

Christmas Island and Pulu Keeling Expeditions 2010 to 2012: field work and locality records

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Abstract. This present series of scientific exploration and expeditions was carried out from 2010 to 2012, totalling six and two weeks, and covering 153 and 50 field stations (some repeated) in Christmas Island and Cocos (Keeling) Islands respectively. The expeditions were carried out by a principle team of 11 from Singapore, with participants from Australia, Japan and Taiwan.

WORKFLOW

This present series of scientific exploration and expeditions was carried out from 2010 to 2012, covering 153 and 50 field stations (some repeated) in Christmas Island and Cocos (Keeling) Islands respectively.

At any one time, one or more teams would be out in the field, usually two teams of minimally two persons. For the stints where part of the team left for Cocos (Keeling) Islands, the other part of the team stayed on in Christmas Island to carry out routine survey work, in accordance to the tide table for intertidal zones.

For dive work, field sites were recorded pre-dive. Subtidal specimens that had been collected were usually kept in separate plastic containers or in mesh bags for robust specimens. Depth was noted using SuuntoTM dive chronometers. After each dive, samples were consolidated in a bucket with seawater and kept cool. As each dive trip consisted of two boat dives, there was provision for sufficient containers, chemicals and bait. Upon reaching the jetty, the samples were sent directly back to base camp for processing. For shore dives, typically only one dive, the same procedure was followed as above.

For terrestrial work involved with caves, permission and guidance was sought from Park officers. Adequate safety gear was used—headlamps and cave helmets. No rappelling, rock climbing or ropes were used. Only caves with easily accessible water were surveyed. Specimens obtained were placed in cooler boxes and brought back to base camp for processing.

For intertidal work, tidal changes were closely monitored to ensure maximal survey time. Suitable footwear (usually dive booties) and torches were used. Specimens obtained were placed in cooler boxes and again brought back to base camp for processing.

For life colour documentation and processing of the collected fauna, the animals were either photographed alive in tanks or euthanised (in accordance to NUS IACUC regulations). Two typical background colours were used, either white and/or black. Digital cameras used were NikonTM DSLR (models D300, D700, D3S) with appropriate macro lenses (60 mm f/2.8, 105 mm f/2.8), extension tubes and wireless macro flash system (R1C1 system). Digital images were captured in both raw and jpeg formats. Portable copy stands were also used to stabilise the camera setup. Organisms photographed were tagged separately and placed into individual containers for preservation.

For specimen processing, aquatic vertebrates were euthanised with an overdose of MS-222. For aquatic invertebrates, they were euthanised using ice slurry or freezing. Vertebrate specimens were fixed with 10% formalin solution for one to two weeks, then soaked in water for formalin to leach out, and subsequently stored in 75% ethanol. Invertebrate specimens were directly preserved in 75% ethanol. For larger invertebrate specimens, they were injected via hypodermic syringes with 95% ethanol before being soaked in 75% ethanol.

Plastic and thick paper tags were used to identify the field station lots. For delicate and fragile specimens, they were placed into separate plastic containers individually. For general collection lots, a single lot is placed into a perforated zip bag with a collective field station tag. Stationery used is usually 2B graphite pencils, which have been proven to be fade- and tamper-proof in preservative fluids.

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For transport of specimens, all liquid preservative had to be drained. The specimens were placed in plastic drums and air-tight containers. Delicate specimens were further wrapped and cushioned with moist tissue paper.

Requisite collection permits and export permits had been obtained prior to start of expedition (see earlier chapter for more details on the permit numbers).

FIELD LOCALITY RECORDS

Initial recording of field location data was in waterproof notebooks with pencils. The data was transferred into a Microsoft™ Excel document. The GPS coordinates were recorded mainly using Garmin™ GPSmap 60CSx, and expressed as degree and minutes (with decimals). The location data is presented in five tables, detailing field stations, dates, time of the day, location and GPS coordinates. See Fig. 1

for Christmas Island field work localities, Fig. 2 for Cocos (Keeling) Islands field work localities and Fig. 3 for North Keeling field work localities.

The tables are presented as follows (where XX is a running series of numbers):

Table 1 for Christmas Island 2010 field location records, where the code CI-XX was used for terrestrial and intertidal field stations, and CI-D-XX was used for subtidal stations.

Table 2 for Christmas Island 2011 field location records, where the code CI-XX-2011 was used terrestrial and intertidal field stations, and CI-DXX-2011 was used for subtidal stations.

Table 3 for Cocos (Keeling) Islands 2011 field location records, where the code CK-XX was used for all field stations, irrespective of habitat.

