

CARNIVAL GRAND BAHAMA INVESTMENTS LTD.

**TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT**

For

Grand Port

Freeport, Grand Bahama Island

The Bahamas

Prepared by

Envirologic International Ltd.

Revision 2

July 2019

CARNIVAL GRAND BAHAMA INVESTMENTS LTD.

TERMS OF REFERENCE ENVIRONMENTAL IMPACT ASSESSMENT

For

Grand Port

Freeport, Grand Bahama Island

The Bahamas

Submitted to:

The Bahamas Environment, Science and Technology Commission

And

The Grand Bahama Port Authority

Prepared by:



Prepared by Envirologic International Ltd.

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Terms of Reference (Revision 2) – Grand Port

1.0 INTRODUCTION

This Terms of Reference (TOR) is being prepared at the request of the Grand Bahama Port Authority (GBPA) and the Government of the Bahamas to address the preparation of an Environmental Impact Assessment (EIA) for the proposed Carnival Grand Bahama Investments Limited (CGBI) “Grand Port”. A separate TOR will be submitted for the Environmental Management Plan (EMP). The “Grand Port” is a generic name and acts as a place holder for a permanent name to be declared in the future. CGBI is a wholly owned subsidiary of Carnival Corporation, a Panamanian corporation. It is intended that this TOR will serve both the Best Commission and the GBPA.

The EIA is being submitted to two different jurisdictional agencies, the GBPA and the Bahamas Environment, Science and Technology (BEST) Commission since the project crosses two different governing boundaries. The proposed project requires approvals for environmental and building permits for the terrestrial side of the project from the GBPA. The Bahamas Government is responsible for approvals for the seaward side of the project including the granting of a seabed lease and environmental and construction permits for the dock and related dredge work.

The separation of jurisdictions for approvals is due to the signing of the Hawksbill Creek Agreement between the Government of the Bahamas and the GBPA. The GBPA was established in 1955 under the Hawksbill Creek Agreement (Hawksbill Creek Agreement – Deepwater Harbour and Industrial Area) and was charged with the responsibility for the development, administration and management, and provision of services within the “Port Area.” The Port Area is defined as the Freeport/Lucaya city limits. The GBPA licenses and regulates businesses in the Port Area including having the responsibility for granting building permits, the GBPA Building and Sanitary Code regulations and enforcement. The GBPA has also adopted the Bahamas Government’s Bahamas Building Code. New projects within the Port Area are approved after consultation with the GBPA’s Building and Development Services Environmental Department and preparation of an EIA.

Envirologic will review the Bahamas Government Draft Environmental Planning and Protection Act of 2005 Environmental Impact Assessments Regulations and use as a guideline in preparing the EIA.

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Envirologic International Ltd. (Envirologic), based in Freeport, Grand Bahama and Carnival Corporation representatives met with the GBPA Building Development Services Department and Environmental staff on January 9th, 2019 to present the proposed project plans and to determine if there were any concerns with the project.

Envirologic International Ltd. and Carnival Corporation representatives also met with the BEST Commission on March 12, 2019 to present the proposed project plans.

1.1 Purpose

The purpose of this TOR document is to define the scope, develop methods, and determine the review process for the Environmental Impact Assessment (EIA) for CGBI Ltd. new cruise port terminal referred to as the Grand Port. The Grand Port will be located in Freeport, Grand Bahama Island along the southern coastline known as Barbary Beach.

The EIA is being prepared at the request of the Grand Bahama Port Authority Ltd. (GBPA) and the Bahamas Government to assess the environmental impacts related to the proposed Grand Port project. Envirologic International Limited (EIL) and its' subconsultants R.C. Minning & Associates and David Decker, P.E. Consulting Engineer have been selected to prepare the EIA. The EIA report will be supplemented by other consulting companies including Applied Technology and Management (ATM), CSA Ocean Sciences, and Caribbean Coastal Systems. Envirologic and the team will follow the contents of this TOR for preparation of the EIA document.

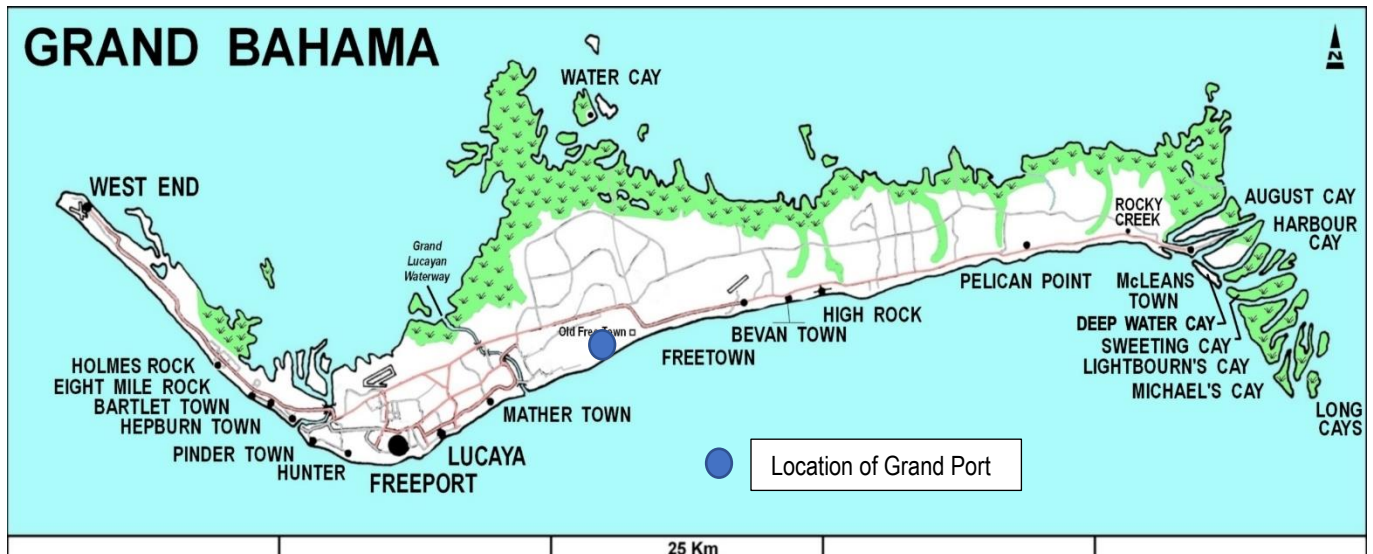
1.2 Executing Agreements

This TOR document is a cooperative agreement between CGBI, BEST Commission, and GBPA for preparation of an EIA and approval of the proposed Grand Port. Carnival is a licensee of the GBPA. A request has been made by the GBPA Environmental Department and Bahamas Government for preparation of an EIA. It is understood that the GBPA may consult and seek the assistance of the BEST Commission and other Bahamas Government Agencies in reviewing the EIA and EMP documents. Carnival will simultaneously seek all relevant Bahamas Government approvals beyond the GBPA jurisdiction.

