

FINAL BASIC ASSESSMENT REPORT FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 10B BY TRANS ATLANTIC DIAMONDS (PTY) LTD

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TRANS ATLANTIC
DIAMONDS

Appendix 6: CVs of Specialists

Aiden Biccard
Dr Kenneth Hutchings
Kevin Schmidt
Michael Artimage
Julia Ndou
John Gribble

Anchor Environmental Consultants
8 Steenberg House, Silverwood Close, Tokai, South Africa
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CURRICULUM VITAE

AIDEN BICCARD

BORN: 3 April 1985, Cape Town, South Africa

AGE: 36 years

NATIONALITY: South African

ACADEMIC QUALIFICATIONS:

MSc. Marine Zoology, 2012, University of Cape Town

BSc. (Hons) Marine Ecology, 2007, University of Cape Town

BSc. Botany and Zoology, 2006, University of Cape Town

OTHER QUALIFICATIONS: Medically in date scientific/commercial class IV diver, class IV diving supervisor, category C small craft skipper with dive endorsement, VHF short-range radio operator.

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Good)

COUNTRY EXPERIENCE: South Africa, Namibia, Mozambique, Republic of Congo.

POSTAL ADDRESS: 8 Steenberg House, Silverwood Close, Tokai 7945

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EMAIL: Aiden@anchorenvironmental.co.za

EMPLOYMENT HISTORY: 2012-Present – Marine Invertebrate Specialist/Marine Biologist Consultant, Anchor Environmental Consultants

2007-2012 – Part-time Research Assistant/Demonstrator, University of Cape Town & Anchor Environmental

SUMMARY PROFILE

Aiden has more than ten years of research and consulting experience in the fields of marine and estuarine research and management, invertebrate systematics and taxonomy, specialist marine impact assessments, hydrocarbon, antifoulant and trace metal pollution and physico-chemical, ecological and biodiversity surveys of marine, estuarine and freshwater benthic habitats, mariculture and various fisheries surveys. He has recently reviewed the barnacle fauna of South Africa and has undertaken the specialist role of invertebrate taxonomist for various local and international clients. Aiden is author of 5 peer-reviewed scientific publications and many specialist reports in his capacity as a taxonomist. Aiden has undertaken biodiversity field surveys and assessments in South Africa, Namibia, Republic of Congo, Somaliland and Mozambique. Aiden also has more than 15 years working experience as a class IV scientific diver/supervisor and small craft skipper.

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS

Member of The Golden Key Honour Society (2007-)

Member of The South African Society of Systematic Biology (2008-)

SELECTED PROJECT EXPERIENCE

Date	Client	Country	Task
2014-present	De Beers Marine Namibia	Namibia	<p>De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining License Area: Annual Benthic Sampling Campaign</p> <p>Project Leader – Survey techniques include the use of a Van Veen grab, sediment and water quality instruments, manned submersible surveys, drop camera and benthic tow camera systems. Identify benthic invertebrate macrofauna, analysis of underwater video footage, statistical analyses and writing of report.</p>
2022	Anglo American/NatureMetrics	Namibia	<p>DNA-based sampling (eDNA & metabarcoding) analyses for marine benthic fauna and sediment fauna at the Atlantic 1 marine mining site operated by Debmarine Namibia (DBMN).</p> <p>Project Leader – Sampling techniques include the use of a Van Veen grab and various sediment and water quality instruments; collection and preservation of water and sediment eDNA samples; collection, preservation and identification of voucher specimens for metabarcoding.</p>
2022	Transnet National Ports Authority	South Africa	<p>Baseline survey marine fauna, flora and antifouling contaminants Port of Durban.</p> <p>Invertebrate specialist - collection, preservation and identification of invertebrates. Data analysis and report writing.</p>
2021	WSP/DP World	Somaliland	<p>Coral relocation feasibility study as part of the upgrade of Berbera Port, Somaliland</p> <p>Marine biologist and scientific diver.</p>
2021	NAMDEB	Namibia	<p>NAMDEB's Offshore Environmental Monitoring Programme in the Midwater Mining License Area: Annual Benthic Sampling campaign</p> <p>Project leader - Conceptualisation of study involving site selection and experimental design. Lead a team of 9 assistants to collect and preserve grab and sediment samples aboard a survey vessel for 1 month at sea. Identify benthic invertebrate macrofauna. Analyse data and prepare report.</p>

2021	South Africa	WWF-South Africa	Environmental Specialist Benthic Monitoring programme for the Saldanha Bay Aquaculture Development Zone. Invertebrate specialist - collection, preservation and identification of invertebrates.
2020	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Environmental Specialist Monitoring of the Saldanha Bay Aquaculture Development Zone. Invertebrate specialist, scientific diver.
2019-2020	South African National Parks	South Africa	Subtidal surveys of commercially important and indicator invertebrate and fish species within the Table Mountain Marine Protected Area. Scientific diver and supervisor.
2014-present	Pisces Environmental	Namibia	Sandy beach macrofauna and sediment quality monitoring programme for the Elizabeth Bay Mining Licence Area, Namibia. Intertidal rocky shore, sandy beach and subtidal field surveys – data collection, collect and preserve invertebrate samples.
2018	Republic of Congo	The Biodiversity Company, Sintoukola Potash	Oceanographic and benthic surveys and ecotoxicity trials to assess potential impacts of proposed potash processing discharge, jetty construction and transhipment of product. Invertebrate specialist - collection, preservation and identification of invertebrates.
2012-present	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	South Africa	Annual State of the Bay Monitoring programme (Saldanha and St. Helena Bay). Invertebrate specialist - collection, preservation and identification of invertebrates. Rocky shore intertidal surveys. Initiating new data collection and survey programmes. Statistical analyses and writing of report.
2018	Council for Geoscience /Department of Mineral Resources	South Africa	Desktop study of the potential impacts of marine and coastal mining on marine ecosystems and marine biota in South Africa Project Leader and Principal Author.
2018	Mainport Africa Shipping	South Africa	Assessment of Biofouling Community of the NM Cherry Blossom. Project Leader – Supervision of team for project execution. Identify benthic invertebrate macrofauna, statistical analyses and writing of report.

2018	Republic of Congo	The Biodiversity Company, Kola Potash	<p>Oceanographic and benthic surveys and ecotoxicity trials to assess potential impacts of proposed potash processing discharge, jetty construction and transhipment of product.</p> <p>Senior consultant - collect, preserve and identify invertebrate specimens.</p>
2012-present	Umhlatuze Water	South Africa	<p>Environmental monitoring of the Richards Bay Pipelines.</p> <p>Senior consultant. Invertebrate specialist.</p>
2016-2017	Department of Water and Sanitation	South Africa	<p>Classification of and resource quality objectives for the water resources of the Berg and Breede water management areas.</p> <p>Senior consultant responsible for status quo descriptions of estuaries in the two study areas and invertebrate specialist for ecological reserve determination studies on nine estuaries.</p>
2016	De Beers Marine Namibia/University of Namibia	Namibia	<p>The use of underwater video footage as a tool in the assessment of mining related impacts on the hard-bottom benthic environment in Southern Namibia</p> <p>Student supervisor for a Masters Project at the University of Namibia – experimental design and development of a method to assess video footage collected aboard the manned submersible, JAGO.</p>
2016	De Beers Marine Namibia	Namibia	<p>Screen monitoring on De Beers Marine Namibia mining vessels in the Atlantic 1 Mining Licence Area: a pilot study.</p> <p>Project Leader – Experimental design and conceptualisation. Development and implementation of screen monitoring protocol of biota aboard mining vessels.</p>
2016	Tongaat Hulett Developments	South Africa	<p>Marine ecology impact assessment for a proposed beach enhancement initiative at Tinley Manor.</p> <p>Intertidal Sandy beach field surveys – collect and preserve invertebrate samples, photographic survey of intertidal and subtidal habitat.</p>
2015-2016	NAMDEB	Namibia	<p>NAMDEB's Offshore Environmental Monitoring Programme in the Midwater Mining License Area: Annual Benthic Sampling campaign</p> <p>Conceptualisation of study involving site selection and experimental design. Lead a team of 9 assistants to collect and preserve grab and sediment samples aboard a survey vessel for 1 month at sea. Identify benthic invertebrate macrofauna.</p>
2015	Department of Water and Sanitation	South Africa	<p>Determination of the Ecological Reserve for the Klein Estuary</p> <p>Invertebrate Specialist – collect, preserve and identify invertebrate specimens and assess health of</p>

			the estuary based on results. Present findings at a workshop.
2015	Bergstan South Africa Consulting and Development Engineers	Mozambique	Environmental scoping study for proposed upgrades to the cruise liner landing facilities at Portuguese Island, Mozambique Project Leader - photographic survey of intertidal and subtidal habitat, data analysis, report write-up.
2015	Pisces Environmental Services	Namibia	Gecko Namibia Vision Industrial Park Development. Conduct baseline field survey of ichthyofauna using beach seine net.
2014-2016	Transnet National Ports Authority/Nemai Consulting	South Africa	Baseline Environmental Monitoring of Sand Banks in the Port of Durban Field survey assistant for the implementation of a water, sediment quality and biological monitoring programme in the Port of Durban.
2014	SRK Consulting	South Africa	Marine Ecology Specialist Study and Impact Assessment for Upgrades to Seawater Intake and Transfer Infrastructure at the Tronox Namakwa Sands Mine Project Leader – photographic survey of rocky shore habitat, data analysis, report write-up.
2014	Coastal & Environmental Services	South Africa	Zirco Roode Heuwel Mine, Northern Cape, South Africa. Marine Specialist Study and Impact Assessment Project Leader - transect and quadrat sampling of rocky shore habitat, data analysis, report write-up.
2014, 2016	Port Nolloth Sea Farms Ranching (PTY) LTD.	South Africa	Baseline survey and monitoring plan for abalone ranching concession area NC3 Subtidal ecological survey.
2013	Cape Nature, Department of Environmental Affairs	South Africa	Assessment of impacts of an oil spill on sandy beach and rocky intertidal communities in the Goukamma MPA. Invertebrate specialist – collect, preserve and identify invertebrates, train interns at DAFF on identification techniques.
2013	Transnet National Ports Authority	South Africa	TNPA Alien Invasive Species Survey (Coega) Collection, preservation and identification of invertebrates.

2013, 2015-2016	Department of Agriculture, Forestry & Fisheries (DAFF)	South Africa	Diving Surveys of the Eastern Cape Abalone Resource. Subtidal abalone counts (transects) on snorkel
2012	A. R. Brink and Associates	South Africa	Identification and Age Estimation of Fouling Cirripedia Collected from M. V. "DD Vogue"
2012	Department of Agriculture, Forestry & Fisheries (DAFF)	South Africa	Algoa Bay fin fish mariculture (DAFF) Deployment, recovery and servicing of ADCP's and thermistor strings. Single-beam echo bathymetry survey. Grab sample collection of benthic macrofauna. Preservation and identification of invertebrate fauna.
2012	Ethekwini Municipality	South Africa	Baseline Survey and EIA for Umhlanga Rocks tidal pool. Transect and quadrat sampling of rocky shore habitat.
2012	Henwood & Nxumalo Consulting Engineers	South Africa	Environmental Impact Assessment of Mzinto Bridge Repair. Project Leader - collection, preservation and identification of invertebrates. Statistical analyses and writing of report.
2012	Nemai Consulting	South Africa	Specialist study to assess marine ecological impacts of offshore sand winning associated with the deepening, lengthening and widening of berth 203 to 205, container terminal, Port of Durban. Research and analysis of data, report writing.
2012	Cape Action Plan for People & the Environment/Cape Nature/Marine & Coastal Management (MCM)	South Africa	Gouritz Estuary Management Plan Review. Review and evaluate proposed EMP according to the National Estuary Management Protocol. Present findings at a workshop.
2012	Pisces Environmental	Namibia	Annual Rocky intertidal and sandy beach biota of Namibia's Pocket Beaches (NAMDEB Diamond Company, Namibia). Field work, statistical analyses and report writing.
2012	Pisces Environmental	Namibia	Scientific Diver and Supervisor for Bogenfels subtidal reef survey (NAMDEB Diamond Company, Namibia). Field work (identify and quantify subtidal reef species).
2012	Cape Action Plan for People & the Environment/Cape Nature/Marine & Coastal Management (MCM)	South Africa	Rapid determination of the Environmental Water Requirements for the Uilkraals Estuary. Identify invertebrate specimens and assess health of the estuary based on results. Present findings at a workshop.

Feb 2012	Various companies	South Africa	<p>Marine specialist report and impact assessment for the reverse osmosis plant at Plettenberg Bay.</p> <p>Fish counts on SCUBA. Collection, preservation and identification of invertebrates. Statistical analyses and writing of report.</p>
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PUBLICATION RECORD

Scientific papers

Pfaff MC, Biccard A, Mvula PE, Olbers J, Mushanganyisi K, Macdonald A, Samaai T. (2022). Giants and titans: first records of the invasive acorn barnacles *Megabalanus tintinnabulum* (Linnaeus, 1758) and *Megabalanus coccopoma* (Darwin, 1854) on intertidal rocky shores of South Africa. *BioInvasions Records* 11 (in press).

Sedick S, Clarke D, Biccard A, Gihwala KA. (2022). A new species of Ninoe (Annelida: Lumbrineridae) from the continental shelf off southern Namibia. *Journal of the Marine Biological Association of the United Kingdom* (paper accepted February 2022).

Biccard, A. and Griffiths, C.L. (2016). Additions to the barnacle (Crustacea: Cirripedia) fauna of South Africa. *African Zoology* 51, 99-116.

Whitehead O, Biccard A & Griffiths CL. 2011. South African pelagic goose barnacles: substratum preferences and influence of plastic debris on abundance and distribution. *Crustaceana* 84 (5-6), 635-649.

Biccard A & Midgley JJ. 2009. Rodent pollination in *Protea nana*. *South African Journal of Botany* 75, 720–725.

Research Thesis

Biccard, A. 2012. Taxonomy, Systematics and Biogeography of South African Thoracic Cirripedia. MSc. Thesis, University of Cape Town, 160 pp.