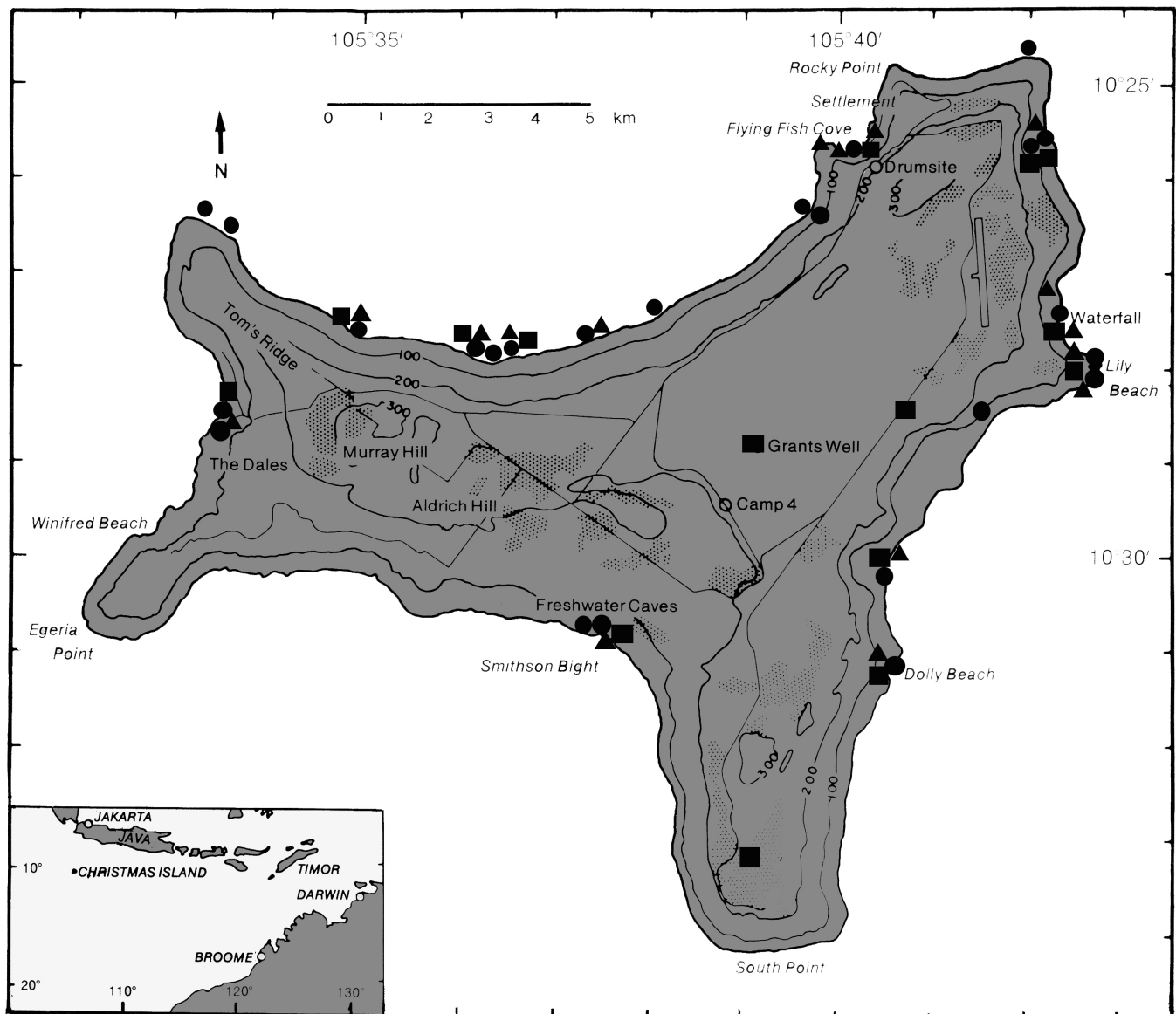


Fig. 1. Map of Christmas Island, showing survey locations (where each symbol may represent more than one site or represent multiple surveys), circle = 2010, square = 2011, triangle = 2012 (adapted from Cogger et al., 1983).