2.0 PROJECT LOCATION

The Carnival Grand Port will be located along the southern coast of Freeport, Grand Bahama Island. Carnival has secured a lease for two adjoining parcels of land from the Grand Bahama Development Company. The project boundary includes Sharp Rocks Point and Silver Point and terminates west of Tony Maura Point. Parcel A is approximately 171 acres and Parcel B is approximately 158 acres giving a total of approximately 329 acres. The site is undeveloped land, which prior to the signing of the Hawksbill Creek Agreement had a small settlement (Old Freetown) located to the east of the site. Currently, a track road (Heritage Trail) parallel to the shoreline exists. The Boundary Survey Map is presented in **Appendix 1**. The general location is presented in **Figure 1** below.

FIGURE 1. General Location of Project Site



The project boundary with the proposed entrance road from Sussex Drive is presented in **Figure 2**. In **Section 7** of this document are aerial photographs of the site.

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FIGURE 2. Approximate Site Boundary Overlaid on Aerial Photograph



The project site currently only accessible through the track road that runs parallel to the shore. CGBI will extend the existing track road, Sussex Drive, to the property boundary with the approval of the GBPA and the Grand Bahama Development Company. There are no utilities present at the site. Provisions will have to be made for water and electricity as well as phone and cable. Carnival has entered into discussions with the Grand Bahama Utility Company for the supply of potable water. Carnival has also started discussions with the Grand Bahama Power Company for the supply of electricity.

3.0 PROJECT DESCRIPTION

Carnival has been bringing passengers to Freeport, Grand Bahama through the Lucayan Harbour for many decades. The Harbour is located in the Industrial Park area of Freeport and tourists have to pass through the heavy industry zoned area before reaching touristic destinations. The construction of the Grand Port at Sharp Rocks Point will be a more aesthetically pleasing experience for visitors to Grand Bahama and enhance the tourism product of Grand Bahama as a destination for the Carnival Corporation branded cruise ships.

The Grand Port will be a new Carnival Corporation port facility which will have docking facilities to accommodate two cruise ships at a time. A preliminary drawing of the dock location is presented in **Appendix 1**. The design of the pier will allow for the future generation of Carnival's XL LNG Class ships which can carry approximately 6,500 passengers to dock at the facility. The pier is designed so passengers can walk from the ship to shore. The land-based operation will provide leisure time on Silver Point beach as well as providing shops, restaurants and recreational activities for both passengers and crew. This facility will allow a large number of passenger's direct access to one of the most pristine beaches in Freeport with new amenities.

A day dock will be constructed from the shore on the western side of the property and overwater structures are proposed on the eastern and western side of the property. The overwater structures are for leisure activities only and will not be constructed for habitation. Based on the conceptual plan the passengers will be ferried from the eastern to western end of the complex using boats along a manmade canal. The current plan is to utilize shallow draft electric powered boats for transporting passengers. A small marina will be constructed for use by the Carnival ferry boats.

An access road (Sussex Drive) will be completed running from the Grand Bahama Highway to the northern boundary of the property. Sussex Drive will be extended approximately 0.67 miles (**Figure 2**) to the Carnival property.

A preliminary site masterplan of the proposed facility is presented in **Appendix 1**. It is noted that this masterplan is subject to revision based on development of the project, infrastructure needs, policy guidelines of the GBPA, and information gathered during the preparation of the EIA.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT REQUIREMENTS

The EIA is required to be processed through the GBPA for the terrestrial side of the proposed project and to the Bahamas Government for the marine portion. The EIA prepared will be submitted to both the Bahamas Government and the GBPA.

Below is the GBPA GENERAL PROCESS FOR EIA/EMP SUBMISSION AND REVIEW.

- 1) The project proponent is responsible for submitting the proposed EIA consultant team for approval.

- 2) The Authority [GBPA] will provide general guidelines or a checklist for the preparation of the EIA as it specifically relates to the project.

- 3) The EIA consultant(s) is expected to prepare terms of reference, utilizing the guidelines, which sets out the proposal and methods for carrying out the assessment of the environmental impacts of the undertaking, before commencing with the environmental impact assessment study.

- 4) An EIA is to be developed which includes an Environmental Management Plan (EMP).

- 5) The Authority shall, within 30 days of receiving the environmental impact assessment, decide if the EIA administratively – a. Meets the requirements of the terms of reference checklist (EIA scope) and is void of deficiencies; or b. Does not meet the requirements of the EIA terms of reference checklist and has deficiencies.

- 6) The Authority (GBPA) shall, within 90 days of receiving the environmental impact assessment, advise the proponent: of any technical deficiencies, the need for additional supporting data, or if it is satisfactory.

The scope of the EIA is included within **Section 5.0**. The project proponent and its consultants will process the EIA following the above guidelines. The project's consulting team is presented in **Section 6.0**.

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Below is the BEST Commission EIA and EMP Guidelines as quoted from their webpage (www.best.gov.bs/eia-and-emp/). It is note that the EIA and EMP are separate documents.

“The BEST Commission provides guidelines for Environment Impact Assessments (EIA) and Environment Management Plans (EMP) for Industrial, Commercial and Residential developments throughout The Bahamas’ archipelago. All non-Bahamian and/or foreign companies seeking to provide EIA services in The Commonwealth of The Bahamas are required to have the following prior to commencing any related activities leading to the development of an EIA document for review:

1. Pre-Approval by the BEST Commission to produce an EIA Document
2. Local Business License
3. Work Permits for all persons involved in the production of the EIA document.”