Consulting Research Reports

Biccard A, Hutchings K, Wright AG, Mostert BM, Sedick S and Clark BM. 2020. The State of St Helena Bay 2020. Report No. AEC 1908/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the St Helena Bay Water Quality Trust. Pp 113.

Biccard, A., K. Gihwala, B.M. Clark, S. Sedick, C. Swart, E.A. Brown, B.P. Mostert, J. Dawson, S Mtsokoba, A. Makhosonke and K. Schmidt. 2021. De Beers Marine Namibia Benthic Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2019 Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1840/2

Biccard, A., K. Gihwala, B.M. Clark, S. Sedick, E.A. Brown, B.P. Mostert, C. Swart, S Mtsokoba, B. Tshingana, A. Masosonke and J. Dawson. 2020. De Beers Marine Namibia Environmental Monitoring Programme: Page 7 of 9

- Atlantic 1 Mining Licence Area 2018 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1807.
- Biccard A, K Gihwala, BM Clark, EA Brown, BP Mostert, A Masosonke, C Swart, S Sedick, B Tshingana and J Dawson. 2019. De Beers Marine Namibia Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2017 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. 1775/1.
- Biccard A, Gihwala K, Clark BM, Mostert B, Brown E, Hutchings K, Massie V and M Melidonis. 2018. Desktop study of the potential impacts of marine mining on marine ecosystems and marine biota in South Africa – Final report. Report prepared by Anchor Research & Monitoring (Pty) Ltd for Council for Geoscience. Report no. 1795/1.
- Biccard A, Gihwala K, Clark BM, Harmer RW, Brown EA, Mostert BP, Wright AG & A Masosonke. 2018. De Beers Marine Namibia Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2016 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. 1726/1.
- Biccard A, Clark BM, Brown EA, Duna O, Mostert BP, Harmer RW, Gihwala K & AG Wright. 2017. De Beers Marine Namibia Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2015 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. 1527/4.
- Biccard A, Clark BM & EA Brown. 2016. De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining Licence Area: 2014 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. 1527/4.
- Biccard A & BM Clark. 2016. De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining Licence Area: 2013 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. 1527/3.
- Biccard A & BM Clark. 2015. Environmental Scoping Study for Proposed Upgrades to the Cruise Liner Landing Facilities at Portuguese Island, Mozambique. Report prepared for Bergstan South Africa Consulting and Development Engineers.
- Biccard A. 2014. Snowgoose 2014 Grab Sampling Campaign – Observations and Review. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. pp. 8.
- Clark BM, Hutchings K, Biccard A, Turpie J, Dawson J, Gihwala K, Swart C, Sedick S, Wright A, Schmidt K, Weiss J, Makhosonke A, Mostert B, Brown E, Laird M, Conrad J, Parker A, Holloway M and Blecher I. 2021. The State of Saldanha Bay and Langebaan Lagoon 2021, Technical Report. Report No. AEC 1936/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2021.
- Clark BM, Hutchings K, Biccard A, Brown E, Dawson J, Laird M, Gihwala K, Swart C, Makhosonke A, Sedick S, Turpie J. and Mostert B. 2020. The State of Saldanha Bay and Langebaan Lagoon 2020, Technical Report. Report No. AEC 1876/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2020.
- Clark BM, Hutchings K, Wright AG, Mostert B, Brown E, Dawson J, Louw S, Biccard A & Massie V. 2020. Mhlathuze Water Environmental Monitoring Programme for the Richards Bay Offshore Outfalls Region 2019/2020 Survey, Technical Report. Report No. 1800/4 prepared by Anchor Research and Monitoring (Pty) Ltd for Mhlathuze Water, March 2020. 239pp (Appendix 1 Raw Data attached separately).
- Duna O, Clark BM, Biccard A, Hutchings K, Harmer R, Mostert B, Brown E, Massie V, Makunga M, Dlaku Z & A Makhosonke. 2016. Assessment of mining-related impacts on macrofaunal benthic communities in the Northern Inshore Area of Mining Licence Area MPT 25-2011 and subsequent recovery. Technical

- Report. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (PTY) Ltd. Report no. 1646/1.
- Huthings, K. & A Biccard 2015. Gecko Namibia Vision Industrial Park Development Baseline Field Survey Report: Surf Zone Fish. Prepared for: Pisces Environmental Services (Pty) Ltd.
- Laird MC, Biccard A & BM Clark. 2013. Marine Alien Invasive Species Survey Within the Port of Ngqura. Report prepared for Transnet National Ports Authority.
- Mostert BP, Biccard A, Duna O & BM Clark. 2016. Baseline survey of the benthic marine environment in the South African diamond mining Concession areas: 1B and 1C. Report prepared for Alexkor and Placer Resource Management by Anchor Environmental Consultants. Report no. 1696/1.
- Pulfrich A, Hutchings K, Biccard A & BM Clark. 2015. Survey of Sandy-Beach Macrofaunal Communities on the Sperrgebiet Coastline: Consolidated Beach Monitoring Report – 2015. Report to NAMDEB Diamond Corporation (Pty) Ltd. Oranjemund. Namibia. pp. 86.
- Pulfrich A, Hutchings K, Biccard A, Clark BM & MC Laird. 2014. Survey of Sandy-Beach Macrofaunal Communities on the Sperrgebiet Coastline. Consolidated Beach Monitoring Report: 2014. Prepared for: NAMDEB Diamond Corporation (Pty) Ltd.

CURRICULUM VITAE

KENNETH HUTCHINGS

Born: 15 June 1972, South Africa
Nationality: South African
Languages: English excellent/Afrikaans good/ Xhosa fair
Present occupation: Principal Consultant
Work address: 8, Steenberg House, Silverwood Close, Tokai 7945 South Africa
Drivers licence: Code 08, 30/07/1990
Commercial dive qualifications: Class III scientific, Supervisor
Commercial skippers ticket: Category B (< 9m, 40 NM, dive & night operations)
Email: ken@anchorenvironmental.co.za

SUMMARY PROFILE

Dr Hutchings has more than 25 years of research and consulting experience in the fields of fisheries management, mariculture, estuarine research and management, marine and estuarine spatial planning, marine impact assessment, research and conservation strategy development, fishery socio-economic surveys and analyses, biological sampling and life-history analyses of fish (age and growth, reproduction, mortality, migration, diet, ecology), taxonomic methodology, population genetics, fisheries modelling, marine ecotoxicity trials, trace metal pollution and physico-chemical, ecological and biodiversity surveys of marine, estuarine and freshwater habitats. Dr Hutchings is experienced in developing estuarine and coastal management plans and in conducting public participation processes. Dr Hutchings is a research associate of the University of Cape Town's Marine Research Institute. He has excellent verbal and writing communication skills, is competent with most software packages used in scientific research and consulting projects. He has published 19 scientific papers and compiled more than 100 consulting reports. Dr Hutchings is comfortable working as part of a team in both a leadership and mentoring position or as a team member. Dr Hutchings has participated in international collaborative studies in Angola, Tanzania, Namibia, Sierra Leone, Republic of Congo, Somaliland and Mauritius. He has practical experience in several fishing sectors and has good understanding of most commercial fishing methods (hand, line, spear, pole, gill net, trammel, net, beach seine net, trap, longline, trawl and purse-seine). He has personally collected scientific data for the demersal trawl and longline hake fisheries, designed, implemented and managed fishery observer training programmes for line, longline, lobster trap and demersal trawl fisheries. He has project managed and completed two, three-year contract research projects for the South African

Department of Environmental Affairs and Tourism (Marine and Coastal Management) and numerous consulting projects for state and private sector clients.

TERTIARY EDUCATION:

PhD Zoology – Fish taxonomy, life history, ecology and management, UCT (2005)

M.Sc. Zoology (with distinction) – Fisheries management, UCT (2000)

B.Sc. (Honours - First Class) Marine Biology, UCT (1997)

B.Sc. Zoology & Environmental and Geographical Science, University of Cape Town (1994)

Distinction in Zoology

RELEVANT WORK AND PROJECT EXPERIENCE

- Principal Consultant, Anchor Environmental Consultants (1999-2022)
- PhD student, Line-fish research (under contract to MCM) (2001-2005)
- Research officer, Zoology Department, University of Cape Town (1998-2000)
- Demersal Trawl Fishery, scientific observer, University of Cape Town (1995)
- Commercial squid (freezer vessel), line-fish crew (deck boat), ski boat crew/skipper, Beach-seine fishing crew, boat-skipper, shore skipper, B & K fishing CC. Messrs. G. William, M. Johnson & B. Docke (1986-2006)

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS

- Professional Natural Scientist, the South African Council for Natural Scientific Professions (2014-present)
- Research Associate Marine Research Institute, Department of Biological Science, University of Cape Town (2006-present)
- Associate Technical Consultant, Marine Stewardship Council (2019-present)
- Linefish Scientific Working Group (1999-2001)

SCIENTIFIC PUBLICATIONS

- ASCHE F, GARLOCK TM, AKPALU W, AMAECHINA EB, BOTTA R, CHUKWUONE NA, EGGERT H, HUTCHINGS K, LOKINA R, TIBESIGWA B & J K TURPIE 2020. Fisheries performance in Africa: An analysis based on data from 14 countries. *Marine Policy*, in press.
- HORTON M, KERWATH S, PARKER D, WINKER H, LAMBERTH S, & K. HUTCHINGS 2019 Age, growth and per-recruit stock-assessment of *Chelon richardsonii* in Saldanha Bay and Langebaan Lagoon, South Africa. *African Journal of Marine Science*, 41: 313-324
- PARKER D, SE KERWATH, TF NÆSJE, CJ ARENDSE, FJ KEULDER-STENEVIK, K HUTCHINGS, BM CLARK, H WINKER, PD COWLEY & CG ATTWOOD 2017. When plenty is not enough: an assessment of the white stumpnose (*Rhabdosargus globiceps*) fishery of Saldanha Bay, South Africa, *African Journal of Marine Science*, **39**:2, 153-166
- HUTCHINGS, K & C.G ATTWOOD 2013 Belman (*Umbrina robinsoni*) In: Mann BQ. (Ed). Southern African Marine Linefish Species Profiles. Special publication, Oceanographic Research Institute, Durban 9:165-166.
- HUTCHINGS, K. and M. H. GRIFFITHS 2010 - Life-history strategies of *Umbrina robinsoni* (Sciaenidae) in warm-temperate and sub-tropical South African marine reserves *African Journal of Marine Science* **32(1)**:37-53
- HUTCHINGS, K. and M. H. GRIFFITHS 2010 – Assessment of South African *Umbrina robinsoni* based on per-recruit models *African Journal of Marine Science* **32(3)**: 511–523
- HUTCHINGS, K. GRIFFITHS M. H. and S.J LAMBERTH 2010 - An investigation of the effect of temporal variation in growth rate of *Umbrina robinsoni* on biological reference point estimates calculated using per-recruit models. *African Journal of Marine Science* **32(3)**: 633–636
- CLARK, B.M., HUTCHINGS, K., and S.J. LAMBERTH 2009. Long-term variations in the composition and abundance of fish in the Berg estuary, South Africa. *Transactions of the Royal Society of south Africa* **64(2)**: 238-258
- LAMBERTH, S.J., VAN NIEKERK, L and K HUTCHINGS 2008 Comparison of, and the effects of altered freshwater inflow on, fish assemblages of two contrasting South African estuaries: the cool-temperate Olifants and the warm-temperate Breede. *African Journal of Marine Science* **30(2)**: 311–336.
- HUTCHINGS, K., CLARK, B.M., ATKINSON, L.J. and C. G. ATTWOOD 2008 - Evidence of recovery of the linefishery in the Berg River Estuary (Western Cape, South Africa) subsequent to closure of commercial gill netting. *African Journal of Marine Science*. **30(3)**: 507–517.

- HUTCHINGS, K., GRIFFITHS, M. H. and J. G. FIELD 2006 – Regional variation in the life history of the canary drum *Umbrina canariensis* (Sciaenidae), in South African waters. *Fisheries Research* **77**:312-325.
- GRIFFITHS, C. L., VAN SITTERT, L., BEST, P. B., BROWN, A. C., CLARK, B. M., COOK, P. A., CRAWFORD, R. J. M., DAVID, J. H. M., DAVIES, B. R., GRIFFITHS, M. H., HUTCHINGS, K., JERARDINO, A., KRUGER, N., LAMBERTH, S., LESLIE, R. W., MELVILLE-SMITH, R., TARR, R. and C. D. VAN DER LINGEN 2004 – Impacts of human activities on marine animal life in the Benguela: A historical overview. *Oceanogr. Mar. Biol. Ann. Rev.* **42**: 303-392.
- HUTCHINGS, K. and M. H. GRIFFITHS 2005 - Identity and distribution of southern African sciaenid fish species of the genus *Umbrina*. *African Journal of Marine Science* **27**(1): 1-22.
- HUTCHINGS, K. and S. J. LAMBERTH 2003 - The likely impacts of an eastward expansion of the gill-net fishery in the Western Cape, South Africa; Implications for Management. *Maine and Freshwater Research* **54**: 39-56.
- HUTCHINGS, K. and S. J. LAMBERTH 2002 – Catch and effort estimates for the gill and beach-seine net fisheries in the Western Cape, South Africa. *S. Afr. J. mar. Sci.* **24**: 205-225
- HUTCHINGS, K. and S. J. LAMBERTH 2002 - By-catch in the gill and beach-seine net fisheries in the Western Cape, South Africa, with implications for management. *S. Afr. J. mar. Sci.* **24**: 227-241
- HUTCHINGS, K., LAMBERTH, S. J. and J. K. TURPIE 2002 – Socio-economic characteristics of gill and beach-seine net fishers in the Western Cape, South Africa. *S. Afr. J. mar. Sci.* **24**: 243-262
- VAN TETS, I. G., HUTCHINGS, K. and S.W. NICHOLSON 2000 – Relative merits of using purified proteins and natural foods in studies of wildlife nutrition: the nitrogen requirements of a rodent pollinator. *African Zoology* **35**(2): 207-215.
- HUTCHINGS, K., LAMBERTH, S. J. and C. L. GRIFFITHS 1999 – Gill nets and line-fish, what is the catch? *SANCOR Occasional Report* **5**: 77-84