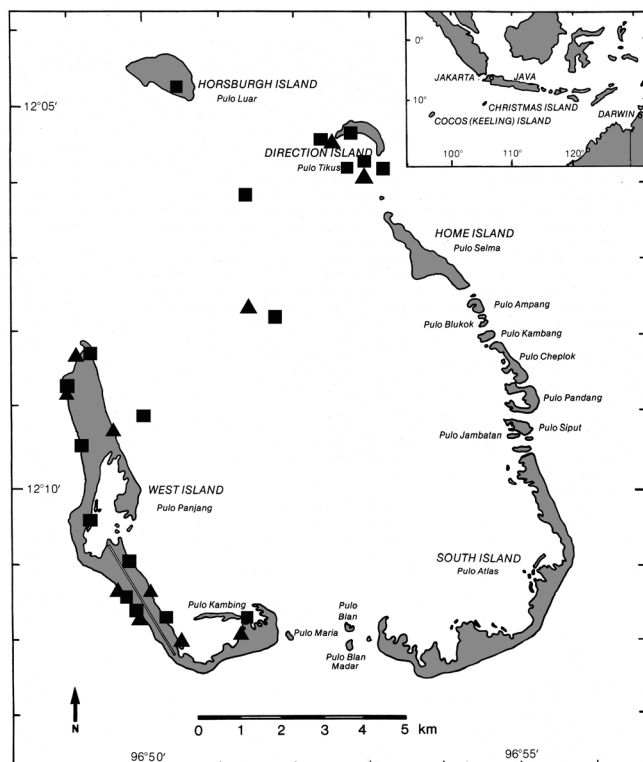


Fig. 2. Map of Cocos (Keeling) Islands - southern atoll, showing survey locations (where each symbol may represent more than one site or represent multiple surveys), square = 2011, triangle = 2012 (adapted from Cogger et al., 1983).

Table 4 for Christmas Island 2012 field location records, where the code CI3-XX was used for terrestrial and intertidal field stations, and CI3-DXX was used for subtidal stations.

Table 5 for Cocos (Keeling) Islands 2012 field location records, where the code CK2-XX was used for all field stations, irrespective of habitat.

SPECIMEN DEPOSITION

Specimens collected are deposited in the Queensland Museum (QM), Brisbane; Western Australian Museum (WAM), Perth; and the Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum, National University of Singapore. Primary types of new taxa are kept in the QM.

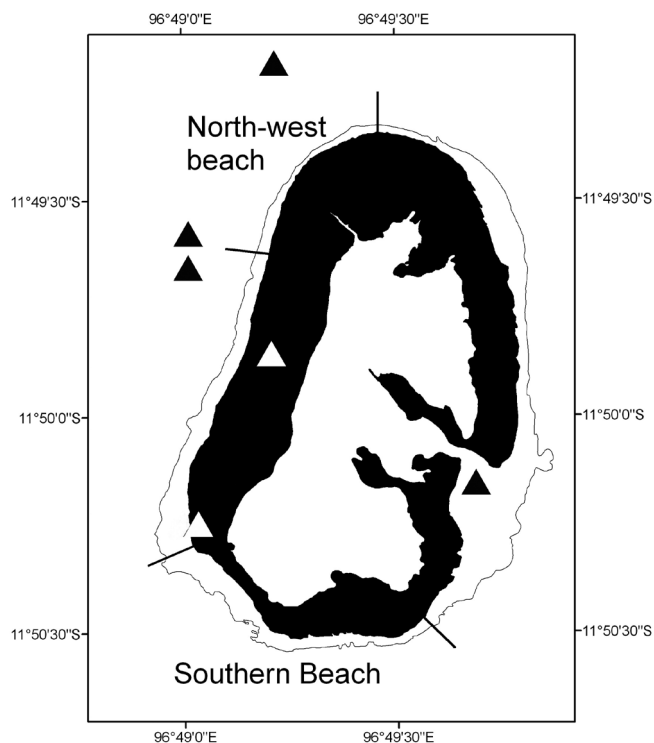


Fig. 3. Map of Cocos (Keeling) Islands - North Keeling Island, showing survey locations, triangle = 2012 (adapted from Whiting et al., 2014).

ACKNOWLEDGEMENTS

We would like to thank the following: Max Orchard, Mike Misso, Brenden Tiernan, Tanya Detto (Christmas Island National Park), Ismail Macrae, Trish Flores, Mohammad, Razak (Pulu Keeling National Park), for field assistance and being such patient field guides; Peter Davie, Shih Hsi-te, Tohru Naruse, Yoshihisa Fujita, Peter Ng and Leo Tan, for field companionship and assistance; Lisa Preston (Inidan Ocean Experiences), for local logistics and general information; Teruki Hamanaka and Lynnie, for dive logistics in Christmas Island; Dieter Gerhard and Tony Bagnell, for dive logistics in Cocos (Keeling) Islands; and funding from LKCNHM and NUS.

LITERATURE CITED

- Cogger H, Sadler R & Cameron E (1983) The terrestrial reptiles of Australia's Island Territories. Australian National Parks and Wildlife Service, Special Publication 11: 1–80.
- Whiting S, MacRae I, Thorn R, Murray W & Whiting AU (2014) Sea turtles of the Cocos (Keeling) Islands, Indian Ocean. Raffles Bulletin of Zoology, Supplement 30: this issue.

Table 1. Christmas Island 2010 field locality records.