All local companies seeking to provide EIA services require pre-approval by the BEST Commission. In addition to the following: A valid Bahamian business license

1. A valid Business License
2. Proof of Liability Insurance
3. Professional Registration (where appropriate e.g. Professional Engineers Act 2004)
4. CV’s of team members involved in the work
5. Evidence of experience in the area of the intended work.
6. Valid work permits for all foreign persons involved in the production of the EIA document

The BEST Commission will review the EIA in a timely manner.

5.0 PROPOSED SCOPE OF WORK FOR EIA

1.0 Executive Summary

- Project overview
- Project location
- Project description
- Summary of baseline conditions
- Socio-economics
- Environmental impacts positive and adverse
- Summary of mitigation

2.0 History of Carnival Corporation

This section will discuss Carnival Corporation, the brands they operate, and their investment in the Grand Bahama Shipyard.

- Who is Carnival Corporation
- Carnival Corporation Brands
- Number of ships Carnival Corporation own
- Number of Caribbean port facilities and where
- Carnival Corporation brands stops in the Bahamas
- Importance of Freeport to Carnival Corporation
- Investment in the Grand Bahama Shipyard

3.0 Statement of Need

This section will discuss the need for the project and the importance of Grand Bahama to Carnival Corporation and the improvement of the tourism product from Carnival's perspective.

- Selection of Freeport as flagship port destination.
- New Port of Entry
- Freeport Harbour – Is in an industrial setting
- Carnival's Grand Port enhances tourism product and visitor experience in Grand Bahama

4.0 Institutional and Regulatory Framework

Discussion on the Regulatory Responsibility of the Grand Bahama Port Authority and the Bahamas Government. Two jurisdictional regulatory authorities for land based and offshore elements of the project.

- GBPA – Founding of Freeport based on the Hawksbill Creek Agreement
- Brief discussion on the Hawksbill Creek Agreement
- Discussion of GBPA Bye-Laws and Draft Bye-Laws
- Discussion of BEST Guidelines
- List of Government of the Bahamas Agencies and Responsibilities

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- Approvals Needed by GBPA and Bahamas Government
- Environmental Health and Health and Safety Act
- Sea Bed Lease from the Bahamas Government
- Need for Bahamas Customs and Immigration
- Additional Relevant Legislation

5.0 Project Location

Discussion on the site location in Freeport, Grand Bahama Island and alternatives evaluated.

- Site Location
- Aerial Photograph
- Undeveloped Land
- Boundary Survey Map
- Zoning
- Distance to Peterson Cay National Park
- Alternative Site Evaluated – Between High Rock and Stat Oil

6.0 Project Description

This section to describe in detail the recreational area and docking facilities and amenities that will be offered. Appropriate drawings and aerial photographs will be provided.

- Facility description
- Labelled scaled drawing of facility
- Number of ships and class of ships calling to Port (Preliminary Schedule)
- Potential number of persons ashore
- Description of amenities
- Description and dimensions of canal and purpose
- Design and dimensions of pier structure
- Installation of Pier – location, depth of water, distance to shoreline
- Means and methods of construction for Pier
- Construction schedule and sequencing and hours of operation
- Dredging area and methods
- Pumping and dewatering area, storage of dredged materials and equipment, and use of dredged materials/sand
- Description, dimensions, use of over water structures including diagrams
- International Ship and Port Facility Security/New Port of Entry
- Roadways – Access road (Sussex Drive) and parking lot (Taxi's and Buses)
- Fuel Storage Tank - Type fuel, volume of tank, and secondary containment
- Number of jetty's and design
- Water Demand – GBUC or Reverse Osmosis Plant
- Collection system and waste water treatment plant
- Electrical demand and emergency generator
- Utilities (Phone and Internet)

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- Back of House Operations
- Commitment for Bahamians to operate retail shops and restaurants in complex
- ISPS Port Security Code and Security measures

7.0 Project Schedule

Discussion on the importance of scheduling in meeting Carnival's start date. Consequences for delays. Describe stages or phases of the construction project as appropriate.

- Timeline for permitting, construction, and start of operations
- Critical dates for Carnival to meet cruise line schedule for opening of the facility

8.0 Baseline Conditions

A list of information and studies that will be completed for the preparation of the EIA.

- Aerial Photography
- Boundary Survey Map – Overlay of Boundary Survey on Current Aerial Photograph
- Topographic Survey
- Quantification of Tides and Water Levels
- Sea Level Rise Projections
- Climate and Rainfall
- Hurricanes and Storm Events - Coastal storm frequency and intensity projections (hindcasting) including storm surge, wave heights and wind magnitude
- Mapping of Vegetative Communities, Wetlands, Invasive Species, and Identification of Protected trees. Floral surveys of the study site will include areas to be directly impacted by project activities during construction and operations, and will assess the structure, composition and diversity of habitats within these areas. Study plots will be distributed along transects throughout the study site, and measures of abundance taken to determine density, frequency and percent cover of tree, shrub and herbaceous species. Observations of fauna within plots and around the project site will be noted to provide measures of abundance and species diversity
- Wildlife
- Blue holes – Location of Owl's Hole and Mermaids Liar. Mapping information of underwater cave systems if available
- Beach Profile and description of Shoreline
- Discussion on currents and sediment transport and along coast
- Wave climate
- Bathymetry
- Marine Resources – Benthic survey of Pier area and surroundings, List of marine species observed and quantification of benthic resources utilizing an acceptable quantitative standard. Benthic survey to include Peterson Cay National Park. Identification of appropriate area for transplanting coral.
- Ground Water – Drilling of approximately 25 observation wells and hydrogeologic profile borings to determine the thickness of the freshwater lens across the site, groundwater flow direction, and baseline water quality. Sampling and Analysis for VOC's, FL PRO, PAHs, RCRA 10- metals, Chloride, turbidity, DO, TDS and Total and Fecal Coliform bacteria for both groundwater and surface water sampling to establish baseline conditions.

