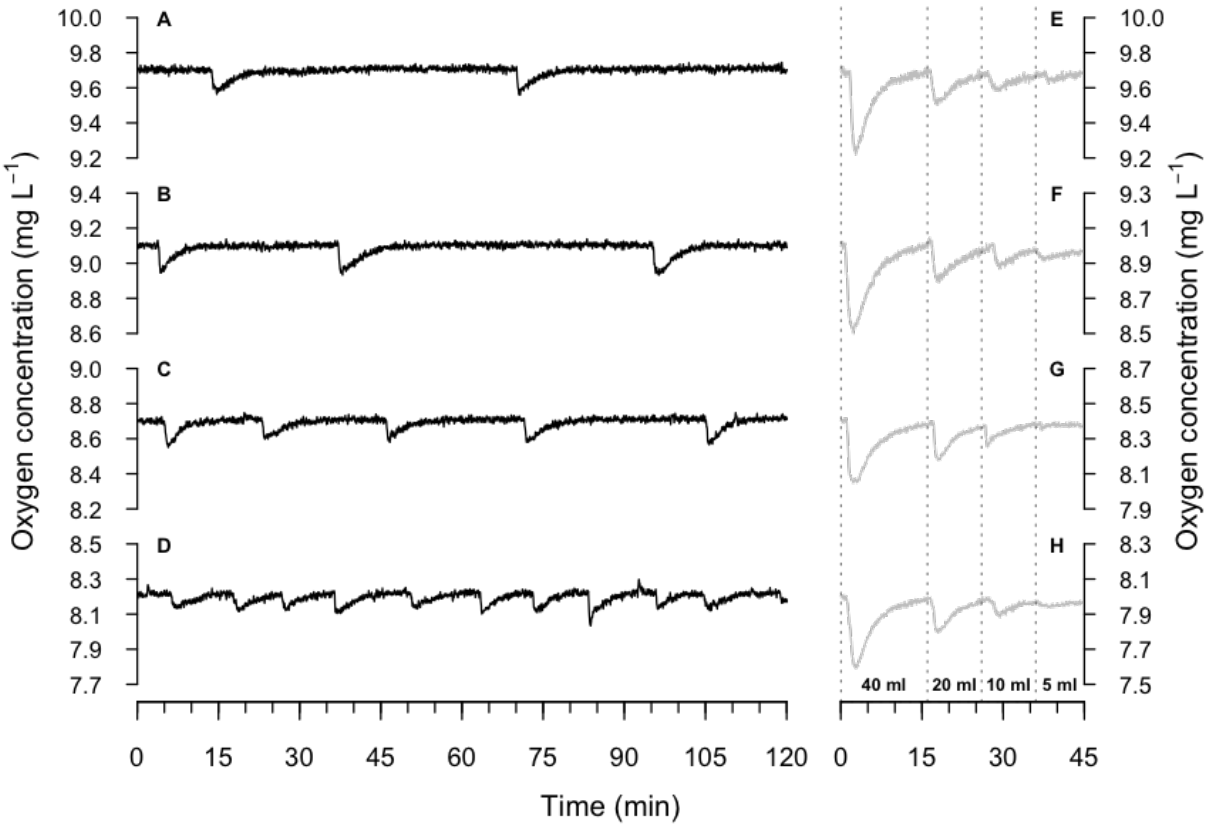

Figure S3. Raw oxygen traces for a representative sea snake testing the pulmonary consumption of oxygen at four temperature treatments; (A) 21˚C, (B) 24˚C, (C) 27˚C and (D) 30˚C. Each drop in oxygen concentration along the trace represents one breathing bout, with breathing rate increaasing in warmer waters. Fixed volumes of N_2 (40, 20, 10 and 5 ml) were injected during periods between snake breathing bouts (E – H) to provide reference points for the magnitude of the snake breathing bouts.