Date	Christmas Island Field Location	Station No.	Time	GPS readings (S)	GPS readings (E)
22 January 2010	Flying Fish Cove	CI-01	afternoon	S10°25.815'	E105°40.180'
22 January 2010	Lily Beach	CI-02	afternoon	S10°28.011'	E105°42.688'
22 January 2010	Ethel Beach	CI-03	afternoon	S10°27.805'	E105°42.443'
22 January 2010	Lily Beach	CI-04	night	S10°28.011'	E105°42.688'
22 January 2010	Ethel Beach	CI-05	night	S10°27.805'	E105°42.443'
23 January 2010	The Grotto, Waterfall Road	CI-06	morning	S10°25.386'	E105°42.127'
23 January 2010	Waterfall Bay (Christmas Island Resort)	CI-07	afternoon	S10°27.54'	E105°42.30'
23 January 2010	Dolly Beach, along track	CI-08	afternoon	S10°31.272'	E105°40.512'
23 January 2010	Waterfall Bay (Christmas Island Resort)	CI-09	night	S10°27.54'	E105°42.30'
23 January 2010	The Grotto, Waterfall Road	CI-10	night	S10°25.386'	E105°42.127'
24 January 2010	Hosnie's Springs	CI-11	morning	S10°28.650'	E105°41.491'
24 January 2010	Greta Beach	CI-12	afternoon	S10°30.127'	E105°40.475'
25 January 2010	Ethel Beach	CI-13	night	S10°27.805'	E105°42.443'
27 January 2010	Whip Cave, Waterfall Road	CI-14	morning	S10°25.377'	E105°42.081'
27 January 2010	Runaway Cave, Waterfall Road	CI-15	morning	S10°25.386'	E105°42.063'
23 January 2010	road towards Dolly Beach	CI-16	afternoon		
28 January 2010	Runaway Cave, Waterfall Road	CI-17	morning	S10°25.386'	E105°42.063'
28 January 2010	Whip Cave, Waterfall Road	CI-18	morning	S10°25.377'	E105°42.081'
28 January 2010	Freshwater Cave, near The Blowholes	CI-19	afternoon	S10°30.796'	E105°37.448'
29 January 2010	Dolly Beach	CI-20	morning	S10°31.272'	E105°40.512'
30 January 2010	Whip Cave, Waterfall Road	CI-21	afternoon	S10°25.377'	E105°42.081'
30 January 2010	Runaway Cave, Waterfall Road	CI-22	night	S10°25.386'	E105°42.063'
30 January 2010	Waterfall Bay (Christmas Island Resort)	CI-23	night	S10°27.54'	E105°42.30'
31 January 2010	Whip Cave, Waterfall Road	CI-24	afternoon	S10°25.377'	E105°42.081'
31 January 2010	Daniel Roux Cave, Smith Point	CI-25	afternoon	S10°26.328'	E105°39.792'
31 January 2010	Territory Day Park, Drumsite	CI-27	afternoon		
1 February 2010	Whip Cave, Waterfall Road	CI-26	afternoon	S10°25.377'	E105°42.081'
1 February 2010	The Blowholes	CI-28	night	S10°30.861'	E105°37.358'
2 February 2010	Daniel Roux Cave, Smith Point	CI-29	afternoon	S10°26.328'	E105°39.792'
2 February 2010	Whip Cave, Waterfall Road	CI-30	afternoon	S10°25.377'	E105°42.081'
2 February 2010	Ethel Beach	CI-31	afternoon	S10°27.805'	E105°42.443'
3 February 2010	Hugh's Dale	CI-32	afternoon	S10°28.716'	E105°33.556'
3 February 2010	Merrial Beach	CI-33	afternoon	S10°28.455'	E105°33.551'
3 February 2010	Anderson's Dale	CI-34	afternoon	S10°29.034'	E105°33.333'
3 February 2010	Whip Cave, Waterfall Road	CI-35	afternoon	S10°25.377'	E105°42.081'
4 February 2010	on road to Airport	CI-36	afternoon		
25 January 2010	Rhoda Wall	CI-D-01	morning	S10°27.729'	E105°37.283'
25 January 2010	Thunderdome Cave	CI-D-02	morning	S10°27.906'	E105°36.465'

Table 1. Cont'd.