PROJECT EXPERIENCE

Period	Country	Client	Project, Tasks
2022	South Africa	Transnet National Ports Authority	Baseline survey marine fauna, flora and antifouling contaminants Port of Durban. Principal consultant responsible for project management and implementation.
2021-2022	South Africa	Diamond Coast Abalone	Environmental Monitoring and stock assessment for abalone ranching concession Area NC4, Northern Cape. Principal consultant responsible for project management and implementation.
2021-2022	South Africa	Department of Forestry, Fisheries and Environment (DFFE).	Specialist monitoring programme and management recommendations for the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project management and implementation.
2021-2022	South Africa	Department of Forestry, Fisheries and Environment (DFFE).	Review of independent stock assessment abalone ranching concession area EC1. Principal consultant responsible for review of stock assessment report, diving verification surveys and recommendations for sustainable future harvest quantities.
2021-2022	South Africa	Trans Atlantic Diamonds	Marine Specialist Studies and Basic Assessment Processes for offshore concession Areas 14A and 11C. Principal Consultant responsible for marine specialist reporting, basic assessment report review and oversight (EAP).
2021	South Africa	Nsovo Environmental Consulting	Marine ecology impact assessment for proposed DNG Energy (Pty) Ltd Busisiwe (Coega 1) and Cheyeza (Coega 2) Gas to Power facilities and associated infrastructure. Principal Consultant responsible for project review.
2021	South Africa	V&A Waterfront, Cape Town	Marine specialist study and dispersion modelling for the East Pier District cooling plant outfall at the V&A Waterfront. Principal Consultant responsible for project review.
2021	South Africa	Allan Gray (Pty) Ltd	Effluent Quality Audit of the Awarded Coastal Waters Discharge Permit (2013/002/WC/VICTORIA & ALFRED) for the seawater cooling system and desalination plant at No. 1 Silo Square, V&A Waterfront. Principal Consultant responsible for project review.
2021	South Africa	Guillaume Nel Environmental	Estuarine constraints analysis for the proposed development on the remaining

Period	Country	Client	Project, Tasks
		Consultants	extent 37 of farm 23 (Uitkomst), Paternoster. Principal Consultant responsible for project review and oversight.
2021	South Africa	Habitat Link Consulting.	Marina Martinique pipeline repair and maintenance. Marine Specialist Report: Assessment of impacts on intertidal and sub-tidal environment. Principal Consultant responsible for project review and oversight.
2021	South Africa	Nomalungelo Faku	Feasibility study for a pearl farm in the greater Nelson Mandela Metropolitan Area. Principal consultant responsible for project design, review and oversight.
2021	Somalia	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Kenya)	Training on data and introduction to electronic data collection for fishery data collection officers at MoFMR, Kismayo. International fisheries expert responsible for project implementation.
2021	South Africa	Guillaume Nel Environmental Consultants	Estuarine Impact Assessment for Development of Erf 222 and 223, Weir Road, Milnerton. Principal consultant responsible for project review and oversight.
2021	South Africa	PHS Consulting	Marine specialist study and dispersion modelling for the proposed expansion of the West Point fish meal processing plant, St Helena Bay. Principal consultant responsible for project review and oversight.
2021	South Africa	WWF-South Africa	Environmental Specialist Benthic Monitoring programme for the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project review and oversight.
2021-2022	South Africa	Sea Harvest Corporation	Coastal waters discharge permit Environmental monitoring. Principal consultant responsible for project review and oversight.
2020-2021	South Africa	EDTEA KZN	Development of an Estuary Management Plan for the Uthongathi Estuary, KzwaZulu-Natal. Project review.
2020-2021	Sierra Leone	Iluka/Sierra Rutile/Digby Wells	Environmental, Safety and Health Impact Assessment (ESHIA) review for mining of the Sembehun group of deposits in the Southern Province of Sierra Leone. Estuarine specialist.
2020	South Africa	Western Cape Government	Value of the Berg Estuary and Importance of Management Interventions. Biodiversity team leader and fisheries expert

Period	Country	Client	Project, Tasks
			responsible for research and reporting.
2020-2021	South Africa	City of Cape Town Metropolitan	Effluent Pipelines Biomonitoring Principal consultant responsible for project review and oversight.
2020	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Fishery Independent Abalone Surveys. Principal consultant responsible for project implementation and oversight.
2020	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Environmental Specialist Monitoring of the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project review and oversight.
2019	Mauritius	International Ocean Institute – African Region.	Biofouling project in Port Louis harbour, Mauritius Phase III – dispersion modelling, BDI determination and sediment contamination. Principal consultant responsible for project review and oversight.
2019	South Africa	Environment for Development Initiative, University of Gothenberg	Completion of Fishery Performance Indicators (see Anderson et al 2015) for South African small pelagic, hake deep-sea trawl, west coast rock lobster and hake longline sectors. Principal consultant who undertook the research, consultation with industry completion of FPI spreadsheets and summary profiles.
2019	South Africa	Doringbaai Abalone	Risk and environmental assessment and public participation process to support a Phase 2 application to undertake abalone ranching. Project leader.
2019-2020	South Africa	South African National Parks	Subtidal surveys of commercially important and indicator invertebrate and fish species within the Table Mountain Marine Protected Area. Project leader.
2019	Mozambique	Golder Mozambique/ Sasol Petroleum Mozambique Exploration Limitada	Marine specialist impact assessment for proposed offshore explorations in shallow water portions of blocks 16 & 19, Inhambane and Sofala provinces, Mozambique. Project leader responsible for study design, implementation and reporting.
2018-2019	Namibia	Namibian DeBeers	Sandy beach, rocky intertidal and subtidal monitoring programme. Studies on the effects of mining activities and mitigation measures to avoid or minimise impacts on the affected environment. Sandy beach team leader, survey design, implementation, analysis and reporting.
2018-2020	South Africa	Umhlathuze Water	Environmental monitoring of the Richards Bay Pipelines. Project leader, physical oceanography and fish specialist.

Period	Country	Client	Project, Tasks
2018-2019	South Africa	Department of Agriculture, Forestry and Fisheries	Marine specialist impact assessment study for the declaration of proposed bivalve and finfish aquaculture development zones in Algoa Bay. Principal consultant responsible for marine ecological assessment, review of EIA, public presentation and stakeholder engagement.
2018	South Africa	Diamond Coast Aquaculture	Basic Assessment Process for proposed upgrades to the diamond coast aquaculture facility Kleinzee, northern cape
2018	South Africa	Port Nolloth Sea Farms Ranching (Pty) Ltd	Basic Assessment process for a proposed abalone holding and processing facility.
2018	Somaliland	WSP, DP World	Marine and coastal specialist Environmental, Health and Social Impact Assessment for proposed Berbera Port expansion.
2018	Namibia	Ministry of Mines and Energy	Marine benthic baseline study of intertidal and subtidal habitats in vicinity of new oil and gas terminal. Fish, sandy beach invertebrate and sea bird specialist.
2018	Republic of Congo	The Biodiversity Company, Kola Potash	Oceanographic and benthic surveys and ecotoxicity trials to assess potential impacts of proposed potash processing discharge, jetty construction and transshipment of product. Project leader.
2017	South Africa	Viking Fishing Group	Socio-economic assessment of a 60% reduction in Viking Fishing Group's allocation in the inshore demersal trawl fishery. Fisheries expert responsible for project supervision and review.
2017-2018	Sierra Leone	Sierra Rutile PTY Ltd	Fish and fisheries expert assess downstream impacts of rutile mining operation on downstream estuarine and marine habitats.
2017	South Africa	Southern Cross Salmon Pty Ltd.	On-site oceanographic monitoring and environmental impact assessment for proposed salmon sea cage farm, Saldanha Bay
2017, 2021	South Africa	National Nuclear Regulator	Marine and fisheries expert review of Thyspunt site safety report submitted by Eskom.
2016-2017	South Africa	Royal Society for the Protection of Birds	Design and conduct a feeding trial experiment to assess the uptake of the rodenticide brodifacoum by Tristan Rock lobsters <i>Jasus paulensis</i> . Principal consultant responsible for all aspects of the study, including permitting, experimental design and setup, data analysis and reporting.

Period	Country	Client	Project, Tasks
2016-2017	South Africa	Department of Water and Sanitation	Classification of and resource quality objectives for the water resources of the Berg and Breede water management areas. Senior consultant responsible for status quo descriptions of estuaries in the two study areas and fish specialist for ecological reserve determination studies on nine estuaries.
2016	South Africa	WorleyParsons RSA (Pty) Ltd and Oiltanking MOGS (Pty)	Marine Impact Assessment for sea water intake and discharge facility at Saldanha Bay. Senior consultant responsible for report.
2016	South Africa	MOGS (Pty) Ltd	Marine baseline report for import facility for natural gas in Saldanha Bay.
2016	South Africa	Port Owen Marina Authority	ADCP measurement and analysis of current velocity in relation to tidal phase in the Berg River Estuary. Development of a timetable for disposal of dredge spoil that is compliant with conditions stipulated in the environmental authorization. Senior consultant responsible for survey and reporting.
2016-2020	South Africa	DeBeers Marine Namibia	Collaboration on survey design and statistical analysis of data collected as part of a long-term benthic monitoring programme. Scientific review of reporting.
2016	South Africa	SE Solutions (Pty) Ltd and South32 Aluminium SA Limited	Prepare marine and estuarine specialist study for EIA for a desalination plant in Richards Bay to supply Hillside Aluminium with process water. Study leader, field investigation and report compilation.
2016	South Africa	City of Cape Town	Preparation of estuary maintenance plan impact assessment reports for eight estuaries within the megacity boundaries. Study leader undertook site visits, liaised with city staff and compiled reports.
2016	South Africa	Atlantic Salmon Pty Ltd.	Deploy and retrieve an acoustic Doppler current profiler to measure currents at a proposed salmon farm site in St Helena Bay. Analyse and present data.
2015-2016	South Africa	Mossel Bay Municipality	Preparation an estuary management plan for the Hartenbos Estuary. Supervisory role in development of plans, presentation and chairing of public meeting.
2014-2016	South Africa	Transnet National Ports Authority	Field survey team leader for the implementation of a water, sediment quality and biological monitoring programme in the Port of Durban. Supervision of analysis and reporting.
2014-	South Africa	Coega Development	Assessment of impacts of wastewater

Period	Country	Client	Project, Tasks
2016		Corporation	discharge from Coega Industrial Development Zone, Algoa Bay. Conduct oceanographic data analysis, marine and marine baseline study.
2014-2016	South Africa	Nelson Mandela Bay Metro, GIBB	Assessment of impacts of wastewater discharge from a new WWTW at Cape Recife, Algoa Bay. Oceanographic, bathymetry and ecological survey team leader, data analysis and reporting.
2006-2021	Namibia	NamDeb Namibia	Sandy beach macrofauna and sediment quality monitoring programme for the Bogenfels and MA1 Mining Licence Areas, Namibia. Studies reported on the effects of mining activities and mitigation measures to avoid or minimise impacts on the affected environment. Sandy beach team leader, survey design, implementation, analysis and reporting.
2015	South Africa	NWJ Environmental	Impact assessment for a proposed sand mining operation on the Umzumbe Estuary, KwaZulu-Natal. Ecological and physico-chemical estuarine survey design, implementation and reporting.
2015	South Africa	Marutleng SHE Services	Marine Impact Assessment Simonstown-Glencairn Railway Rehabilitation and Maintenance Work. Sandy beach and rocky shore survey design, implementation and reporting.
2015	South Africa	AquaTech	Risk assessment for in-water hull cleaning operations in the Port of Durban, South Africa. Contribution to methodology, supervision of sampling protocol, review of report.
2015	Namibia	Pisces Environmental Services	Gecko Namibia Vision Industrial Park Development. Compilation of baseline field survey ichthyofauna report.
2014-2015	South Africa	South African Pelagic Fishing Industry Association	Assessment of the socio-economic impacts of a reduction in the sardine minimum Total Allowable Catch (TAC). Project leader responsible for design, data collection by means of interviews with industry and fishery scientists, socio-economic analysis and reporting.
2014	South Africa	Molapong Aquaculture	Risk Assessment for culture of King and Coho salmon in South Africa. Reporting and review.
2014	South Africa	Transnet National Ports Authority	Assessment of potential impacts of the proposed Durban Dig Out Port of the annual sardine migration up the East coast of South Africa. Research and reporting.

Period	Country	Client	Project, Tasks
2014	South Africa	WWF-SA	Assist with the development of a Fisheries Improvement Project for Small Scale Fisheries in the Kogelberg. Undertaking fisheries assessments using the Marine Stewardship Council benchmarking tool, workshops and reporting.
2014	South Africa	Tronnox Namaqua Sands, Matzikamma Municipality, SRK	Environmental impact assessment for an aquaculture facility at Doringbaai, Northern Cape. Assessment of sites for intake and discharge infrastructure and potential environmental impacts of proposed abalone and finfish aquaculture discharges on the marine environment.
2014	South Africa	Cape Nature	Rezoning and realignment of borders for Betty's Bay, Goukamma and Robberg marine protected areas in South Africa. Fisheries impacts, advice and review.
2014-2017 2019 2020	South Africa	Port Nolloth Sea Farms Ranching (PTY) LTD. Diamond Coast Aquaculture. Diamond Coast Abalone	Baseline survey and monitoring for abalone ranching concession areas NC2, NC3 and NC4. Team leader responsible for sub tidal ecological survey design, implementation and reporting.
2013-2014	South Africa	iSimangaliso Wetland Park Authority	Assessment of the hydrological, hydrodynamic and ecological functioning of the Lake St Lucia Estuarine System and formulation of recommendations for rehabilitation and improved management of the system. Responsible for an assessment of marine fishery impacts under past, present and future management scenarios.
2013	South Africa	Cape Nature, Department of Environmental Affairs	Assessment of impacts of an oil spill on sandy beach and rocky intertidal communities in the Goukamma MPA. Project leader responsible for field survey design and implementation.
2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Development of a Strategy for Research in the Fisheries Sector. Principal consultant responsible for consultation, data acquisition and reporting.
2013	South Africa	Transnet National Ports Authority	Marine specialist study as part of an EIA for upgrading the General Maintenance Quay (GMQ) in the Port of Saldanha Bay. Field survey leader.
2013	South Africa	Sea Harvest	Assessment of fish factory effluent water quality. Sampling, analysis and reporting.
2013, 2015-2016	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Diving Surveys of the Eastern Cape Abalone Resource. Study leader responsible for planning, implementation and reporting.