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- Roadway and Improvements – Discussion on access road from Grand Bahama Highway
- Air Quality
- Utilities – None present. Discussion on R.O. plant and/or city water supply, and location of the Grand Bahama Utility Company Wellfield # 6.
- Noise
- Project Distance to the Bahamas National Trust Peterson Cay National Park

9.0 Project Impacts

Analysis of Environmental Impacts and project stages to be addressed. Environmental impacts will be determined by evaluating changes to the existing physical environment, biological environment, water table, socioeconomic aspects, and infrastructure, all resulting from the implementation of the proposed project.

- Water Resources Impacts – Changes to the freshwater lens to be computer modeled utilizing the Visual Modflow computer program. Any impacts to wetland will also be identified.
- Vegetation – Calculation of communities for removal, preservation of wetlands and buffer zone, preservation of other vegetative communities, dune preservation/stability and removal of casuarina trees along coast.
- Management of the Marine Environment. Including but not limited to: marine water quality, coral reef conservation, environmental restrictions for the vessels while docked, zoning, carrying capacity of beaches and other sensitive areas, etc.
- Carrying Capacity of Beaches
- Marine habitat impacts from dredging and turbidity control measures.
- Shoreline Impacts from pier and channel construction – Points of erosion and accretion due to construction of the vessel berths and jetty's at channel entrances.
- Cut and Fill Plan to raise site elevation. Finish Floor Elevations.
- Identify waste streams, waste management during construction and operation, and any recycling opportunities for glass bottles.
- Maintenance areas and environmental control measures.
- List of chemicals or hazardous materials to be kept onsite.
- Waste Water Treatment – Collection system, effluent standards, monitoring, disposal well design and training. Reuse of treated water for irrigation and alternatives.
- Reverse Osmosis Plant and Associated Wells
- Traffic and Parking. Widening and extension of Sussex Drive from Grand Bahama Highway to project site.
- Air Quality – Discussion on air quality from ships and screening model
- Electricity – and other utilities including the use of Solar Power
- Summary of Vessel Simulation Study
- Socio-Economic Impacts
- Impact Matrix – Long-term, Short-term, Reversible, Permanent, Significant, Moderate, Not Significant

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10.0 Avoidance, Minimization, and Mitigation

Discussion of Avoidance, Minimization and Mitigation strategies for various aspects of the project. Proposed actions and schedule to mitigate environmental impacts (including proposed monitoring activities).

- Communication with Bahamas National Trust, Save the Bays, and Water Keepers Alliance
- Communication with Regulatory Authorities
- Discussion of Avoidance and Minimization of Environmental Impacts during construction and operation

11.0 Socioeconomic Study (Information Provided by Carnival Grand Bahama Investments Ltd.)

- Carnival Corporation Invested in Industry and Tourism in Grand Bahama
- Capital Investment
- Direct Jobs – Construction and Operation, Indirect Jobs – Construction and Operation
- Projected Government Revenue
- Current Economic State of Grand Bahama. Closed Hotels, Unemployment, Etc.
- Benefits to local economy (Tour Operators, Businesses, etc.)
- Employment opportunities for Bahamians
- Training

12.0 Consultation with Non-Governmental Organization's

- Meetings with Grand Bahama based NGO's, Bahamas National Trust, Save the Bay's, and Waterkeepers Bahamas to provide information on the project and find out their concerns and address those concerns as part of the EIA process.

6.0 LIST OF CONSULTANTS

Below is a list of companies and associated Individuals that will be employed in the preparation of the EIA and/or EMP documents. Information on Consulting Companies and resumes of individuals are presented in **Appendix 2**.

ENVIROLOGIC INTERNATIONAL LTD.

- Lloyd Cheong

R.C. MINNING & ASSOCIATES

- Robert Minning

DAVID DECKER, P.E. CONSULTING ENGINEER

- David Decker

TOM JOHN, PROFESSIONAL ENGINEER, PA.

- Tom T. John

APPLIED TECHNOLOGY AND MANAGEMENT (ATM)

- Dr. Mike Jenkins

CARIBBEAN COASTAL SERVICES

- Mark Daniels

CSA OCEAN SCIENCES

- Erin C Hodel
- Rex E. Baumberger, Jr.
- Frank R. Johnson
- David B. Synder
- Benjamin Alcocer