Date	Christmas Island Field Location	Station No.	Time	GPS readings (S)	GPS readings (E)
27 January 2010	Coconut Point	CI-D-03	morning	S10°24.741'	E105°41.868'
27 January 2010	Middle Beach	CI-D-04	morning	S10°27.464'	E105°38.079'
28 January 2010	Northwest Point	CI-D-05	morning	S10°26.467'	E105°33.273'
28 January 2010	West White Cave, off West White Beach	CI-D-06	morning	S10°27.733'	E105°35.054'
28 January 2010	beach foray, West White Beach	CI-D-07	morning	S10°27.733'	E105°35.054'
29 January 2010	West White Cave, off West White Beach	CI-D-08	afternoon	S10°27.733'	E105°35.054'
29 January 2010	Thundercliff Cave. 6 m depth, 10–15 m wide airpocket	CI-D-09	afternoon	S10°27.964'	E105°36.404'
29 January 2010	West White Cave, off West White Beach	CI-D-10	night	S10°27.733'	E105°35.054'
30 January 2010	Thunderdome Cave	CI-D-11	morning	S10°27.906'	E105°36.465'
30 January 2010	Thundercliff Cave. 6 m depth, 10–15 m wide airpocket	CI-D-12	morning	S10°27.964'	E105°36.404'
30 January 2010	Daniel Roux Cave, Smith Point	CI-D-13	morning	S10°26.315'	E105°39.699'
30 January 2010	Thunderdome Cave	CI-D-14	morning	S10°27.906'	E105°36.465'
1 February 2010	Perpendicular Wall	CI-D-15	morning	S10°26.722'	E105°33.641'
1 February 2010	Barracuda Bay	CI-D-16	morning	S10°27.984'	E105°36.146'
1 February 2010	Flying Fish Cove	CI-D-17	night	S10°25.815'	E105°40.180'
2 February 2010	Flying Fish Cove	CI-D-18, CI-D-19	morning	S10°25.815'	E105°40.180'

Table 2. Christmas Island 2011 field locality records.

Date	Christmas Island Field Location	Station No.	Time	GPS readings (S)	GPS readings (E)
19 March 2011	Flying Fish Cove	CI-01-2011	afternoon	S10°25.815'	E105°40.180'
19 March 2011	at the Hook sculpture	CI-02-2011	afternoon	S10°24.994'	E105°40.474'
19 March 2011	Ethel Beach	CI-03-2011	night	S10°27.805'	E105°42.443'
20 March 2011	Merial Beach	CI-04-2011	afternoon	S10°28.455'	E105°33.551'
20 March 2011	Flying Fish Cove	CI-05-2011	night	S10°25.815'	E105°40.180'
21 March 2011	Freshwater Cave, near The Blowholes	CI-06-2011	morning	S10°30.795'	E105°37.453'
21 March 2011	on road to The Blowholes	CI-07-2011	morning		
21 March 2011	on road near Margaret Knoll	CI-08-2011	morning	S10°28.406'	E105°40.709'
21 March 2011	Ethel Beach	CI-09-2011	afternoon	S10°27.805'	E105° 42.443'
22 March 2011	Freshwater Cave, near The Blowholes	CI-10-2011	morning	S10°30.795'	E105°37.453'
22 March 2011	Runaway Cave, Waterfall road	CI-11-2011	morning	S10°25.391'	E105°42.062'
22 March 2011	Hole 19 Cave, near the Golf course	CI-12-2011	morning	S10°25.493'	E105°42.074'
22 March 2011	Merial Beach	CI-13-2011	afternoon	S10°28.455'	E105°33.551'
23 March 2011	Freshwater Cave, near The Blowholes	CI-14-2011	morning	S10°30.795'	E105°37.453'
23 March 2011	Runaway Cave, Waterfall road	CI-15-2011	morning	S10°25.391'	E105°42.062'
23 March 2011	Hole 19 Cave, near the Golf course	CI-16-2011	morning	S10°25.492'	E105°42.074'
23 March 2011	Waterfall Bay (Christmas Island Resort)	CI-17-2011	afternoon	S10°27.54'	E105°42.30'
24 March 2011	Freshwater Cave, near The Blowholes	CI-18-2011	morning	S10°30.795'	E105°37.453'
24 March 2011	Runaway Cave, Waterfall road	CI-19-2011	morning	S10°25.391'	E105°42.062'
24 March 2011	Whip Cave, Waterfall Road	CI-20-2011	morning	S10°25.377'	E105°42.081'
24 March 2011	Hole 19 Cave, near the Golf course	CI-21-2011	morning	S10°25.493'	E105°42.074'
24 March 2011	Waterfall Bay (Christmas Island Resort)	CI-22-2011	evening	S10°27.54'	E105°42.30'
25 March 2011	Freshwater Cave, near The Blowholes	CI-23-2011	morning	S10°30.795'	E105°37.453'
25 March 2011	Hole 19 Cave, near the Golf course	CI-24-2011	morning	S10°25.493'	E105°42.074'
25 March 2011	Runaway Cave, Waterfall road	CI-25-2011	morning	S10°25.391'	E105°42.062'
25 March 2011	Whip Cave, Waterfall Road	CI-26-2011	morning	S10°25.377'	E105°42.081'
25 March 2011	Waterfall Bay (Christmas Island Resort)	CI-27-2011	evening	S10°27.54'	E105°42.30'
26 March 2011	Freshwater Cave, near The Blowholes	CI-28-2011	morning	S10°25.391'	E105°37.453'
26 March 2011	Whip Cave, Waterfall Road	CI-29-2011	morning	S10°25.377'	E105°42.081'
27 March 2011	Freshwater Cave, near The Blowholes	CI-30-2011	morning	S10°30.795'	E105°37.453'
27 March 2011	Whip Cave, Waterfall Road	CI-31-2011	morning	S10°25.377'	E105°42.081'
27 March 2011	Runaway Cave, Waterfall road	CI-32-2011	morning	S10°25.391'	E105°42.062'
27 March 2011	Greta Beach	CI-33-2011	evening	S10°30.127'	E105°40.475'
27 March 2011	Southpoint	CI-34-2011	afternoon	S10°33.034'	E105°38.949'
28 March 2011	Freshwater Cave, near The Blowholes	CI-35-2011	morning	S10°30.795'	E105°37.453'
28 March 2011	Whip Cave, Waterfall Road	CI-36-2011	morning	S10°25.377'	E105°42.081'
28 March 2011	Runaway Cave, Waterfall road	CI-37-2011	morning	S10°25.391'	E105°42.062'
28 March 2011	Ethel Beach	CI-38-2011	evening	S10°27.805'	E105°42.443'