Period	Country	Client	Project, Tasks
2012	South Africa	South African National Parks	Fisheries consultant for a study of the potential impacts of the Addo Elephant National Park Marine Protected Area on commercial fisheries and their value. Tasks included collection of data by means of interviews with fishing industry representatives and government scientists, data analysis and reporting.
2012	Mauritius	Mauritius Oceanography Institute	Diving team leader for alien species, and water and sediment quality assessment of Port Louis, Mauritius.
2012	South Africa	Transnet National Ports Authority	Marine specialist appointed to assess potential impacts of iron ore oxide (Fe ₂ O ₃) on the marine flora and fauna of Saldanha Bay. Analysis of storm water runoff.
2012	South Africa	Amathole Water Board	Marine specialist appointed to assess the suitability of different sites and the impacts of reverse osmosis desalination plant discharge on the marine environment.
2010-2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Principal consultant as marine ecology and aquaculture specialist on an EIA for four Marine Aquaculture Development Zones (MADZs) in the Eastern Cape, South Africa. Project tasks included reviewing available technology and its suitability for use at each of the selected sites, identifying key risks and impacts that could arise from the culture of selected species on the sites including impacts on existing beneficial uses, and developing an Environmental Management and Monitoring Plan for each site as a whole as well as individual concession areas within each site.
2011	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Principal consultant on a Strategic Environmental Assessment (SEA) to identify potential sea-based finfish aquaculture development zones (ADZ) off the South African coastline. The study entailed identifying and applying a suite of quantitative site selection criteria in a geographical information system (GIS) framework to identify suitable sites for sea based finfish culture in South Africa, taking account of environmental suitability, environmental sensitivity, and user conflict considerations.
2011	South Africa	Element Consulting Engineers	Marine specialist baseline report for a reverse osmosis desalination plant at Lamberts Bay. Responsible for sub-tidal ecological survey design, implementation,

Period	Country	Client	Project, Tasks
			analysis and reporting.
2011	South Africa	Really Useful Investments no 72 (PTY) LTD	Environmental assessment for the abalone (<i>Haliotis midae</i>) ranching right application (phase 2) in the Northern Cape (area NC2). Desktop research and reporting.
2011	South Africa	Council for Scientific and Industrial Research (CSIR)	Benthic macrofauna and fish baseline survey for a reverse osmosis desalination plant at Saldanha. Survey team leader responsible for design, implementation analysis and reporting.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Assessment of the effects of heavy metal accumulation from land based sources on the Diep River Estuary. Principal consultant on a study assessing trace metal pollution in the Diep estuary in the City of Cape Town, to investigate potential sources of pollution and to prepare management recommendations for addressing principal sources of pollution.
2010	South Africa	Port Owen Marina Authority	Assessment of Port Owen marina dredging activities on the Berg River estuarine fish and macrobenthos communities. Senior consultant responsible for survey and reporting.
2010	South Africa	Chand Environmental	Marine and coastal specialist appointed to assess the status and sensitivity of the coastal marine environment off Partridge Point on the Cape Peninsula, and likely impacts that would arise from development of the site.
2009-2019	South Africa	Various companies	Consultant on a series of environmental impact assessments for desalination plants at Sedgefield, Plettenberg Bay, Witsands, Saldanha Bay, Mossel Bay and Port Nolloth, and Cape Town. (7 separate appointments).
2009-2011	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.)/Cape Nature/Marine & Coastal Management (MCM)	Consultant appointed to develop a management plans for the Olifants, Berg, and Uilkraals Estuaries, South Africa. (Three separate appointments). Projects entailed preparing situation assessments and strategic management plans for the Olifants, Berg and Uilkraals estuaries that included recommendations for establishment of a new marine protected area, terrestrial protected area, zonation plans for each of these elements, visitor management plans, and recommendations for institutional development. Consultant appointed for the implementation of the

Period	Country	Client	Project, Tasks
			Verloerenvlei estuary management plan. All projects included presentation of plans and consultation with stakeholder leading to the establishment of estuary management forums comprising management agency representatives and local stakeholders.
2009-2011	South Africa	WWF-SA, Lotto Programme	Scientific advisor on a shore-based fisheries monitoring programme coordinating a team of 20 fisheries monitors at six sites on the South and East coasts of South Africa. Tasks included on-going training, quality control and report reviews.
2009-2010	South Africa	WWF-SA/Cape Action for People and the Environment (C.A.P.E.)	Fisheries consultant for the preparation of marine and coastal spatial plans and socio-economic assessments for the Kogelberg Biosphere Reserve and Garden Route Initiative. The project involved mapping biodiversity pattern and processes in the marine and coastal environment, spatial mapping of economic value, goods and services, and of threats to these ecosystems.
2009	South Africa	West Coast District Municipality, Jeffares & Green (Pty) Ltd	Principal consultant on an assessment of the Jakkalsvlei estuary, the purpose of which was to describe and assess the ecological impacts of illegal excavation and infilling activities that took place during July 2008, and to draft rehabilitation plan to mitigate any impacts.
2009	South Africa	City of Cape Town	Consultant on project to prepare a situation assessment for the Coastal Monitoring Programme for the City of Cape Town (City of Cape Town). Preparation of an overview report on the conservation status and sensitivity of the City of Cape Town Coast including estuaries.
2009	South Africa	Doug Jeffery Environmental Consultants	Senior consultant on an assessment of the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula with an assessment of potential constraints relating to impacts to the marine environment on the development of the site.
2002, 2009, 2015-2018	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Estimation of west coast rock lobster catch and effort by the recreational fishery sector. Responsible for telephone survey data analysis and reporting. Project included a series of workshops aimed at resolving inconsistencies in previous

Period	Country	Client	Project, Tasks
			surveys and developing improved methodology for future surveys.
2009	South Africa	Chand Environmental Consulting	Marine and coastal specialist appointed to assess the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula, and likely impacts that would arise from development of the site.
2008-2011	South Africa	Century City Property Owners Association	Principal consultant on a study to assess the effectiveness of a fish eradication programme conducted in the Century City wetlands and canals using the ichthyocide rotenone, and for development of recommendation for future management of the system
2007-2011	South Africa	Resource Ballast Technology (Pty) Ltd	Consultant appointed as independent assessor of efficacy of a newly developed ballast water treatment system and evaluation (risk assessment) of the residual toxicity of ballast water treated with the system. Project entailed verifying the efficacy of the ballast water treatment system as well as literature survey and laboratory toxicity testing to assess the residual acute and chronic toxicity of the treated ballast water to a variety of different organisms and potential risks posed by the treated ballast water to the environment and human health.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Scientific advisor of a fisheries monitoring programme designed to assess levels of fishing mortality, stock abundance indices and to evaluate the effectiveness of management measures for the commercial and recreational linefishery, tuna pole, hake longline, west coast rock Lobster, Inshore demersal trawl and hake handline fishing in South African waters. Scientific advisor was responsible for recruiting and training a team of fishery observers who were deployed on-board vessels and at strategic landing sites around the country, quality control of all data collected and review of data reports.
2007-2010	Ghana	Tullow Oil Plc	Consultant responsible for preparation of Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practise (BMP) required for seismic surveying and exploratory drilling for

Period	Country	Client	Project, Tasks
			offshore oil and gas resources in the Tano shallow water and Deep water blocks in Ghana. (Three separate EIA studies).
2006-2011	Tanzania	International Conservation Union (IUCN)/Pangani Water Basin Office, Tanzania	International mentor of the Estuary Team for a project entitled “Flows for People and the Environment: Supporting Sustainable Land Management in the Pangani Basin (Tanzania)”. The estuary component of the project included conducting a health assessment of the Pangani estuary with the Tanzanian national team and the development of a flow assessment tool to guide allocation of freshwater flow in the system.
2006	South Africa	Department of Science and Technology	Investigation of stakeholder requirements and potential host institutions for the South African National Antarctic Programme (SANAP).
2005-2007	Angola	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global Environment Facility (GEF)	Consultant on a project aimed at assessing the status of biodiversity along the Angola coastline. The project entailed completing a series of field surveys at selected localities at approximately 100 km spacing along the Angolan coastline at which inshore fish, rock intertidal and sandy beach biota were surveyed. Data were analysed with a view to identifying biogeographic patterns in Angolan coastal fauna and flora.
2005-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.), Cape Nature, and Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Consultant on a biodiversity and economic assessment and development of an integrated conservation plan for CAPE estuaries. The project comprised filling estuary biodiversity data gaps (collection and collation of new botanical, fish and bird data for temperate South African estuaries).
2007, 2005	South Africa	Transnet-National Ports Authority (Transnet NPA)	Consultant on ballast water, flora and fauna survey in the Ports of Durban and Port Elizabeth. Surveys were conducted in representative examples of all habitat types present in the Port of Durban and Port Elizabeth to identify all species present in the port, including all alien and potentially cryptogenic species. Responsible for sampling and reporting.
2005	South Africa	National Empowerment Fund (NEF)	Principal consultant on a due diligence (feasibility) study to assess the feasibility of

Period	Country	Client	Project, Tasks
			a proposed eel aquaculture and processing operation in the Eastern cape, South Africa, focussing on biological, ecological, logistic and legislative considerations of the proposed project.
2001-2005	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Project leader on a research programme that investigated the taxonomy, biology and management of South African Sciaenid fish of the genus <i>Umbrina</i> . Responsible for project design, sampling strategy, biological sampling and processing of samples to provide data on taxonomy, age and growth, reproduction and population genetics. Analysis and use of these data in stock assessments and management recommendations.
2005	South Africa	Emross Consulting CC.	Marine specialist for the assessment of the potential impacts of a boat launching site on the marine environment at Mbotyi River Mouth.
2004-2021	South Africa	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	Senior consultant on a team appointed to develop a series of "State of the Bay" Monitoring Programme and Reports for Saldanha Bay and Langebaan Lagoon in 2004, and annually between 2008 and 2015. The project involved collation and analysis of historic data from a wide range of disciplines, identification of key indicators for the reporting system, as well as initiating new data collection and survey programmes, and the production of annual monitoring reports and yearly State of the Bay Reports.
2003-2005	South Africa	Department of Water Affairs & Forestry (DWAF)	Estuarine and fisheries consultant on the Berg River Baseline Monitoring Programme. The objective of the baseline monitoring programme was to describe the natural and present state, including the natural variability, of those chemical, physical and biological characteristics of the river and its hydraulically linked systems (i.e. estuary, floodplains and groundwater) most likely to be affected by changes imposed after the construction of the Skuifraam Dam. The study spanned a period of three years and required a multidisciplinary approach. Duties included assisting specialists from a wide range of disciplines including water quality, sociology, macroinvertebrates, fish,

Period	Country	Client	Project, Tasks
			avifauna, vegetation and algae.
2001-2003	South Africa	Department of Environmental Affairs & Tourism/ Rhodes University	Fisheries specialist contracted to assist with an Economic Sectoral Study of the South African Fishing Industry. The consultant was responsible for collecting requisite data on the linefish, sector.
2001	South Africa	GEF/UNDP/IMO Globallast Programme	Fish scientist on a ballast water surveys in the Port of Saldanha. The objective of the study was to survey representative examples of all habitat types present in the ports with a view to developing a full list of all species including all alien and potential cryptogenic species in the port.
1999-2000	South Africa	Foundation for Research Development	Researcher on a project to assess the impacts of exploitation of wonderworm <i>Marphysa sanguinea</i> on bouldershore habitats on the Cape Peninsula, South Africa. The project included field surveys, literature review, statistical analysis of data and report production.
1998-2000, 2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Scientific advisor and operations manager of an offshore, boat-based fisheries monitoring programme designed to supply and deploy scientific observers aboard fishing vessels for the inshore trawl, hake longline and west coast rock lobster fisheries. Responsibilities of the scientific advisor included ensuring that observers were trained to collect accurate data on the nature of fisheries operations, catch composition, by-catch mortality, fish biology, quantity and size range of discarded target species, and biological samples as required. Data were captured electronically and submitted to the client for use in stock assessment and resource management programme.
1998-2000	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Lead researcher on a 3-year project that assessed the catch, effort and socioeconomic status of the Western Cape gill and beach-seine net fisheries. Responsible for project design and implementation. Included sampling of commercial fish catches, conducting detailed socio-economic interviews with industry participants, experimental netting and interpretation of the findings into management recommendations.

