

Near-shore Acoustical Survey at Cape Shirreff, Livingston Island, Antarctica

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Introduction

A survey of the near-shore-prey and habitat was conducted within the foraging ranges of seals and penguins that were concurrently monitored via satellite tags at Cape Shirreff. The near-shore survey (out to about 10 n.mi.) was conducted using a specially equipped 19 foot Zodiac and the off-shore survey (out to 60 n.mi.) was conducted via the R/V Yuzhmorgeologiya. The Zodiac, R/V Ernest, was launched from the ship on 5 February and subsequently based day-to-day operations from the island camp. The Zodiac was equipped with a split-beam 120 kHz echosounder, GPS, portable CTD and an underwater video camera, as well as radar, radios and survival gear. Daily, it was used to conduct acoustic transects, deploy the CTD at selected stations, and lower the video camera into acoustic targets for the purpose of species identification. The ship operated further offshore, but in such a manner so as to be ready to render assistance by picking up the survey Zodiac and/or launching the second Zodiac, which will be held ready as a rescue boat. The ship concurrently conducted acoustic transects and CTD and IKMT net sampling stations following the procedures outlined below for the South Shetland survey. Ship operations were on a 24 hour per day basis, while Zodiac operations were conducted for approximately 6 to 9 hours each day.

Methods

A 19 foot Zodiac Mark V has been fitted with a custom aluminum house with remote steering station and wind-break (Port Townsend Shipwrights Inc.); two engines (9.9 HP 4-stroke Yamaha and 45 HP Evinrude); Simrad EY500 split-beam 120 kHz echosounder with control/data logging computer; motorized down-rigger for deployment of an SBE19 SeaCat CTD and a digital 3-CCD underwater video and lighting system; redundant GPSs and VHF radios; a WeatherPak; 24 n.mi. radar; Scientific Computer System for continuous data logging and display; four gel cell batteries for up to 20 hours of continuous survey operations; an alternator and backup generator for power restoration; compass; binoculars; survival equipment including a 406 MHz EPIRB, camping and survival-kit; and two coffee cups with holders.

Continuous measurements were made of Ernest's geographic position, air temperature, barometric pressure, relative humidity, wind speed, and wind direction. Continuous data was logged on a notebook computer. A meteorological instrument package was mounted on the boat's cabin top. Ernest was equipped with a Scientific Computer System (SCS) that continuously logged and displayed data from the GPS (date, time, latitude, longitude, quality, number of satellites, HDOPs, course over ground, and speed over ground), and

WeatherPak (compass, apparent and true wind speed and direction, barometric pressure, humidity, and air temperature). All data were displayed in real-time as well as archived.

0205 1200 The 120 kHz EY500 Echosounder (ES120-F transducer; SN 23258; beamwidths L=9.2, T=8.9; Equivalent 2-way beam-angle = -18.5 dB) was calibrated in about 15 m of water circa Cape Shirreff using a 38.1 mm WC sphere at a range of 10 m. Sound speed estimated to be 1449 m/s (TS=-39.8 dB).

0206 0910 Ernest underway; **echo sounder on**; choppy sea.

0945 **Station 6.1** (62 27.4S / 60 35.0W); video camera in krill swarm at 75 m; penguins swimming nearby, large iceberg ~0.25 n.mi. away.

1050 Underway to station 6.2; iceberg stranded on our station.

1135 **Station 6.2**; returning to Cape Shirreff.

1145 Fin whale chasing Ernest, swam underneath and surfaced next to zodiac; penguins swimming nearby, too.

1250 Cape Shirreff Cove; **echo sounder off**

1310 Moorings secured; east wind calming seas.

0207 1030 Ernest underway

1130 **Station 4.1; echo sounder on; CTD**

1250 Fur seal sighted

1248 **Station 4.2; CTD**; swell increasing

1355 **Station 5.2; CTD**; wind and sea building; seals and penguins sighted

1505 **Station 5.1; CTD**; foraging chinstrap penguins; 3m seas and 20 kt winds

1630 Leopard Seal spy-hopping behind zodiac

1645 Cape Shirreff Cove; **echo sounder off**

0208 0910 Ernest underway

1115 **Station 2.1; echo sounder on; CTD**

1230 **Station 2.2; CTD**; choppy seas

1325 **Station 3.2; CTD; wind up**

1420 **Station 3.1; CTD**

1615 Cape Shirreff Cove; **echo sounder off**

0209 0915 Ernest underway

1100 **Station 6.4; echo sounder on; CTD**

1202 **Station 6.3; CTD**

1300 **Station 6.2; CTD; large tabular iceberg to starboard; 3-10 kt wind**

1415 **Station 7.3; CTD; many penguins sighted**

1515 **Station 7.2; CTD; penguins sighted**

1615 **Station 6.1; CTD; 0-5 kts winds; calm seas**

1800 Cape Shirreff Cove; **echo sounder off**

0210 0940 Ernest underway; **echo sounder on**

1010 **Station 5.0; CTD; penguins and fur seal sighted**

1100 **Station 5.1**

1130 Making 3.8 kts into 30 kt wind; **echo sounder off**

1240 Ernest's house separates from Zodiac while hoisting aboard ship.

1300 Ernest and house hoisted aboard separately; all aboard and safe.