Table 2. Cont'd.

Date	Christmas Island Field Location	Station No.	Time	GPS readings (S)	GPS readings (E)
28 March 2011	Lily Beach	CI-39-2011	evening	S10°28.011'	E105°42.688'
28 March 2011	Greta Beach	CI-40-2011	evening	S10°30.127'	E105°40.475'
29 March 2011	Grant's well	CI-41-2011	afternoon	S10°28.888'	E105°39.127'
22 March 2011	Northwest Point (5–22.3 m depth)	CI-D01-2011	morning	S10°26.683'	E105°33.622'
22 March 2011	Thundercliff Cave (1–8 m depth)	CI-D02-2011	morning	S10°27.964'	E105°36.404'
24 March 2011	Ethel Beach (3–27.5 m depth)	CI-D03-2011	morning	S10°27.805'	E105°42.443'
25 March 2011	Thunderdome Cave (3–16.6 m depth)	CI-D04-2011	morning	S10°27.906'	E105°36.465'
25 March 2011	West White Cave, off West White Beach (1–12.3 m depth)	CI-D05-2011	morning	S10°27.733'	E105°35.054'
26 March 2011	Thunderdome Cave (3–16.6 m depth)	CI-D06-2011	morning	S10°27.906'	E105°36.465'
26 March 2011	West White Beach	CI-D07-2011	morning	S10°27.733'	E105°35.054'
26 March 2011	West White Cave, off West White Beach (1–12.3 m depth)	CI-D08-2011	morning	S10°27.733'	E105°35.054'
27 March 2011	Thunderdome Cave (3–16.6 m depth)	CI-D09-2011	afternoon	S10°27.906'	E105°36.465'
27 March 2011	West White Cave, off West White Beach (1–12.3 m depth)	CI-D10-2011	afternoon	S10°27.733'	E105°35.054'
27 March 2011	Flying Fish Cove	CI-D11-2011	evening	S10°25.815'	E105°40.180'
28 March 2011	Thunderdome Cave (3–16.6 m depth)	CI-D12-2011	afternoon	S10°27.906'	E105°36.465'
28 March 2011	West White Cave, off West White Beach (1–12.3 m depth)	CI-D13-2011	afternoon	S10°27.733'	E105°35.054'
29 March 2011	perpendicular wall	CI-D14-2011	morning	S10°26.722'	E105°33.641'
29 March 2011	Boat Cave	CI-D15-2011	morning		
29 March 2011	Flying Fish Cove	CI-D16-2011	evening	S10°25.815'	E105°40.180'
30 March 2011	Thunderdome Cave (3–16.6 m depth)	CI-D17-2011	afternoon	S10°27.906'	E105°36.465'
30 March 2011	Rhoda Wall, off Rhoda Beach (5–16 m depth)	CI-D18-2011	afternoon	S10°27.729'	E105°37.283'
30 March 2011	Flying Fish Cove	CI-D19-2011	evening	S10°25.815'	E105°40.180'

Table 3. Cocos (Keeling) Islands 2011 field locality records.