CURRICULUM VITAE

KEVIN MIKUS SCHMIDT [USA Citizen, South African Permanent Resident]

SACNASP: Professional Natural Scientist #117752

ACADEMIC QUALIFICATIONS:

MSc Applied Marine Science, 2016, University of Cape Town – Marine Research Institute

BSc (Hon Equivalent) Environmental Science, 2013, University of Delaware – College of Earth,
Ocean and Environment

OTHER QUALIFICATIONS:

Medically in date Class IV Scientific/ Commercial Diver (South Africa), SAMSA Cat B Skipper with
dive endorsement (South Africa), PADI Staff Instructor #329403, Technical/ Rebreather Diver,
Merchant Shipping (Training and Certification) STCW (expires 2027)

SKILLS:

Scientific Diving, Matlab, Big Data Management, Satellite Imagery, Remotely Sensed Reanalysis
Climate Data, ArcGIS, Water Resource Management, Watershed Hydrologic Modelling, Google
Earth Engine, Delft3D Hydrodynamic Modelling, Adobe Lightroom/ Premier Pro, MS suite, R-Studio

LANGUAGE PROFICIENCY: English (Excellent), German (Basic)

COUNTRY EXPERIENCE: North America, Caribbean, South Africa, Namibia, Mozambique, Madagascar

OCEAN EXPERIENCE: Northern & Southern Atlantic, Caribbean, Southern Ocean, Indian Ocean

ECOSYSTEM EXPERIENCE: Air – Sea Interface, Upwelling Systems, Pelagic Zone, Coral Reefs, Seagrasses,
Mangrove Forests, Kelp Forests, Intertidal and Nearshore Rocky Reefs, Soft/ Hard
Benthos, Wetlands, Coastal Watersheds

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EMPLOYMENT HISTORY: Dec 2017 – Current: Marine Consultant (Anchor Environmental Consultants)
2017: PADI Instructor/Technician, MASS Diving
2016-2017: Analyst, Researcher, Author, CSIR-SOCCO
2015-2016: UCT Graduate Research, Ma-Re, CSIR-SOCCO
2014: PADI Instructor/Technician for Reef Divers
2009 – 2013: University of Delaware Research, UMBC REU
2006 – 2014: Baltimore Aquarium

SUMMARY PROFILE: Kevin has an undergraduate degree (BSc and Hon) in Marine Ecosystem Sciences from the University of Delaware and a graduate degree (MSc) in Applied Marine Sciences from the University of Cape Town. During his undergraduate degree, he investigated the influence of anthropogenic climate change upon community dynamics of coral reef and their associated ecosystems. During his graduate degree, he collaborated with scientists from the Southern Ocean Carbon and Climate Observatory (SOCCO) to investigate the wind field variability of the Southern Ocean using WaveGlider technology and remotely sensed satellite reanalysis data. In January of 2017 he published his MSc findings in the American Meteorological Society (AMS) Journal of Atmospheric and Ocean Technology (JTECH). Since then, Kevin has been actively incorporating satellite-derived data “on the ground”; performing validation and extrapolation tasks to broaden the spatial and temporal coverages of atmospheric, land and oceanographic variable datasets. With his expertise in querying global repositories, he can provide his peers and clients holistic and globally unique data inputs for impact assessments, variability studies and computational fluid dynamic models. Kevin intends to use these remotely sensed environmental variables, satellite imagery, and machine learning to bridge the gap between ecology and oceanography and to increase the efficacy of ecological surveying techniques and the strategic implementation of conservation management strategies.

SELECT PROJECT EXPERIENCE:

Period	Employer	Country	Clients	Project, Tasks
<p>Dec 2021 – Current [ONGOING]</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Namibia</p>	<p>DeBeers Marine Namibia DBMN; Anglo American Future Smart Mining (FSM)</p>	<p>DESIGN OF A SEDIMENT GENERATION CONTROL AND LONG-TERM EFFECTS PREDICTIVE MODEL, MONITORING SYSTEM, DATA DASHBOARD Remote sensing specialist; provision of essential meteocean variables for boundary conditions of coupled hydrodynamic models (ERA5). Satellite imagery query and spectral classification of visible sediment plumes at the surface (Google Earth Engine/ ArcGIS). ESRI Geospatial Dashboard Conceptual design and development – predictive and prescriptive indicators to improve operational efficiency and environmental compliance. MATLAB specialist; big data reference library and indexing Development of far-field wave and particle tracking models (Delft-3D) Equipment specialist; ADCP – Nortek Signature 250, prepared for 12 month deployment. Upward facing in tandem with thermistor array in 120m water depth. Data used to validate and calibrate hydrodynamic models and remotely sensed data.</p>
<p>April 2021 – Current [ONGOING]</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Saldanha Bay, South Africa</p>	<p>WWF South Africa</p>	<p>SPECIALIST MONITORING IN COMPLIANCE WITH THE ENVIRONMENTAL SAMPLING PLAN, MANAGEMENT PROGRAM AND ENVIRONMENTAL AUTHORISATION FOR THE SALDANHA BAY AQUACULTURE DEVELOPMENT ZONE (ADZ) Commercial scientific diver for one full benthic macrofauna survey in April 2021 and two annual benthic chemical surveys, one in April 2021, with second following in April 2022. Analysis of historical data (macrofauna and sediment physicochemical) and finalisation of a scientific paper. Deployment, retrieval and servicing (cleaning of the instrument of biofouling organisms and changing of the batteries) of bottom moorings by means of scuba for the below</p>

				<p>mentioned oceanographic equipment, every 6 to 8 weeks (20 servicing intervals) over the two year contract period.</p> <ul style="list-style-type: none"> - Four oxygen sensors (JFE Advantech Rinko-W Oxygen optical sensors) - One nitrate sensor (SUNA)
Jan 2022 – Feb 2022	Anchor Environmental Consultants Pty Ltd	Durban, South Africa	Transnet SOC Ltd	<p>BASELINE SURVEY OF MARINE FAUNA, FLORA AND ANTIFOULING CONTAMINANTS TO ASSESS CHANGES IN FAUNA AND FLORA IN THE PORT OF DURBAN FOR A PERIOD OF 12 MONTHS</p> <p>Scientific commercial diver Collection of wall scrapes at select berths on scuba for taxonomic analysis Collection of fish, invertebrate, and plankton by seine netting Deployment of SeaBird CTD for vertical water column oceanographic profiles Equipment technician</p>
Dec 2021 – Current [ONGOING]	Anchor Environmental Consultants Pty Ltd	Kwazulu-Natal, South Africa	Nemai Consulting	<p>HYDRODYNAMIC MODELLING STUDY TO UNDERSTAND THE SALINITY DRIVERS AND EFFECTS WITHIN THE MZIMKHULU ESTUARY, KWAZULU-NATAL</p> <p>Hydrodynamic model specialist (ArcSWAT, WRM Pitmann) for Basic Assessment process and a Water Use Licence Application (WULA) on behalf of the Ugu District Municipality for the proposed development of a weir in the uMzimkhulu River.</p> <p>The model hydrologic simulations are run on daily intervals and are driven by remotely sensed climate data, validated by in situ gauging stations.</p>
September 2021 - Current [ONGOING]	Anchor Environmental Consultants Pty Ltd	Mossel Bay, South Africa	Mossel Bay Municipality	<p>ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN (EMMP) FOR THE GREAT BRAK ESTUARY.</p> <p>Remote Sensing specialist: provided climate data from ECMWF ERA-5, rainfall data from 2000-2021 for select locations to corroborate with historic stream-flow gauge records. Processed within MATLAB.</p> <p>Deployable sensor technician: designed and constructed custom mooring system for <i>in-situ</i> CTD (AquaTROLL 600)</p>

<p>Aug 2021- Current [ONGOING CAMPAIGN]</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Namibia, South Africa</p>	<p>De Beers Marine Namibia</p>	<p>DE BEERS MARINE NAMIBIA: ENVIRONMENTAL MONITORING PROGRAMME: ATLANTIC 1 MINING LICENSE AREA 2021 BENTHIC SAMPLING CAMPAIGN Marine GIS specialist, remote sensing specialist for various projects within the annual geophysical survey report. Ski-Monkey benthic camera system: pre cruise calibration using SeaGIS, CAL, and TransectMeasure software to enable post cruise analysis to include length and area measurements from video imagery. At sea scientist/ shift leader – worked with a team of 10 scientists to collect and preserve 1000+ van veen grab and 2000+ sediment samples aboard a survey vessel (DP Star) for 6 weeks at sea. Average sampling depth 100+m. Collection of eDNA macrofaunal, sediment, and water samples. Deployment and maintenance of RBR CTD, processing of data in MATLAB. GIS specialist – selection of sampling sites and visualisation of bathymetry.</p>
<p>Jun 2021 – Mar 2022</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>South Africa West Coast</p>	<p>Trans Atlantic Diamonds (Pty) Ltd</p>	<p>MARINE SPECIALIST IMPACT ASSESSMENT FOR EXPLORATION AND PROSPECTING ACTIVITIES IN CONCESSION AREAS 7C, 10B, 11C, 12B, 14A Marine GIS specialist, remote sensing specialist: prepared maps of marine protected areas, ecological- biologically significant areas, coastal threat and protection status, average annual reported commercial and local fisheries effort and catch metrics for the region, overlaid with location of concession area. Calculated proportion of the average national total catch of coastal and pelagic fisheries within concession area. Delineated reef boundaries and sensitive habitats</p>
<p>June 2021 – July 2021</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Olifants Estuary, South Africa</p>	<p>Mineral Sand Resources (Pty) Ltd (MSR); Tormin Mineral Sands Project</p>	<p>ESTUARINE AND FRESHWATER SPECIALIST STUDY Coastal hydrology specialist: developed a SWAT Hydrologic model to simulate ephemeral stream flow</p>

				rates and days flowing per year using remotely sensed climate inputs
Apr 2021 – May 2021	Anchor Environmental Consultants Pty Ltd	Greenland	De Beers Group	<p>ENVIRONMENTAL MITIGATION ASSESSMENT FOR PLANNED GEOPHYSICAL SURVEY ON THE WEST GREENLAND CONTINENTAL SHELF</p> <p>Marine GIS specialist, remote sensing specialist: general mapping of Greenland, Sea ice extent, Sea surface temperature (SST) spatial analysis for coastal Greenland and surrounding oceans using ArcGIS, Matlab and ERA-5 derived remotely sensed data. Mapped areas of concern and closed areas for all marine mammals (beluga, bowhead whale, narwhal and walrus) deemed particularly sensitive to geophysical surveys relative to the proposed survey area. Mapped historic catch of sensitive fisheries (Northern Shrimp, Halibut, Lump sucker, Cod, Snow Crab)</p>
Feb 2021 – June 2021	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	V&A Waterfront Management Authority	<p>ECONOMIC ASSESSMENT OF RECREATIONAL SAILING IN CAPE TOWN: MAKING THE CASE FOR INVESTMENT IN THE PROPOSED GRANGER BAY MARINA</p> <p>Questionnaires were designed and face to face interviews were undertaken with representatives from the six main marinas and yacht clubs in the Greater Cape Town area as well as a number of stakeholders from the boat building and boat repair industry. An online survey was disseminated to members of the yacht clubs and marinas in Cape Town and visiting vessels to these clubs.</p>
Nov 2020 – May 2021	Anchor Environmental Consultants Pty Ltd	Sierra Leone, West Africa	Sierra Rutile Limited	<p>GIS SPECIALIST</p> <p>Delineate watershed boundaries around two active mining operations, collate historic satellite imagery in Google Earth Engine for use in a machine-learning driven supervised classification effort to identify and isolate sensitive habitats for focused <i>in-situ</i> sampling.</p>
Oct 2020 - Jan 2022	Anchor Environmental Consultants Pty Ltd	Saldanha, South Africa	Sea Harvest Corporation (Pty) Ltd	<p>UPDATED DRAFT COASTAL WATERS DISCHARGE PERMIT (CWDP)</p> <p>Scientific commercial diver Equipment technician for Aquatroll200 CTD</p>

Oct 2020 – Dec 2020 [ANNUAL REPORT]	Anchor Environmental Consultants Pty Ltd	St Helena Bay, South Africa	St Helena Bay Water Quality Trust	<p>MARINE GIS SPECIALIST FOR ANNUAL STATE OF THE BAY REPORT</p> <p>Prepared data on a variety of physical and biological parameters, including activities and discharges affecting the health of the Bay (fish processing and wastewater discharge), water quality in the Bay itself (historical data pertaining to temperature, oxygen, salinity, nutrients, and pH), sediment quality (particle size, total organic carbon and nitrogen), and ecological indicators (benthic macrofauna).</p>
Nov 2019- Aug 2021	Anchor Environmental Consultants Pty Ltd	Namibia, South Africa	De Beers Marine Namibia	<p>DE BEERS MARINE NAMIBIA: ENVIRONMENTAL MONITORING PROGRAMME: ATLANTIC 1 MINING LICENSE AREA 2019 BENTHIC SAMPLING CAMPAIGN</p> <p>Marine GIS specialist, remote sensing specialist for various projects within the annual geophysical survey report. Ski-Monkey benthic camera system: post-campaign processing of spatio-temporal data collected during the 2019 campaign to assess mining-related impacts on epifaunal communities inhabiting hard substrata and subsequent recovery after mining. Investigation into the applications of machine learning image annotation. Prepared data on a variety of physical and biological parameters; historical data pertaining to temperature, oxygen, salinity, nutrients, and pH), sediment quality (particle size, total organic carbon and nitrogen), and ecological indicators (benthic macrofauna).</p>
May – July 2020	Anchor Environmental Consultants Pty Ltd	Somerset West, Cape Town, South Africa	Rheinmetall Denel Munition RF (Pty) Ltd	<p>Field Scientist</p> <p>Worked in the field to sample sediment, macrofauna and water quality parameters as part of the environmental monitoring and management programme for Rheinmetall Denel Munition coastal waters discharge permit.</p>
Apr 2020 – Current [ONGOING]	Anchor Environmental Consultants Pty Ltd	South Africa	Aqunion, Portion 2 of Klipfontein Farm no 711	<p>ENVIRONMENTAL MONITORING AND STOCK ASSESSMENT ACTIVITIES FOR AQUINION ABALONE RANCHING IN THE NORTHERN CAPE (AREA NC 4)</p> <p>Aqunion have recently regained access to area NC 4 and would like to resume</p>

