

Detection of free-ranging West Indian manatees *Trichechus manatus* using side-scan sonar

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Supplement 1.

Fig. S1. *Trichechus manatus*. Continuation of Fig. 2 from main article. Representative screenshots of *T. manatus* detected by side-scan sonar. Side-scan and echo-sounder beam frequencies were producing at 262 and 200 kHz, respectively, during all screenshots. Figure symbols: water column (Wc), bottom response (B), manatee (M), manatee calf (C), shadow (S), sediment debris (D), motor interference (I), (see Fig. 2 legend in main text for a complete explanation of symbols used in figures). (c) Screenshot of 2 adult manatees and a calf. Laguna de las Ilusiones, Mexico, water depth 1.5 m, boat speed 3.5 km h⁻¹, left and right side, side-scan sonar range 12.2 m. (d) Digitally enhanced interpretation of Panel (c). The dashed white line represents the junction between of the water column (Wc), and the bottom response (B). The sediment debris (D) has been highlighted to assist in visualization. No motor interference (I) appears on the right side, because the lateral beam does not have to traverse its turbulence. Note the strong reflection from the dorsal area of all 3 manatees (M). Relatively, the calf (C) produces a smaller acoustic reflection and shadow (S). Based on the sonar image, the bottom substrate is very smooth, flat (B) and has a few holes (H). The water was very calm, producing a very clear image. (e) Screenshot of a single adult manatee on the right side of the boat. Laguna de las Ilusiones, water depth 1.5 m, boat speed 4.8 km h⁻¹, side-scan sonar range 12.2 m. Note the sediment (D) stirred by the swimming action of the animal. (f) Screenshot of 2 adult manatees (M) and 1 calf (C) resting in a large depressed area on the bottom substrate. Laguna de las Ilusiones, water depth 2.1 m, boat speed 7.4 km h⁻¹, side-scan sonar range 6.1 m. (g) Screenshot of a single

adult manatee oriented parallel to the boat swimming downwards head-first. Crystal River, water depth 3.04 m, boat speed 6.4 km h⁻¹, left side only, side-scan sonar range 12.2 m. Note the strongest acoustic reflection of the manatee (M) is located on the dorsal area of the body (presumably the location of the lungs). The shadow (S) created by the manatee is on the far left, indicating this animal was higher in the water column (Wc). The acoustic reflection of the manatee is located completely in the area of the water column, because this animal was directly below the boat and the side beam hit it before the bottom return (B). (h) Screenshot of 4 adult manatees resting at a distance of from 6 to 9 m from the boat. Crystal River, water depth 1.83 m, boat speed 6.1 km h⁻¹, left side only, side-scan sonar range 12.2 m. Note the different shapes of the shadows (S) caused by the different orientations of the animals. All shadows are connected to the acoustic reflections of the manatees (M), indicating that they were in contact with or very close to the bottom substrate. (i) Screenshot of a mother and calf under a bridge in perpendicular orientation relative to the boat. Crystal River, water depth 2.7 m, boat speed 4.3 km h⁻¹, left side only, side-scan sonar range 12.2 m. Both cement pillars (P) supporting the bridge produce strong acoustic reflections and never-ending shadows (Ps), because they stick out of the water and the sonar beam never travels over them. Note that the acoustic reflections of the manatees (M and C) are almost absent; however, their shadows (S) are clearly visible. (j) Screenshot of 2 adult manatees (M) and a calf (C) on the left side of the boat. Laguna de las Ilusiones, water depth 2.1 m, boat speed 6.8 km h⁻¹, side-scan sonar range 12.2 m.