7.0 PHOTOGRAPHS OF PROJECT SITE

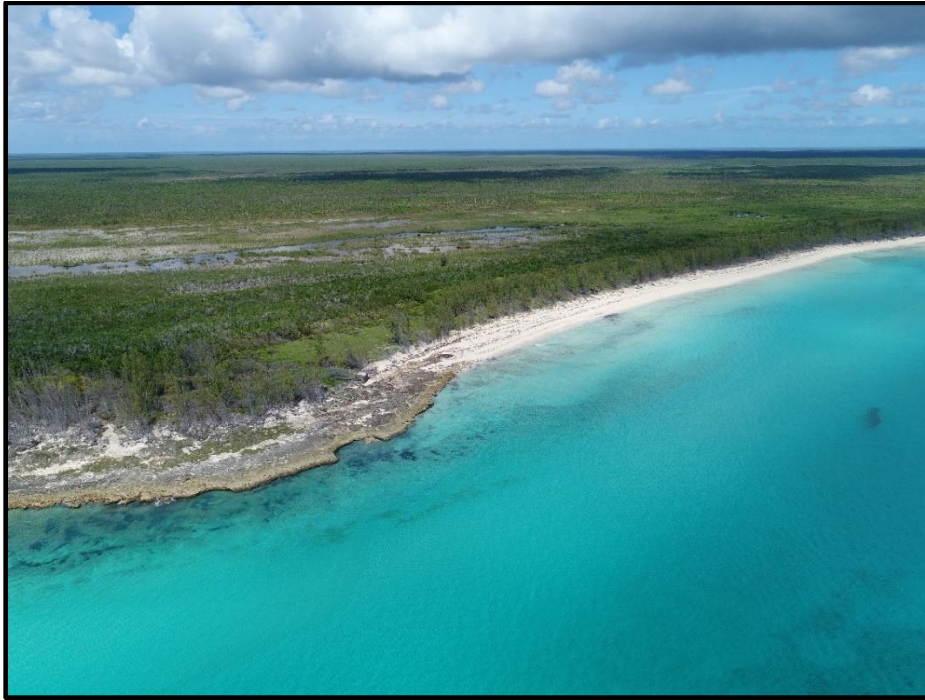


Figure 7.1 View from Sharp Rocks Point Looking North and East

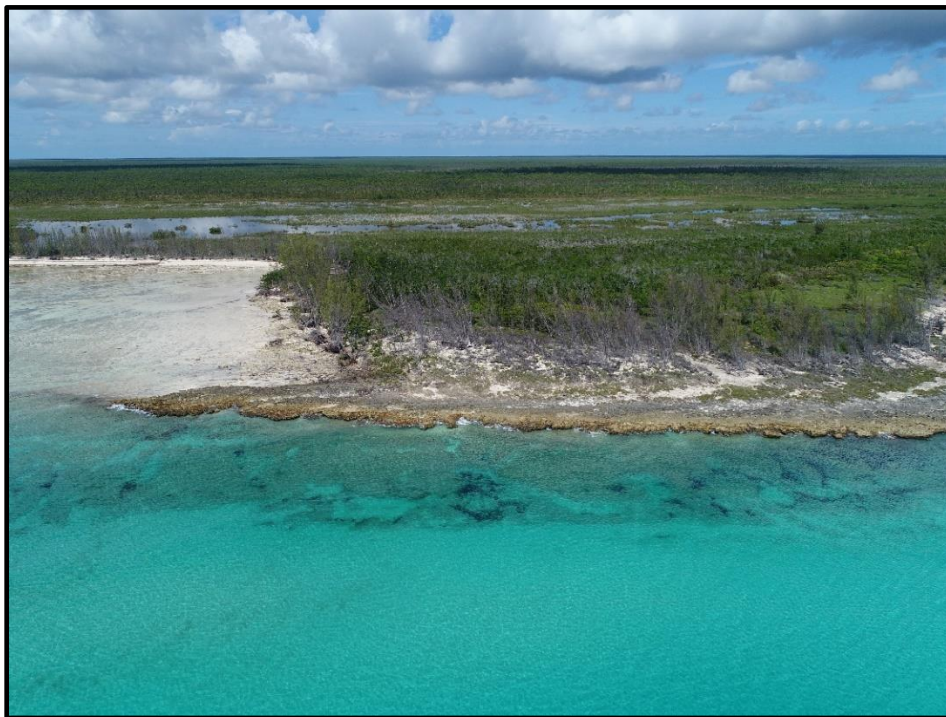


Figure 7.2 View of West Sharps Rock Point (Western Property Boundary)

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Figure 7.3. View from near Silver Point Looking west towards Sharp Rocks Point

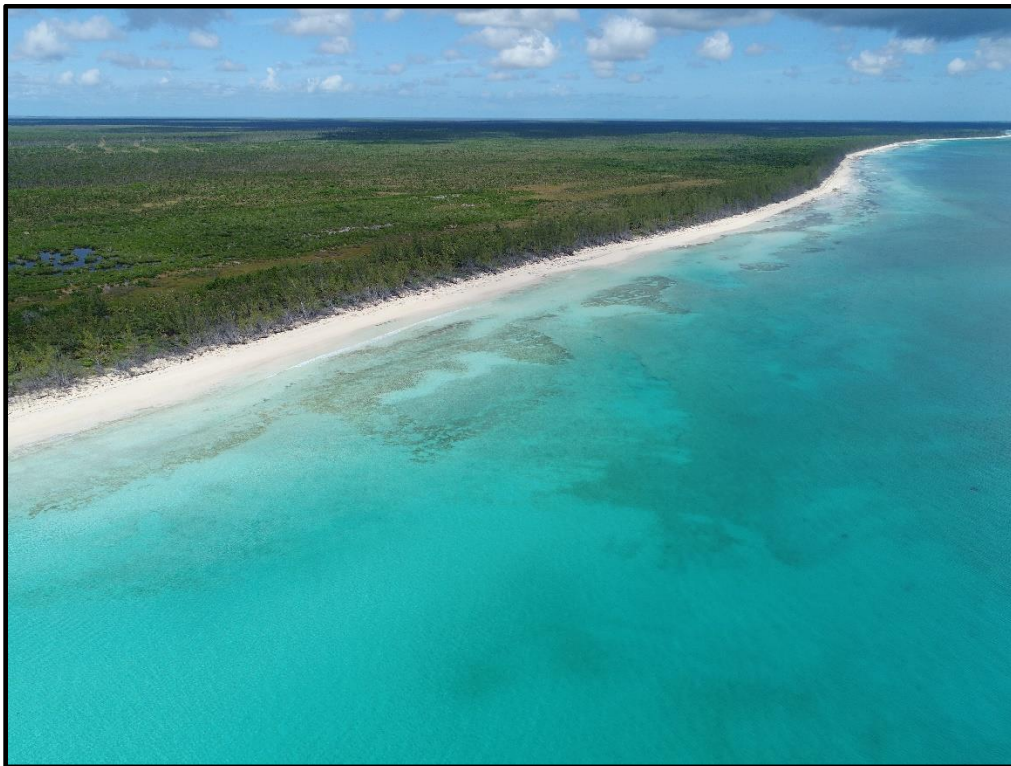
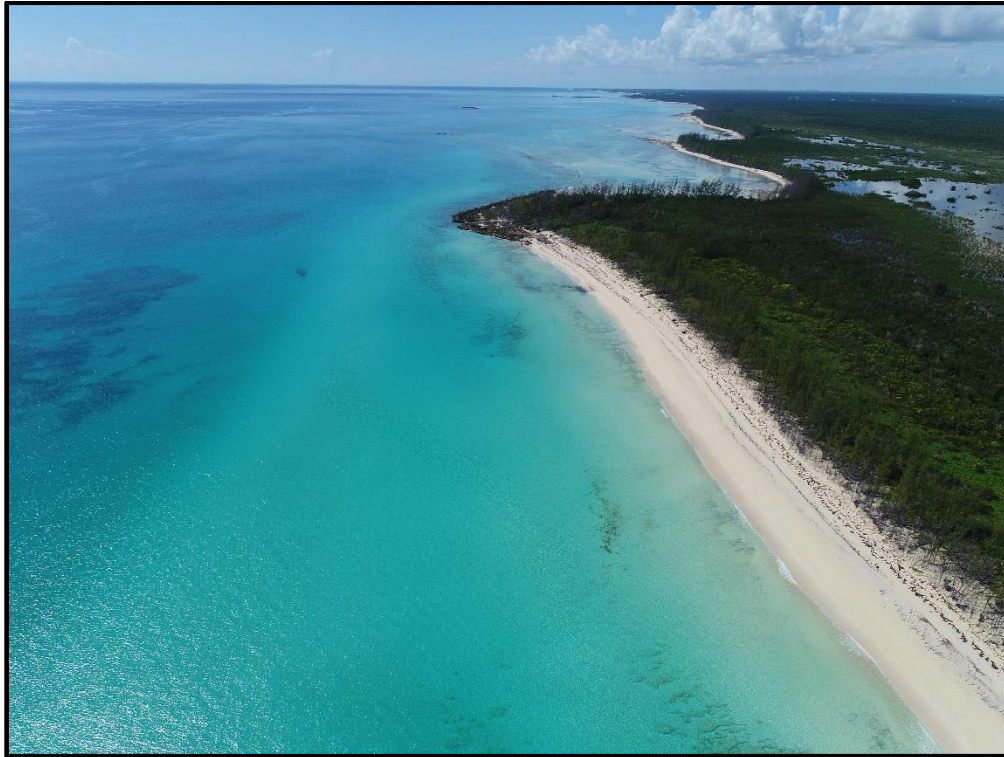