				<p>ranching activities (seeding and harvesting stock) and the required monitoring surveys. In addition to the monitoring surveys, work as commercial diver to conduct independent stock assessment of the six sites seeded to date.</p> <p>Based on the abalone counts per seed site, performed distance weighted spatial interpolation to assess the movement speed and extent of the natural and seeded populations.</p>
<p>2018 – Current [ANNUAL REPORT] [ONGOING]</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Saldanha, Cape Town</p>	<p>Saldanha Bay Water Quality Forum Trust (SBWQMFT)</p>	<p>Commercial/ Scientific Diver As part of the annual State of the Bay Monitoring programme in Saldanha Bay, for two weeks in March of each year, work as a commercial diver to operate a low-pressure compressor vacuum system to collect and sieve sediment samples for identification of benthic invertebrates. Performing bi-monthly visits to Geelbek reserve to retrieve in-situ CTD, download data, clean sensor and replace for annual monitoring of freshwater variability in the lagoon.</p> <p>Marine GIS Specialist Prepared data on a variety of physical and biological parameters, including activities and discharges affecting the health of the Bay (fish processing and wastewater discharge), water quality in the Bay itself (historical data pertaining to temperature, oxygen, salinity, nutrients, and pH), sediment quality (particle size, total organic carbon and nitrogen), and ecological indicators (benthic macrofauna).</p> <p>Remote Sensing Specialist Using Google Earth Engine, accessed historic Sentinel2 Imagery and conducted a supervised classification effort to map the spatio-temporal variability of invasive phragmites, aquatic seagrasses, and salt marsh within Saldanha Bay and Langebaan.</p>
<p>Mar 2020</p>	<p>Anchor Environmental Consultants Pty Ltd</p>	<p>Robben Island, South Africa</p>	<p>City of Cape Town Department of Environmental Affairs, Branch:</p>	<p>Fishery Independent Abalone Surveys (FIAS) in Robben Island MPA Scientific diver to sample abalone length measurements along a series of 20 transects around Robben Island.</p>

			Fisheries Management	
Jan 2019- April 2022	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	City of Cape Town, Marine Outfalls Monitoring Plan	City of Cape Town Effluent Pipelines Biomonitoring Scientific diver to deploy, maintain, and retrieve subsurface mussel moorings to investigate the performance and effects of the domestic effluent outfalls offshore of Hout Bay, Camps Bay and Green Point
Nov 2019- Jan 2021 [5 YEAR SURVEY]	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	Table Mountain National Parks/ SAN Parks	Commercial/ Scientific Diver Collect quantitative data on commercially and ecologically important indicator fish assemblages at 60+ designated sites within the TMNP Marine Protected Area.
Nov 2019- July 2020	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	UN Environment: Ecosystem Services	Hydrologic Specialist Prepared an ArcSWAT hydrologic model of the Thukela Watershed to assess the impacts of land use classification change (to degraded landscapes) and invasive vegetation on stream, nutrient and sediment transport in Kwazulu-Natal, South Africa. Remote Sensing Specialist For the period of 1979-2014, gathered and validated historic precipitation, temperature, wind, relative humidity, solar radiative flux for use as input into hydrologic model.
Jan 2019- Dec 2019 [ANNUAL REPORT]	Anchor Environmental Consultants Pty Ltd	Namibia, South Africa	De Beers Marine Namibia	DE BEERS MARINE NAMIBIA: ENVIRONMENTAL MONITORING PROGRAMME: ATLANTIC 1 MINING LICENSE AREA 2019 PLUME MODELLING CAMPAIGN Preparing equipment for deployment (ADCP, thermistor array, CTD) to collect data for use in a Delft3D near field model of sediment plume dispersion from actively mining vessels. Remote Sensing Specialist Gather historic remotely sensed/ reanalysis air-sea interface data to assess hydrodynamic characteristics of large portions of the Atlantic 1 MLA.
Apr 2019- Jan 2020	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	Atlantic Salmon	Data Analyst, Report Writing Conducting an impact analysis using Delft3D near shore modelling for the proposed construction of an Atlantic

				Salmon aquaculture effort in port of Cape Town. Remote Sensing Specialist Gathered and validated remotely sensed weather data (wind, temperature, humidity, solar radiative flux) to force near-field models of hydrodynamic properties within the waterfront.
2019 [ANNUAL REPORT]	Anchor Environmental Consultants Pty Ltd	Elizabeth Bay, Namibia	Pisces Environmental Services Pty Ltd/ De Beers Marine Namibia	DE BEERS MARINE NAMIBIA: ENVIRONMENTAL MONITORING PROGRAMME: ATLANTIC 1 MINING LICENSE AREA 2019 ECOLOGICAL IMPACT CAMPAIGN Baseline marine surveys and annual monitoring of intertidal and subtidal rocky shores and beaches in the Sperrgebiet National Park, Namibia, for Namdeb Diamond Corporation
Nov 2019 - June 2020	Anchor Environmental Consultants Pty Ltd	Inhambane, Mozambique	Golder Associados Moçambique Limitada/ Sasol Petroleum Mozambique Exploration Limitada	Scientist, Diver, Remote Sensing Specialist Prepare initial baseline report for offshore seismic exploration in area north of Bazaruto Archipelago National Park (BANP), north of Inhassoro. Project suspended, pending client.
Nov 2019- July 2020 [5 YEAR SURVEY]	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	Table Mountain National Parks/ SAN Parks	Commercial/ Scientific Diver Collect quantitative data on commercially and ecologically important indicator invertebrate species (rock lobster, abalone, alikreukel, kelp and sea urchins) at 87 designated sites within the TMNP Marine Protected Area.
2019-2021	Anchor Environmental Consultants Pty Ltd	Richards Bay, South Africa	Mhlathuze Effluent Monitoring Program	Data analyst, report writing Developed MATLAB scripts to automatically process and generate baseline models and display historic and current trendlines of sediment and heavy metal (Al, Fe, As, Cd, Cu, Cr, Hg, Ni, Pb, Zn) toxicity data gathered during the annual monitoring program. Used to assess impacts associated with the discharge of effluent through three municipal sea outfalls in Richards Bay.
2019	Anchor Environmental Consultants Pty Ltd	Stillbai, South Africa	Doug Jeffery Environmental Consultants	Scientist, report writing Wetland and Stream Assessment for proposed construction of arterial road. Compilation of historic imagery, use of ArcGIS to delineate watershed.

2019	Anchor Environmental Consultants Pty Ltd	Mossel Bay, South Africa	Mossel Bay Municipality	Scientist Estuary survey conducted using track and gill nets, also acted as photographer for fish identification.
2019	Anchor Environmental Consultants Pty Ltd	Maputo, Mozambique	Conseng and JG Afrika (Pty) Ltd, Mozal Aluminium Smelter	Scientist/ Co-author of Report Estuarine impact assessment for the MOZAL Matola River pipeline During field work, collected sediment samples using Van veen grab, deployed SeaBird SeaCAT CTD, skippered boat during bathymetry profiling of the river, and photographed bird populations. Processed low-cost high-resolution bathymetry profiles using MATLAB and Garmin's quickdraw contour function.
Apr 2018- Mar 2020	Anchor Environmental Consultants Pty Ltd	Breede River, South Africa	Turnkey Water Solutions, Hessequa Local Municipality	Commercial/ Scientific Diver Performed bi-monthly visits to retrieve in-situ CTD positioned at the outflow of a recently developed solar powered desalination plant. Downloaded data, cleaned sensor and replaced. Also performed SeaBird SeaCAT CTD dips to validate in situ data, as well as water quality, sediment and macrofauna sampling one year after the desalination plant had been operating.
Jan 2018 – Dec 2018 [ANNUAL REPORT]	Anchor Environmental Consultants Pty Ltd	Namibia, South Africa	De Beers Marine Namibia	DE BEERS MARINE NAMIBIA: ENVIRONMENTAL MONITORING PROGRAMME: ATLANTIC 1 MINING LICENSE AREA 2018 BENTHIC SAMPLING CAMPAIGN Scientist – work with a team of 9 scientists to collect and preserve grab and sediment samples aboard a survey vessel for 1 month at sea. Deployment of towed Ski-Monkey benthic camera system to assess mining-related impacts on epifaunal communities inhabiting hard substrata and subsequent recovery after mining. Identification of benthic invertebrate macrofauna, statistical analyses and report writing.
2018	Anchor Environmental Consultants Pty Ltd	South Africa, 4 miles offshore Algoa Bay	Mainport Africa	Commercial/ Scientific Diver Diving under the <i>NM Cherry Blossom</i> , collected samples and photographs of biofouling community from locations on NM Cherry Blossom: port side bow; starboard side bow; port bilge keel; starboard bilge keel; port sea chest.

2018 - 2019	Anchor Environmental Consultants Pty Ltd	Saldanha, Cape Town	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	Commercial/ Scientific Diver As part of the annual State of the Bay Monitoring programme in Saldanha Bay, for two weeks in March of 2018 and 2019, worked as a diver to operate a low-pressure compressor vacuum system to collect and sieve sediment samples for identification of benthic invertebrates.
2017-2018	Anchor Environmental Consultants Pty Ltd	Cape Town, South Africa	De Beers Marine Namibia	Lab work At Anchor Environmental's in house lab, processed sediment samples through sieves and extracting benthic invertebrates for identification and classification.
Seasonally 2014, 2016, 2018	Reef Divers	Nosy Be, Madagascar	Operation Wallacea (UK)	Scientific Diver, Lecturer, Technician Stereo-Video Fish Assemblage Surveying, Coral/ Invert Benthic Line Transect Surveying, Rugosity and Habitat Assessment (3D Modelling).
2016	GEOMAR - Helmholtz-Zentrum für Ozeanforschung Kiel	South Africa (Cape Town) – Brazil (Rio de Janeiro)	FS METEOR CRUISE M124	Onboard Scientist (1 month cruise) Performed a cross-oceanic basin lower atmosphere/upper ocean physical and biogeochemical survey along approximately 30°S in the sparsely sampled South Atlantic Ocean. - Use of Acoustic Doppler Current Profilers, CTDs, uCTD/ RapidCast systems, Multinets (Hydrobios), Sunphotometers (Microtops)
2016-2017	Southern Ocean Carbon and Climate Observatory (SOCCO)	Cape Town, South Africa	CSIR – Cape Town	Remote Sensing Data Analyst, Report Writing, Lead Author Processed data from Waveglider deployments from 2015-2016 (post MSc graduation). Submitted research to American Meteorological Society Journal for Atmospheric and Ocean Technology (AMS JTECH), in final form July 2017, and published online December 2017. “Evaluation of satellite and reanalysis wind products with <i>in situ</i> Wave Glider wind observations in the Southern Ocean”

2015-2016	University of Cape Town	Cape Town, South Africa	University of Cape Town/ CSIR/ Southern Ocean Carbon and Climate Observatory (SOCCO)	MSc Applied Marine Science, Marine Research Institute Student Remote sensing (satellite derived ocean products) validation task with <i>in situ</i> measurements by WaveGlider technology. Application of MATLAB for statistical and data analysis.
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PUBLICATION RECORD

Project Reports

Schmidt KM, AG Wright & BM Clark. 2022. Development of a metocean monitoring system, database and tailings plume model for Debmarine Namibia. Phase 1: Conceptual design of the environmental database, data dashboard and numerical model. Report no. 2007/1 prepared by Anchor Environmental Consultants (Pty) Ltd for Debmarine Namibia and Anglo American. 55 pp.

Clark BM, Letley G, and K Schmidt. 2021. Economic Assessment of Recreational Sailing in Cape Town: Making the case for investment in the proposed Granger Bay Marina. Socio-economic assessment. Report No. AEC 1930/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the V&A Waterfront

Clark BM, Hutchings K, Biccard A, Turpie J, Dawson J, Gihwala K, Swart C, Sedick S, Wright A, Schmidt K, Weiss J, Makhosonke A, Mostert B, Brown E, Laird M, Conrad J, Parker A, Holloway M and Blecher I. 2021. The State of Saldanha Bay and Langebaan Lagoon 2021, Technical Report. Report No. AEC 1936/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2021.

Biccard, A, BM Clark and KM Schmidt. 2021. Environmental Mitigation Assessment for Planned High Resolution Geophysical Surveys on the West Greenland Continental Shelf. Report prepared for De Beers Group by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1925/1.

Biccard, A., K. Gihwala, B.M. Clark, S. Sedick, C. Swart, E.A. Brown, B.P. Mostert, J. Dawson, S Mtsokoba, A. Makhosonke and K. Schmidt. 2020. De Beers Marine Namibia Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2019 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1840.

Clark BM, Hutchings K, Biccard A, Brown E, Dawson J, Laird M, Gihwala K, Swart C, Makhosonke A, Sedick S, Turpie J, Schmidt K, and Mostert B. 2020. The State of Saldanha Bay and Langebaan Lagoon 2020, Technical Report. Report No. AEC 1876/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2020.

Dawson J, Schmidt KM and B Clark. 2019. Water quality monitoring of the estuarine environment at the reverse osmosis plant on the Breede River Estuary, Witsand, South Africa. Report no. 1831/2 prepared by Anchor Environmental Consultants (Pty) Ltd for Turnkey Water Solutions. Pp 19.

Wright, A.G., Schmidt, K., Mostert, B., Swart, C., Clark, B. 2019. ESTUARINE SPECIALIST REPORT FOR THE MOZAL MATOLA RIVER PIPELINE, MOZAMBIQUE: ESTUARINE IMPACT ASSESSMENT.