Date	Location	Station	GPS readings (S)	GPS readings (E)
19 March 2011	Tanjong Puji, West Island	CK1	S12°11.589'	E96°51.549'
20 March 2011	Beach and reef near Airport, outside of lagoon, Settlement, West Island	CK2	S12°11.343'	E96°49.714'
20 March 2011	Tanjong Puji, West Island	CK3	S12°11.589'	E96°51.549'
20 March 2011	Trannies Beach, West Island	CK4	S12°08.507'	E96°49.095'
20 March 2011	North Point, near jetty, Hujung Tanjung, West Island	CK5	S12°08.254'	E96°49.405'
20 March 2011	Alor Penyu, outside of lagoon, West Island	CK6	S12°09.511'	E96°49.249'
20 March 2011	Trannies Beach, West Island	CK7 & 8	S12°08.507'	E96°49.095'
21 March 2011	off William Keeling Crescent, Settlement, West Island	CK9	S12°11.544'	E96°49.884'
21 March 2011	Anchorage, SW of Direction Island (8.6 m depth)	CK10	S12°06.020'	E96°51.479'
21 March 2011	Lion Cave Point, W of Direction Island (30.9 m depth)	CK11	S12°05.335'	E96°52.353'
21 March 2011	southern beach of Direction Island	CK12		
21 March 2011	south of Direction Island (15.8 m depth)	CK13	S12°05.722'	E96°52.893'
21 March 2011	WSW of Rumah Baru (Boat Launch), West Island	“Uca corner”	S12°10.492'	E96°49.282'
22 March 2011	near Rumah Baru (Boat Launch), West Island	CK14		
22 March 2011	behind Airport (Lagoon side), next to rubbish dump, West Island	CK15	S12°10.913'	E96°49.804'
22 March 2011	lagoon side from Airport near Meteorological Station, West Island	CK16		
22 March 2011	Lion Cave Point, W of Direction Island (28.9 m depth)	CK17	S12°05.722'	E96°52.893'
22 March 2011	The Rip, SW of Direction Island (5.7 m depth)	CK18	S12°05.675'	E96°53.175'
22 March 2011	South of Direction Island (6.9 m depth)	CK19	S12°05.503'	E96°52.904'
23 March 2011	Horsburgh Island	CK20		
23 March 2011	Lion Cave Point, W of Direction Island (29.1 m depth)	CK21	S12°05.722'	E96°52.893'
23 March 2011	off Rumah Baru (Boat Launch) (4.3 m depth)	CK22	S12°09.111'	E96°50.357'
23 March 2011	off North Point (13.1 m depth)	CK23	S12°07.670'	E96°51.813'
24 March 2011	WSW of Rumah Baru (Boat Launch), West Island	CK24	S12°10.492'	E96°49.282'
24 March 2011	off William Keeling Crescent, Settlement, West Island	CK25	S12°11.544'	E96°49.884'
24 March 2011	lagoon side from Airport near Meteorological Station, West Island	CK26		
24 March 2011	near Rumah Baru (Boat Launch), West Island	CK27		
25 March 2011	off William Keeling Crescent, Settlement, West Island	CK28	S12°11.544'	E96°49.884'

Table 4. Christmas Island 2012 field locality records.