Figure 7.4. View to Center to East Coastline of Project Area

Consulting Companies and Resumes

ENVIROLOGIC INTERNATIONAL LTD.

LLOYD S. CHEONG

P.O. Box F-40163

Freeport, Grand Bahama Island

Phone 351-2490

EDUCATION

Bachelor of Science, Environmental Geology, Northeastern University, Boston, Ma. 1996
Bachelor of Science, Chemistry, Florida International University, Miami, Fl. 1988
Hazardous waste operations and emergency response (HAZWOPER) training, Envirobusiness Education Services, Cambridge, Ma.
Nationality: Bahamian

PROFESSIONAL EXPERIENCE

- Prepared an Environmental Impact Assessment and Environmental Management Plan including Environmental Procedures for a Pilot Plant Scale Pharmaceutical Manufacturing facility.
 - Conducted an Environmental Review for Save the Bays – Coalition to Protect Clifton Bay for the Clifton Pier area located in Southwest New Providence Island, which includes seawater, sediment and oil analysis. Additionally, historical information and current problems relating to oil seepage from the coastline into the sea were documented. The study was conducted over a period of two years.
 - Prepared a Shoreline Change Analysis for Save the Bays – Coalition to Protect Clifton Bay for Nygard Cay. The project included aerial photography and Geographic Information System analysis of the shoreline over time. Also, reviewed previous reports and compiled photographs to show man made impacts to property.
 - Prepared and Environmental Impact Assessment for Eco-Oil Bahamas for an Oil Storage and Treatment Plant Facility and Berthing Area.
 - Prepared an Environmental Impact Assessment for Coral Vita for the collection and growing of Corals for Grand Bahama Island.
 - Ground water contamination assessment for local power company which included the installation of ground water monitoring wells and sampling and analysis.
 - Mold sampling and analysis for United States Customs and Border patrol at Grand Bahama International Airport and various residences.
 - Prepared an Environmental Impact Assessment for the Coral Beach Hotel for a new Waste Water
-

Treatment Plant.

- Responsible for monthly water quality sample collection, analysis and reports for Grand Bahama Resort Utility Services located in West End, Grand Bahama which services Old Bahama Bay Resort and Marina.
 - Prepared an Environmental Impact Assessment for 400-acre Freeport Harbour - East Harbour Expansion which includes 255 acres of dredging to a depth of 52 ft. below mean water berthing for a future container port site. EIA included history of Freeport Harbour, flood analysis for Hawksbill Creek area, blast management plan, baseline environmental assessment, identification of positive and negative impacts, and environmental management plan. Project approved and started in 2014. Additionally, prepare biannual progress report for the local regulator.
 - Prepared an Environmental Assessment for Bahamas Tobacco International cigarette manufacturing plant located in Freeport, Bahamas.
 - Prepared an Environmental Assessment for Caribbean Tobacco Enterprises cigarette manufacturing plant located in Freeport, Bahamas.
 - Conduct environmental compliance monitoring for the West Sunrise Plant power plant owned by Grand Bahama Power and operated by Emera Utility Services. Monitoring includes environmental audits, groundwater sample collection and analysis, thermal monitoring of Freeport Harbour and Hawksbill Creek, and cooling water supply well and discharge sampling and chemical analysis (2012 to present).
 - Prepared an Environmental Impact Assessment for Morgan Oil Marine Bahamas for sale of marine petroleum hydrocarbon products.
 - Prepared a report on water resources for establishing an emergency well field during storm events for the Grand Bahama Utility Company.
 - Prepared a Phase I Environmental Site Assessment Report for property west of Basin 3, Freeport Harbour submitted to Martin Marietta Materials according to ASTM Standard.
 - Liaised with the Grand Bahama Port Authority on environmental permitting for new 52-MW West Sunrise Plant. Coordinated thermal study of cooling water discharge and biological assessment of Hawksbill Creek.
 - Conducted quarterly groundwater monitoring sample events (March 2012 – December 2013) which include sampling, shipment of samples, analysis, and preparation of reports for StatOil Bahamas - South Riding Point Terminal.
 - Assisted with coastal study along Princess Isles, Freeport, Grand Bahama.
 - Prepared an Environmental Assessment for Grand Bahama Terminals hydrocarbon storage facility.
-