Journal

Turpie, J.K., Letley, G., Schmidt, K., Weiss, J., O'Farrell and Jewitt, D. 2021. The potential costs and benefits of addressing land degradation in the Thukela catchment, KwaZulu-Natal, South Africa: NCAVES project report: <https://seea.un.org/content/knowledge-base>

Turpie, J.K., Letley, G., Schmidt, K., Weiss, J., O'Farrell and Jewitt, D. 2020. Towards a method for accounting for ecosystem services and asset value: Pilot accounts for KwaZulu-Natal, South Africa, 2005-2011. Available at: <https://seea.un.org/content/knowledge-base>

Thesis

Schmidt, K.M., S. Swart, C. Reason, and S. Nicholson, 2017: Evaluation of Satellite and Reanalysis Wind Products with In Situ Wave Glider Wind Observations in the Southern Ocean. *J. Atmos. Oceanic Technol.*, 34, 2551–2568, <https://doi.org/10.1175/JTECH-D-17-0079.1>

References available on request

MICHAEL PHILIP ANTHONY ARMITAGE

DATE OF BIRTH: 9 September 1996

NATIONALITY: South African

ACADEMIC QUALIFICATIONS

MSc (Distinction) Environmental and Geographical Science, University of Cape Town, 2019-2022

BSc (Hons) (Distinction) Environmental and Geographical Science, University of Cape Town, 2018

BSc Environmental and Geographical Science and Archaeology, University of Cape Town, 2015-2017

COUNTRY EXPERIENCE: South Africa, People's Republic of China

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Basic)

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EMPLOYMENT HISTORY: 2022-Present: Environmental Consultant: Marine Ecosystems and Resources
(Anchor Environmental Consultants)

2021: Research Assistant (South African National Biodiversity Institute and the
Breede-Gouritz Catchment Management Agency)

2015: Mathematics and Physical Science Tutor (Mastermaths)

SUMMARY PROFILE

Michael holds an MSc degree in Environmental and Geographical Science, BSc. Hons degree in Environmental and Geographical Sciences and a BSc in Environmental and Geographical Science and Archaeology from the University of Cape Town. His MSc research involved quantifying the degree of anthropogenic heavy metal contamination within the Knysna Estuary through the analysis of estuarine sediment. As part of this work, he also conducted parallel study of heavy metal contamination of the Yangtze Estuary in the People's Republic of China for comparative analysis. He has a background and interest in the fields of estuarine management, water resource management, and pollution. Of particular importance to him are integrated approaches to environmental, riverine, and estuarine management, with "nature-based" solutions such as Sustainable Drainage Systems (SuDS), being preferred to hard design options. Prior to working at Anchor, he analysed water quality data from the Breede River on behalf the Breede-Gouritz Catchment Management Agency and the South African National Biodiversity Agency (SANBI). Within Anchor Environmental Consultants, his primary responsibilities include estuarine specialist studies, management plans, and work on environmental impact assessments (EIA's) in marine, coastal, estuarine, and terrestrial environments.

PROJECTS

Period	Country	Clients	Project, Tasks
2022	South Africa	Infinity Environmental	Estuarine Specialist Upgrade to Zandvlei Canal
2022	South Africa	Nemai Consulting	Estuarine Ecologist Ecological Water Requirements (EWR) update and estuarine impact assessment for the Mzimkhulu Estuary, Kwa Zulu Natal.

Period	Country	Clients	Project, Tasks
2022	South Africa	KSEMS Environmental Consulting	Estuarine Specialist Assessment of Impacts of Proposed Upgrade of the N2 Section 25 between the Isipingo Interchange and Umlaas Canal, and Construction of a New Drainage Canal, in the Ethekwini Municipality, Kwazulu-Natal.
2022	South Africa	Matzikama Kaolin	Co-Author Scoping & Environmental Impact Assessment and application for prospecting rights: Prospecting of kaolin in the Western Cape
2022	South Africa	Xwena Kaolin	Co-Author Scoping & Environmental Impact Assessment and application for prospecting rights: Prospecting of kaolin and silica in the Western Cape
2022	South Africa	Trans Atlantic Diamonds	Co Author of Marine & Fisheries and Socio-Economic Considerations specialist reports and contributor to Basic Assessment (BAR) Report Basic Assessment Process and application for prospecting rights in an offshore sea concession 10B in the Northern Cape (application pending)
2022	South Africa	Trans Atlantic Diamonds	Co Author of Marine & Fisheries and Socio-Economic Considerations specialist reports and contributor to Basic Assessment (BAR) Report Basic Assessment Process and application for prospecting rights in an offshore sea concession 7C in the Northern Cape (application pending)
2022	South Africa	Infinity Environmental	Estuarine Specialist Zandvlei Dredge Assessment: Current Ecological Status

THESES

Armitage M.P.A. 2022. An Assessment of the Heavy Metal Concentrations in Surface Sediments from the Knysna Estuary. MSc Thesis, The University of Cape Town, 172 pp.

Armitage M.P.A. 2018. A Current Analysis of the Heavy Metal Load in the Ashmead Channel (Knysna Lagoon) Sediments. BSc (Hons) Thesis, University of Cape Town, 39 pp.

CONFERENCES

2021 Joint Society of South African Geographers-Southern African Association of Geomorphologists Conference (Presentation)

2021 International Association for Impact Assessment South Africa: Re-Thinking IEM (Integrated Environmental Management) in Pursuit of the Sustainable Development Goals (Attendee)

2021 National Research Fund-National Natural Sciences Foundation of China Collaborative Research Closing Symposium with academics from East China Normal University (Presentation)

2019 National Research Fund-National Natural Sciences Foundation of China Collaborative Research Symposium hosted in Shanghai with academics from East China Normal University and the University of Cape Town (Presentation)

2019 Pollution State of the Knysna Estuary Symposium with members of the Knysna Municipality, Town Council, and stakeholders (Presentation)

- 2018** National Research Fund-National Natural Sciences Foundation of China Collaborative Research Symposium hosted in Shanghai with academics from East China Normal University and the University of Cape Town (Presentation)
- 2018** International Urban Biodiversity & Food Security conference, which was held in Cape Town (Volunteer & Attendee)

JULIA NDOU

DATE OF BIRTH: 10 August 1991

NATIONALITY: South African

ACADEMIC QUALIFICATIONS

MSc (Zoology) Aquatic Health, University of Johannesburg, 2020

BSc (Hons) Zoology, University of Johannesburg, 2016

BSc Biochemistry and Zoology, University of Johannesburg, 2015

SCIENTIFIC REGISTRATIONS

SACNASP – Ecological and Zoological Sciences (Candidate Natural Scientist): Number 133433

COUNTRY EXPERIENCE: South Africa

LANGUAGE PROFICIENCY: English (Excellent), Tshivenda (Excellent), Sesotho, Isizulu and Xitsonga (Good)

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EMPLOYMENT HISTORY: 2022 – Present — Ecologist and Environmental Consultant: Anchor Environmental Consultants

2021 – 2022 — Assistant Ecologist: Digby Wells Environmental

2019 – 2021 — Aquatics Intern: Digby Wells Environmental

SUMMARY PROFILE

Julia attained a Master of Science degree (MSc) in Aquatic Health (Zoology) and an Honours (BSc Hons) in Zoology and Bachelor of Science degree (BSc) in Biochemistry and Zoology from the University of Johannesburg. She is a Registered South African Scoring System version 5 (SASS5) practitioner with three years of research and consulting experience. Her training and experience have made her highly competent within a variety of disciplines, including environmental monitoring and impact assessments, aquatic, wetland and terrestrial biodiversity and ecology. In her previous work experience included assist mines to become environmental compliant according to government legislations in the fulfilment of Environmental Impact Assessments, Environmental and Social Impact Assessments, Mining Right Applications, Water Use License Applications, Biodiversity Action Plans and Biodiversity Management Plans. In addition, she assessed rivers and wetlands to determine the impact done by industrial/mining operations and/or activities then offer mitigation measures. This includes fieldwork, the compilation of aquatic, wetland and terrestrial proposals, baseline, scoping & impact assessment reports. Within Anchor Environmental Consultants, her primary role is that of an Ecologist and Environmental Consultant. Her tasks include applications for prospecting, ranching and other operational rights, environmental licenses and environmental authorisations; specialist impact assessments and baseline studies; environmental monitoring of important conservation and disturbed habitats; and monitoring environmental compliance of various operations.

PROJECTS UNDERTAKEN

Period	Country	Clients	Project, Tasks
Anchor Environmental Consultants			
2021/2022	South Africa	Trans Atlantic Diamonds	<p>Basic Assessment Process and application for prospecting rights in an offshore sea concession 10B in the Northern Cape (application pending)</p> <p>Tasks</p> <ul style="list-style-type: none"> • Assisting the lead Environmental Assessment Practitioner; • Conducting an Environmental Impact Assessment; • Compiling an Environmental Impact Assessment (S&EIA) Report; and • Compiling stakeholder lists for Public Participation Processes.
2021/2022	South Africa	Trans Atlantic Diamonds	<p>Basic Assessment Process and application for prospecting rights in an offshore sea concession 7C in the Northern Cape (application pending)</p> <p>Tasks</p> <ul style="list-style-type: none"> • Assisting the lead Environmental Assessment Practitioner; • Conducting an Environmental Impact Assessment; • Compiling an Environmental Impact Assessment (S&EIA) Report; and • Compiling stakeholder lists for Public Participation Processes.
2022/2023	South Africa	Matzikama Kaolin	<p>Scoping & Environmental Impact Assessment and application for prospecting rights: Prospecting of kaolin in the Western Cape</p> <p>Tasks</p> <ul style="list-style-type: none"> • Assisting the lead Environmental Assessment Practitioner; • Conducting an Environmental Impact Assessment; • Compiling an Environmental Impact Assessment (S&EIA) Report; and • Compiling stakeholder lists for Public Participation Processes.
2022/2023	South Africa	Xwena Kaolin	<p>Scoping & Environmental Impact Assessment and application for prospecting rights: Prospecting of kaolin and silica in the Western Cape</p> <p>Tasks</p> <ul style="list-style-type: none"> • Assisting the lead Environmental Assessment

			Practitioner; <ul style="list-style-type: none"> • Conducting an Environmental Impact Assessment; • Compiling an Environmental Impact Assessment (S&EIA) Report; and • Compiling stakeholder lists for Public Participation Processes.
2022/2023	South Africa	I&J Danger Point	Abalone ranging right application & Risk Assessment Tasks: <ul style="list-style-type: none"> • Public Participation Process; and • Conducting Risk Assessment for application.
2022/2023	South Africa	Drylands	Basic Assessment Process for a proposed agricultural development on a mine in the Northern Cape of South Africa Tasks: <ul style="list-style-type: none"> • Assisting the lead Environmental Assessment Practitioner; • Conducting an Environmental Impact Assessment; • Compiling an Environmental Impact Assessment (S&EIA) Report; and • Compiling stakeholder lists for Public Participation Processes.
Digby Wells Environmental Consultants			
Aquatic Projects: <ul style="list-style-type: none"> • New Largo Coal Mine aquatic biomonitoring Mpumalanga Province, South Africa 2019-2020 • Sasol Mooikraal Colliery wastewater and aquatic biomonitoring Gauteng Province, South Africa On-going • Eskom Kilbarchen Colliery aquatic baseline assessment Mpumalanga Province, South Africa 2020 • Dagsoom Twyfelaar Coal Mine aquatic biodiversity and impact assessment Mpumalanga Province, South Africa 2019-2020 • Mafube Coal Mine aquatic biomonitoring Mpumalanga Province, South Africa On-going • Ivanplats Platinum Mining Operation aquatic biomonitoring Mpumalanga Province, South Africa On-going • Sasol ECO Ash Backfilling aquatic biomonitoring Free State Province, South Africa On-going • Blair Atholl DWS Queries Gauteng Province, South Africa 2020 • ERWP Aquatic Biomonitoring Mpumalanga Province, South Africa 2021 • Matla Colliery Aquatic & Wetland Biomonitoring Mpumalanga Province, South Africa On-going • Sibanye Stillwater: Aquatic Biomonitoring Northwest Province, South Africa 2021 			
Fauna and Flora Projects: <ul style="list-style-type: none"> • Matla Colliery Terrestrial Ecology Assessment Mpumalanga Province, South Africa 2021 • Copper Sunset Mining Right Extension: Fauna and Flora Assessment Mpumalanga Province, South Africa 2021 • New Clydesdale Fauna and Flora Assessment Mpumalanga Province, South Africa 2021 • Cora Gold's Sanankoro ESIA: Fauna and Flora Assessment Mali 2021 			

- Oklo Resources: Fauna and Flora Assessment | Mali | 2021

Wetland Projects:

- Anglo American Greenside Colliery wetland and impact assessment | Mpumalanga Province, South Africa | 2020
- Sasol Irenedale wetland assessment | Mpumalanga Province, South Africa | 2019
- Mbuyelo Group's Weltevreden Mine wetland assessment | Mpumalanga Province, South Africa | 2019
- Universal Coal Development 's Eerstelingsfontein Colliery Expansion wetland assessment | Mpumalanga Province, South Africa | 2019-2020

Compliance Auditing:

- Environmental audit for Sasol Retail Filling Stations – Sasol Limited's South African Energy Business | Across South African Provinces | 2019-2020

Project Assistance and Administration:

- Harmony Gold Invoice Recon | 2020
- Digby Wells Environmental BBBEE audit | 2020-2021
- EACOP | 2019-2020

MSc THESIS

Ndou J (2020) Evaluation the effects of selenium on the testes of *Oreochromis mossambicus* adult fish using the following techniques. MSc Thesis, University of Johannesburg, 217 pp.

PUBLICATION RECORD — TECHNICAL REPORTS

SWART C, **NDOU J**, DALASILE S AND BM CLARK. 2022. Draft Basic Assessment Report for the proposed prospecting in Sea Concession Area 10B by Trans Atlantic Diamonds (Pty) Ltd. Report no. 2039/1 Part A. Prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. In prep.

SWART C, **NDOU J**, DALASILE S AND BM CLARK. 2022. Draft Basic Assessment Report for the proposed prospecting in Sea Concession Area 7C by Trans Atlantic Diamonds (Pty) Ltd. Report no. 2038/1 Part A. Prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. In prep.