Date	Christmas Island Field Location	Station No.	Time	GPS readings (S)	GPS readings (E)
3 February 2012	road towards Christmas Is. Resort	CI3-01	night	S10°27.213'	E105°42.239'
3 February 2012	Ethel Beach	CI3-02	night	S10°27.805'	E105°42.443'
4 February 2012	Waterfall Bay	CI3-03	afternoon	S10°27.54'	E105°42.239'
4 February 2012	Ethel Beach	CI3-04	night	S10°27.805'	E105°42.443'
5 February 2012	Greta Beach	CI3-05	morning	S10°30.127'	E105°40.475'
5 February 2012	Whip Cave	CI3-06	afternoon	S10°25.377'	E105°42.081'
5 February 2012	Waterfall Bay	CI3-07	night	S10°27.54'	E105°42.30'
6 February 2012	Hugh's Dale	CI3-08	afternoon	S10.474941	E105.561576
7 February 2012	Whip Cave	CI3-09	morning	S10°25.377'	E105°42.081'
7 February 2012	Grotto	CI3-10	morning	S10°27.041'	E105°42.349'
7 February 2012	Freshwater Cave	CI3-11	afternoon	S10°30.795'	E105°37.453'
8 February 2012	Ross' Hill near pumphouse	CI3-12	morning	S10°31.149'	E105°40.452'
8 February 2012	Flying Fish Cove (intertidal)	CI3-13	afternoon	S10°25.792'	E105°40.028'
9 February 2012	Flying Fish Cove (intertidal)	CI3-14	early morning	S10°25.792'	E105°40.028'
10 February 2012	Flying Fish Cove (intertidal)	CI3-15	early morning	S10°25.792'	E105°40.028'
11 February 2012	Flying Fish Cove (intertidal)	CI3-16	early morning	S10°25.792'	E105°40.028'
11 February 2012	Flying Fish Cove (in coral rocks/rubble; infauna)	CI3-17	early morning	S10°25.792'	E105°40.028'
11 February 2012	Runaway Cave	CI3-18	afternoon	S10°25.391'	E105°42.062'
11 February 2012	Whip Cave	CI3-19	afternoon	S10°25.377'	E105°42.081'
11 February 2012	Grotto	CI3-20	afternoon	S10°27.041'	E105°42.349'
12 February 2012	Freshwater Cave	CI3-21	morning	S10°30.795'	E105°37.452'
12 February 2012	Lily Terraces	CI3-22	afternoon	S10°28.125'	E105°42.715'
13 February 2012	Waterfall Bay (intertidal)	CI3-23	early morning	S10°27.54'	E105°42.30'
13 February 2012	Lily Terraces	CI3-24	morning	S10°28.125'	E105°42.715'
14 February 2012	Flying Fish Cove (intertidal)	CI3-25	early morning	S10°25.792'	E105°40.028'
14 February 2012	Lily Terraces	CI3-26	morning	S10°28.125'	E105°42.715'
15 February 2012	Runaway Cave	CI3-27	afternoon	S10°25.391'	E105°42.062'
15 February 2012	Freshwater Cave	CI3-28	afternoon	S10°30.795'	E105°37.452'
15 February 2012	Greta Beach	CI3-29	evening	S10°30.127'	E105°40.475'
16 February 2012	Lily Terraces	CI3-30	morning	S10°28.125'	E105°42.715'
15 February 2012	Flying Fish Cove, west side	CI3-D01	morning	S10°25.815'	E105°40.180'
15 February 2012	West White Cave	CI3-D02	morning	S10°27.733'	E105°35.054'
15 February 2012	Thunderdome Cave	CI3-D03	afternoon	S10°27.906'	E105°36.465'
15 February 2012	Thundercliff Cave	CI3-D04	afternoon	S10°27.964'	E105°36.404'
15 February 2012	Flying Fish Cove, near Smith Point	CI3-D05	evening	S10°25.815'	E105°40.180'
15 February 2012	Thundercliff Cave	CI3-D06	night	S10°27.964'	E105°36.404'
16 February 2012	Thundercliff Cave	CI3-D07	morning	S10°27.964'	E105°36.404'
16 February 2012	Thundercliff Cave entrance	CI3-D08	morning	S10°27.964'	E105°36.404'
16 February 2012	Thunderdome Cave	CI3-D09	morning	S10°27.906'	E105°36.465'

Table 5. Cocos (Keeling) Islands 2012 field locality records.

Date	Cocos (Keeling) Islands Location	Station No.	GPS readings (S)	GPS readings (E)
5 February 2012	West Island, southern lagoon-side, past Scout Park	CK2-01	S12°11.592'	E96°51.570'
5 February 2012	West Island, lagoon-side, east of end of airport, near Merry-go-round structure	CK2-02	S12°12.041'	E96°50.467'
5 February 2012	off northern tip of Direction Island, Two Caves (dive)	CK2-03	S12°05.326'	E96°52.334'
5–6 February 2012	West Island, next to west side of airport, the Lagoon accommodation environs	CK2-04	S12°11.472'	E96°49.916'
5 February 2012	West Island, northern tip, old jetty (dive)	CK2-05	S12°08.254'	E96°49.395'
6 February 2012	West Island, central part, new jetty	CK2-06		
6 February 2012	Centre Beacon, near middle of lagoon (dive)	CK2-07	S12°07.766'	E96°51.793'
6 February 2012	Direction Island, lagoon side (dive)	CK2-08	S12°05.713'	E96°52.869'
6 February 2012	West Island, westward reef flats, behind Tropika Restaurant	CK2-09	S12°11.297'	E96°49.726'
7 February 2012	West Island, lagoon-side shore next to meteorological station	CK2-10	S12°11.290'	E96°50.083'
8 February 2012	North Keeling Island, within 500 m radius of landing point on wet side	CK2-11		
8 February 2012	North Keeling Island, west side, dive just north of landing site	CK2-12	S11°49.782'	E96°49.039'
8 February 2012	North Keeling Island, west side, dive just south of landing site	CK2-13	S11°49.782'	E96°49.039'
8 February 2012	North Keeling Island, Parks camp site at central west side of lagoon	CK2-14		
8 February 2012	North Keeling Island, Lagoon	CK2-15		
8 February 2012	North Keeling Island, outside Lagoon channel	CK2-16		
8 February 2012	North Keeling Island, west to southwest coast, intertidal area	CK2-17	S11°49.782'	E96°49.039'
9 February 2012	North Keeling Island, northwest side (dive)	CK2-18		
8 February 2012	West Island, Trannies Beach	CK2-19		
9 February 2012	West Island, seagrass area next to golf course, lagoon side	CK2-20		
11 February 2012	West Island, Trannies Beach	CK2-21		
11 February 2012	West Island, seagrass area next to golf course, lagoon side	CK2-22		