- Prepared draft framework and environmental guidelines for Marina Operators of the Bahamas.
 - Phase II Environmental Site Assessment for the Hawksbill Creek, including sediment and seawater sampling.
 - Conducted a Phase II Hydrogeological Investigation at the Grand Bahama Power Company including the drilling of additional groundwater monitoring wells.
 - Supervised drilling activities and well construction for the installation of all storm drains on the Ginn West End property.
 - Saline water testing for the Grand Bahama Port Authority for a seawater supply well.
 - Conducted a Hydrogeological Investigation at the Grand Bahama Power Company Generation Plant.
 - Prepared an Environmental Impact Assessment for the Grand Bahama Power Company for a high voltage transmission line from Freeport to West End, Grand Bahama.
 - Prepared an Environmental Impact Assessment for Bahama Rock Ltd., a subsidiary of Martin Marietta Materials for the proposed Area 4 excavation in the Freeport Harbour area. This was a complex project which included a groundwater resource assessment and groundwater computer modeling, vegetative study and wetland delineation, flood analysis, noise evaluation and computer modeling, and discussion of blast management procedures.
 - Conducted ground water sampling and guided Eclipse Environmental & Engineering in the preparation of an Environmental Impact Assessment for a greenfield site for a new petroleum storage tank farm for Vopak Terminal Bahamas (BORCO).
 - Responsible for installation of groundwater monitoring wells and preparation of a water resource assessment for a proposed hotel resort and yacht club development for Eastern Grand Bahama
 - Conducted an Environmental Site Assessment for 70-acre parcel for Bahama Rock Ltd., a subsidiary of Martin Marietta Materials.
 - Assisted Ginn West End – a 2,000-acre resort development in preparing environmental monitoring summary reports and site compliance inspections for the submittal to the BEST Commission to ensure compliance with the Environmental Management Plan.
 - Prepared an Environmental Impact Assessment for the Bahamian Brewery & Beverage Company Ltd. located in Freeport. Responsible for annual groundwater monitoring for the facility from 2007 to present).
 - Assisted in Phase II Environmental Site Assessment of the former Uniroyal Chemical Plant in
-

Freeport, Grand Bahama.

- Supervised drilling of two test wells and conducted specific capacity pump test for Ginn West End Project. Initiated approval process for deep injection and R.O. supply wells with Water and Sewerage Corporation.
 - Review of an EIA and preparation of Environmental Management Plan for a hotel expansion project in West End, Grand Bahama. Assisted in review process with Bahamas Environment and Technology Commission (BEST) for project approval.
 - Reviewed draft EIA for a Florida based company for a proposed 4000-acre real estate development project for Freeport, Grand Bahama.
 - Assisted the Ministry of Tourism in successfully implementing the Foundation of Environmental Education's Blue Flag marina environmental certification program in the Bahamas.
 - Phase I Environmental Site Assessment of 200-acre parcel of land for Blue Marlin LNG Terminal in eastern Grand Bahama according to ASTM Standard.
 - Phase II Environmental Site Assessment for Bahama Cement Company facility (Tractebel Bahamas LNG) in accordance to ASTM standards. Assisted Tractebel Bahamas LNG and consultants in project development.
 - Prepared Remedial Action Plan for Tractebel Gas Engineering GmbH for the Bahama Cement Company facility.
 - Phase I Environmental Site Assessment for Marriott Vacation Club International in Freeport, Bahamas
 - Conducted Phase I Environmental Site Assessment for Discovery Bay Holdings in Freeport, Bahamas.
 - Responsible for ground water sampling on shallow monitoring wells (1999 - present) and water quality testing on deep injection well effluent at Polymers International Ltd.
 - Responsible for semi-annual sampling at the Pine Ridge Landfill for leachate and shallow groundwater monitoring wells in Freeport, Grand Bahama (2000 - present).
 - Conducted semi-annual sampling at Honeywell Bahamas (Pharmaceutical Fine Chemicals.)
 - Conducted performance review of Ground Water Remediation System at the Honeywell Bahamas facility. Supervised drilling and construction of re-injection and recovery wells.
 - Project Geologist for 600 ft. injection well construction for the Grand Bahama Shipyard and liaised with the Grand Bahama Port Authority on all aspects of well construction.
 - Supervised drilling activities for 600 ft. injection well for Polymers International Ltd. and liaised with the Bahamas Government on all aspects of well construction. Produced lithologic log, down-the-hole
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video of completed well, conducted caliber logging, and assisted in geophysical logging. Conduct annual groundwater sampling from 1999 to present including, shipment of samples and preparation of reports.

- Collected core samples for proposed limestone mining operation in Abaco, Bahamas.
- Installed ground water monitoring wells at new sanitary landfill in Pine Ridge and conduct semi-annual ground water monitoring to present date.
- Assisted Lloyd Werft GmbH Shipyard, Royal Caribbean Cruise Lines and Carnival Cruise Lines in finding solutions for environmental management issues for the Lloyd Werft Shipyard and liaised with BEST Commission during start-up.
- Prepared the EIA for the Lloyd Werft Freeport Shipcare Facility in Freeport, Grand Bahama. Currently known as the Grand Bahama Shipyard.
- Prepared report on coastal erosion for property along Taino Beach, Freeport, Bahamas.

Sanitation Services Company, Ltd. April 1996 to July 1996
Environmental Scientist

- Responsibilities included evaluating waste disposal operations and identifying environmental impacts at the Freeport Dump. Coordinated composting operations with Canadian environmental firm.

Zoino-Hebert Geotechnical Engineers Inc., Raynham, Massachusetts
Student Field Geologist July 1995 to December 1995

- Field Geologist responsible for the supervision and coordination of geotechnical drilling for the subsurface exploration of the Central Artery/Tunnel project in Boston, Ma. Duties included the classification of soil and bedrock core samples, conducted groundwater permeability tests, and generated cost analysis and progress reports.