CONFERENCES

2015 Oral Presentation: "Honours project focused on the morphometric study of the testes of *Oreochromis mossambicus* (Peters, 1852) acutely exposed to different concentrations of selenium." Zoological Sciences Symposium, University of Johannesburg, June 2015

2015 Oral Presentation: "Honours project focused on the morphometric study of the testes of *Oreochromis mossambicus* (Peters, 1852) acutely exposed to different concentrations of selenium." National Research Foundation Research Symposium, University of Johannesburg, November 2015

- 2019** Poster Presentation: "Evaluation the effects of selenium on the testes of *Oreochromis mossambicus* adult fish using the following techniques". Zoological Society of Southern Africa Symposium 39th Conference Programme, Skukuza, Mpumalanga, 8 – 10 July 2019

WORKSHOPS

- 2016** Short course: Analysis & effects of metals in the environment.
- 2020** Environmental Management and GIS Techniques Workshop: Ubuntu Environmental Services
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CV – JOHN GRIBBLE

(Last updated – 22 February 2022)

Name: John Gribble
Profession: Archaeologist (Maritime)
Date of Birth: 15 November 1965
Parent Firm: ACO Associates cc
Position in Firm: Senior Archaeologist
Years with Firm: 4
Years of experience: 32
Nationality: South African
HDI Status: n/a

Education:

1979-1983 Wynberg Boys' High School
1986 BA (Archaeology), University of Cape Town
1987 BA (Hons) (Archaeology), University of Cape Town
1990 Master of Arts, (Archaeology) University of Cape Town

Employment:

- September 2017 – present: ACO Associates, Senior Archaeologist and Consultant
- 2014-2017: South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit
- 2012-2018: Sea Change Heritage Consultants Limited, Director
- 2011-2012: TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology
- 2009-2011: EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology
- 2005-2009: Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine
- 1996-2005: National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist
- 1994-1996: National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (ASAPA) (No. 043)
- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have more than 25 years of professional archaeological and heritage management experience. After completing my postgraduate studies and a period of freelance

archaeological work in South Africa and abroad, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. In 1996 I became the NMC's first full-time maritime archaeologist and in this regulatory role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I established Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change traded until 2018, providing archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy.

Relevant maritime experience includes specialist archaeological consultancy for more than two dozen offshore renewable energy projects and aggregate extraction licence areas in UK waters including:

- Lynn and Inner Dowsing OWF;
- Humber Gateway OWF;
- Sheringham Shoal OWF;
- Race Bank OWF;
- Docking Shoal OWF;
- Triton Knoll OWF;
- Neart na Gaoithe OWF;
- Dogger Bank OWF;
- Hornsea OWF;
- Navitus Bay OWF;
- Aggregate Area 392/393, Hilbre Swash;
- Area 478, East English Channel;
- Area 372/1, North Nab;
- Areas 401 & 2;
- Area 466, North West Rough; and
- Area 447, Cutline.

In the UK I was also involved in strategic projects which developed guidance and best practice for the UK offshore industry with respect to the marine historic environment. This included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector (*Historical Environment Guidance for the Offshore Renewable Energy Sector* (2007) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (2010)). I was also manager and lead author in the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry, and in the 2009 *UK Continental Shelf*

Offshore Oil and Gas and Wind Energy Strategic Environmental Assessment for Department of Energy and Climate Change. In 2013-14 I was lead author and project co-ordinator on *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom* and in 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was appointed as Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant. Since being at ACO I have carried out a wide range of terrestrial and maritime archaeological assessments, many of which are listed in the following section.

In 2018 of the potential impacts of marine mining on South Africa's palaeontological and archaeological heritage for the Council for Geoscience, on behalf of the Department of Mineral Resources.

I have been a member of the Association of Southern African Professional Archaeologists (No. 043) for nearly thirty years and am accredited by ASAPA's Cultural Resource Management section.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and served as a member of its Bureau between 2009 and 2018.

Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project'.

I have served on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee since 2014.

Selected Project Reports:

Gribble, J. 2017. *Archaeological Assessment of Farm No 8/851, Drakenstein*. Unpublished report prepared for Balwin Properties Pty Ltd. ACO Associates.

Gribble, J. 2017. *Archaeological Assessment of Bosjes Phase 2, Farm 218 Witzenberg*. Unpublished report prepared for Farmprops 53 (Pty) Ltd. ACO Associates.

Gribble, J. 2017. *Canal Precinct, V&A Waterfront: Heritage Impact Assessment*. Unpublished report prepared for Nicolas Baumann Urban Conservation and Planning. ACO Associates.

- Gribble, J. 2017. *Archaeological Assessment of the proposed dam on the farm Constantia Uitsig, Erven 13029 and 13030, Cape Town*. Unpublished report prepared for SLR Consulting (South Africa) (Pty) Ltd. ACO Associates.
- Gribble, J. 2017. *Archaeological Assessment of Erf 4722 Blouvlei, Wellington*. Unpublished report prepared for Urban Dynamics Western Cape (Pty) Ltd. ACO Associates.
- Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed Phezukomoya Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed San Kraal Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. 2018. *Integrated Heritage Impact Assessment of the Peter Falke Winery on Farm 1558 Groenvlei, Stellenbosch*. Unpublished report prepared for Werner Nel Environmental Consulting Services. ACO Associates.
- Gribble, J. & Halkett, D. 2018. *Heritage Impact Assessment for a Proposed Extension of the Kaolin Mine on Portion 1 of the Farm Rondawel 638, Namaqualand District, Northern Cape*. Unpublished report prepared for Rondawel Kaolien (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. *Archaeological Impact Assessment for Proposed Sand Mining on Portion 2 of Farm Kleinfontein 312, Klawer District, Western Cape*. Unpublished report prepared for Green Direction Sustainability Consulting (Pty) Ltd. ACO Associates.
- Halkett, D. & Gribble, J. 2018. *Archaeological/Heritage Report for the Expansion of the Current Granite Mining at Oeranoep and Ghaams, Northern Cape Province*. Unpublished report prepared for Klaas Van Zyl. ACO Associates.
- Gribble, J. 2018. *Potential Impacts of Marine Mining on South Africa's Palaeontological and Archaeological Heritage*. Report prepared for Council for Geoscience. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: Block ER236, Proposed Exploration Well Drilling*. Unpublished report prepared for ERM Southern Africa (Pty) Ltd. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: IOX Cable Route*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2018. *Archaeological Assessment of the Terrestrial Portion of the IOX Cable Route*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2018. *Archaeological Assessment: Erven 11122, 11123, 11124, 11125, 11126, 11127 and Re 11128, Corner Frere Street and Albert Road, Woodstock, Cape Town*. Unpublished report prepared for Johan Cornelius. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: Expansion of Diamond Coast Aquaculture Farm on Farm 654, Portion 1, Kleinzee, Northern Cape*. Unpublished report prepared for ACRM. ACO Associates.
- Gribble, J. 2018. *Heritage Impact Assessment: Ship Repair Facility, Port of Mossel Bay*. Unpublished report prepared for Nemaï Consulting. ACO Associates.

- Gribble, J. 2018. *Archaeological Assessment: Sites B and C, Portswood Ridge Precinct, V&A Waterfront*. Unpublished report prepared for Urban Conservation. ACO Associates.
- Gribble, J. 2018. *Heritage Impact Assessment: Zandrug, Farm Re 9/122, Cederberg*. Unpublished report prepared for Cederberg Environmental Assessment Practice. ACO Associates.
- Gribble, J. and Hart, T.G. 2018. *Initial Assessment Report and Motivation for Exploratory Permit, Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown*. Unpublished report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.
- Gribble, J. and Hart, T.G. 2018. *Initial investigation report with respect to human remains found at Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown*. Unpublished permit report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. *Maritime Heritage Impact Assessment: ASN Africa METISS Subsea Fibre Optic Cable System*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2019. *Maritime Archaeological Impact Assessment of Proposed Aquaculture Areas 1, 6 And 7, Algoa Bay, Eastern Cape Province*. Unpublished report prepared for Anchor Research & Monitoring (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. *Heritage Impact Assessment: Rooilandia Farm Dam, Pipeline and New Irrigation Areas*. Unpublished report prepared for Cornerstone Environmental Consultants. ACO Associates.
- Gribble, J. 2019. *Maritime Archaeological Impact Assessment of Proposed Equiano Cable System, landing at Melkbosstrand, Western Cape Province*. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2019. *Heritage Baseline for Prospecting Right Applications: Sea Concession Areas 14b, 15b and 17b, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: San Kraal Wind Energy Facility, Noupoot, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: Phezukomoya Wind Energy Facility, Noupoot, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: Hartebeeshoek West Wind Energy Facility, Noupoot, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: Hartebeeshoek East Wind Energy Facility, Noupoot, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Heritage Assessment: Infrastructure Associated with the San Kraal, Phezukomoya and Hartebeeshoek East and West Wind Energy Facilities, Noupoot, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.

- Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Proposed Grid Connection for the De Aar 2 South Wind Energy Facility, De Aar, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J., Euston-Brown, G.L. & Hart, T. 2020. *Heritage Impact Assessment: Proposed Construction of Five Guest Cottages on the Farm Groenfontein (Farm 96), Outside Ceres, Western Cape*. Unpublished report prepared for Doug Jeffery Environmental Consultants. ACO Associates.
- Gribble, J. 2020. *Maritime Archaeological Impact Assessment for Prospecting Rights Applications: Sea Concession Areas 14b, 15b and 17b, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. 2020. *Maritime Archaeological Impact Assessment for Prospecting Rights Applications: Sea Concession Areas 13C and 15C - 18C, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. 2020. *Heritage Impact Assessment for Proposed Sand Mining on Portion 2 Of Farm Kleinfontein 312, Klawer District, Western Cape*. Unpublished report prepared for Green Direction Sustainability Consulting (Pty) Ltd. ACO Associates.
- Gribble, J. 2020. *Archaeological Assessment: Erven 10712 and Re 14932, Corner Railway Street and Albert Road, Woodstock, Cape Town*. Unpublished report prepared for Claire Abrahamse. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Leliefontein to Conmarine Bulk Water Pipeline, between Paarl and Wellington*. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Proposed Expansion of the Sand Mine on Portion 4 of The Farm Zandbergfontein, Robertson, Western Cape*. Unpublished report prepared for Greenmined Environmental. ACO Associates.
- Gribble, J. 2021. *Maritime Archaeological Impact Assessment of Proposed 2AFRICA/GERA (East) Submarine Fibre Optic Cable System, Landing at Duynfontein, Western Cape Province*. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2021. *Maritime Archaeological Impact Assessment of Proposed 2AFRICA/GERA (West) Submarine Fibre Optic Cable System, Landing at Yzerfontein, Western Cape Province*. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2021. *Heritage Impact Assessment: Beaufort West Photovoltaic Project, outside Beaufort West, Western Cape*. Unpublished report prepared for Nema Consulting (Pty) Ltd. ACO Associates.
- Gribble, J. 2021. *Heritage Impact Assessment: Proposed Esizayo 132KV Transmission Integration Project, on Farms Standvastigheid 210 Remainder and Aurora 285, Western and Northern Cape*. Unpublished report prepared for WSP Group Africa (Pty) Ltd. ACO Associates.
- Gribble, J. 2022. *Heritage Impact Assessment: Proposed Oceana 10 MW Solar Photovoltaic Facility, on Portion 4 of Farm 6 Duyker Eiland, St Helena Bay, Western Cape*.

Unpublished report prepared for SRK Consulting (South Africa) (Pty) Ltd. ACO Associates.

Gribble, J. & Euston-Brown, G. 2021. *Heritage Impact Assessment: Proposed Photovoltaic Facility on Remainder of Farm Vaal Rivier 261, Farm Vaal Kloof 262, Portion 1 of Farm Jurgens Fontein 263, Portion 2 of Farm Kolkies Rivier 234 and Portion 1 of Farm Eiberg West 260, East of Ceres, Western Cape*. Unpublished report prepared for Ecocompliance. ACO Associates.

Publications:

Gribble, J. and Scott, G., 2017, *We Die Like Brothers: The sinking of the SS Mendi*, Historic England, Swindon.

Sharfman, J., Boshoff, J. and Gribble, J. 2017. Benefits, Burdens, and Opportunities in South Africa: The Implications of Ratifying the 2001 UNESCO Convention on the Protection of Underwater Cultural Heritage, in L. Harris (ed) *Sea Ports and Sea Power: African Maritime Cultural Landscapes*, Springer International Publishing, Switzerland, pp 101-110.

Lloyd Jones, D., Langman, R., Reach, I., Gribble, J., and Griffiths, N., 2016, Using Multibeam and Sidescan Sonar to Monitor Aggregate Dredging, in C.W. Finkl and C. Makowski (eds) *Seafloor Mapping along Continental Shelves: Research and Techniques for Visualizing Benthic Environments*, Coastal Research Library 13, Springer International Publishing, Switzerland, pp 245-259.

Athiros, G. and Gribble, J., 2015, *Wrecked at the Cape Part 2*, The Cape Odyssey 105, Historical Media, Cape Town.

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Gribble, J., 2015, Underwater Cultural Heritage and International Law. Cambridge by Sarah Dromgoole, in *South African Archaeological Bulletin*, 70, 202, pp 226-227.

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Gribble, J., 2014, Learning the Hard Way: Two South African Examples of Issues Related to Port Construction and Archaeology, in *Dredging and Port Construction: Interactions with Features of Archaeological or Heritage Interest*, PIANC Guidance Document 124, pp 97-107.

UK UNESCO 2001 Convention Review Group, 2014, *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom*, ISBN 978-0-904608-03-8.

- Sadr, K., Gribble, J. and Euston-Brown, G, 2013, Archaeological survey on the Vredenburg Peninsula, in Jerardino et al. (eds), *The Archaeology of the West Coast of South Africa*, BAR International Series 2526, pp 50-67.
- Gribble, J. and Sharfman, J, 2013, Maritime Legal Management in South Africa, *Online Encyclopaedia of Global Archaeology*, pp 6802-6810.
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- Gribble, J., 2011, Competence and Qualifications, in Guèrin, U., Egger, B. and Maarleveld, T. (eds) *UNESCO Manual for Activities directed at Underwater Cultural Heritage*, UNESCO - Secretariat of the 2001 Convention, Paris.
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- Gribble, J. 2002, The Past, Present and Future of Maritime Archaeology in South Africa, *International Handbook of Underwater Archaeology* (eds Ruppe and Barstad), New York, Plenum Press.
- Thackeray, F. and Gribble, J., 2001, Historical Note on an Attempt to Salvage Iron from a Shipwreck, *Looking Back*, Vol 40, November 2001, pp 5-7.
- Gribble, J., 1998, Keeping Our Heads Above Water – the development of shipwreck management strategies in South Africa, *AIMA Bulletin*, Vol 22, pp 119-124.
- Gribble, J. 1996, Conservation Practice for Historical Shipwrecks, Monuments and Sites of South Africa, Colombo, Sri Lanka, ICOMOS 11th General Assembly.
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