Syntex Pharmaceuticals International Ltd.
Environmental Chemist II

- Coordinated disposal of hazardous waste to the United States that included sampling, testing and the completion of waste profile sheets, hazardous waste manifest, and land ban forms. Liaised with Department of Environmental Health Services for approval process.
 - Project manager for the operation and maintenance of an insitu-biological groundwater remediation and vapor extraction system that included groundwater monitoring and preparing financial cost exposure reports to corporate finance and managing a \$400,000 per year budget.
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- Responsible for groundwater monitoring program including coordinating sampling events with Geraghty & Miller Environmental Services and drilling and installation of ground water monitoring wells and vapor extraction wells.
- Supervised and trained wastewater laboratory technicians in conducting analytical testing of wastewater effluent discharge, including treatability studies for new processes to determine the potential impact on the wastewater treatment plant.
- Worked with corporate environmental staff (Palo Alto, Ca.) on all environmental concerns.

Environmental Chemist I

- Coordinated Phase II Environmental Site Assessment of 40-acre parcel that included soil gas analyses, groundwater quality testing, and direction of groundwater flow.
- Project Manager for RCRA trial burn for a hazardous waste rotary kiln incinerator.
- Coordinated bioassay testing to determine treated waste water quality. This resulted in the identification and removal of specific waste streams that had an adverse impact on the wastewater treatment plant.
- Laboratory Chemist responsible for analytical testing to support the industrial waste water treatment plant and environmental department. Responsible for operation of the environmental laboratory.

Process Development Laboratory Technician and Chemical Operator

- Assisted production department in process development for reworking substandard material (Steroids).
 - Responsible for the small-scale production of all final products (Steroids).
 - Pilot Plant Chemical Operator.
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ORGANISATIONS

BLUE FLAG MARINA ENVIRONMENTAL CERTIFICATION

National Jury Member for the Commonwealth of the Bahamas (2004- 2012). Assisted the Ministry of Tourism with implementing the Blue Flag Program (operated by the Foundation of Environmental Education) at Old Bahama Bay Resort and Marina, Atlantis Marina, Cape Eleuthera Resort and Marina, and Bimini Sands Resort and Marina.

BAHAMAS NATIONAL TRUST

Chairman for Grand Bahama Regional Branch (April 2011 – April 2013). Responsibilities included fundraising, and assistance with the management of Lucayan National Park, Rand Nature Center, and Peterson Cay National Park.

ROBERT C. MINNING, L.P.G.

- EDUCATION:** M.S. Geology/Hydrogeology; *University of Toledo*, Toledo, Ohio
M.A.T. Earth Science; *Indiana University*, Bloomington, Indiana
B.A. Geology; *Wittenberg University*, Springfield, Ohio
- REGISTRATION:** Professional Geologist: AIPG #2565; Indiana #123;
Wisconsin #1053
Certified Mediator: State of Florida No. 7716C
Qualified As "Special Master" for proceedings under the Harris Act and Dispute Resolution Act, Ch. 95-181 of the Laws of Florida
- PROFESSIONAL ORGANIZATIONS:** National Ground Water Association - 1968 to Present
Director, 1977-1978
Chairman, Technical Division (AGWSE), 1977-1978
Secretary/Treasurer, Technical Division (AGWSE) - 1976
M. King Hubbert Award - 1978
American Water Works Association - 1971 to Present – Lifetime Member
American Institute of Professional Geologists – 1972 to Present
President, Michigan Section, 1978
Secretary/Treasurer, Michigan Section, 1977
Florida Academy of Professional Mediators, Inc. – 1995 to Present
Florida Conflict Resolution Consortium - Roster Listing - 1996 to Present
U. S. Institute for Environmental Conflict Resolution – Roster Listing – 2000 to Present

SUMMARY OF PROFESSIONAL EXPERIENCE:

Mr. Minning has had extensive experience with respect to hydrogeologic and multidisciplinary investigations and remedial program development. He has been involved as project director for numerous RCRA and CERCLA investigations, feasibility studies and corrective action programs. He has expertise pertaining to all aspects of subsurface investigation and interpretation of investigative plans to assess soil and groundwater contamination, the development and execution of remedial plans for soil and aquifer restoration, the planning and permitting of land disposal of wastewater programs, and the exploration, development and permitting of groundwater resources.

Mr. Minning's experience in water resources development includes the use of surface and borehole geophysics, aquifer performance testing and conjunctive use of surface and groundwater supplies. His experience includes small systems of 50 gallons per minute up to 20 million gallons per day supplies for municipalities which required wellfield layout, design, and computer modeling.

Mr. Minning has also provided oversight and objective second or third party reviews and opinions on environmental issues of significant economic and political impact. He has been involved in high-level negotiations with local, state and federal regulatory agencies and personnel. He has considerable experience as an expert witness and in providing assistance to counsel in strategy formulation. His expertise also includes providing comprehensive alternative dispute resolution services including: binding and non-binding arbitration, mediation, mediation/arbitration, response cost allocations and negotiations.

ROBERT C. MINNING, L.P.G.

PRESENTED PAPERS AND PUBLICATIONS

"Financial & Technical Considerations for Wellhead Protection Programs", Training Session presented at the Indiana Water & Wastewater Association 16th Annual Conference, April 9, 1998, Jasper, Indiana

"Forensic Review of Environmental Reports in Administrative and Judicial Settings", paper presented at Environmental and Land Use CLE Seminar, Hillsborough County Bar Association, Tampa, Florida. May 30, 1997.

"Financial Considerations of Brownfield Projects", paper presented at the Florida Environmental Expo, Tampa, Florida, October 2, 1996

"How To's of Environmental Auditing - Applying Scientific Techniques, Explaining the Results", paper presented at Seminar on Implications of Environmental Law in Real Estate Transactions, Troy and Grand Rapids, Michigan. May 14 & 16, 1991 respectively paper published in proceedings: Homeward Bound Seminars, Real Property Law Section, State Board Michigan

"Environmental Audits", paper presented at seminar on Environmental Real Estate Issues, Institute of Continuing Legal Education and Negligence and Environmental Law Sections, Michigan State Bar, Southfield, Michigan, Paper published in course handbook, pp. 21-29, December 20, 1989

"The Role of the Hydrogeologist in Ground Water Contamination Studies", paper presented at the 1982 Annual Environmental Law Section Meeting, State Bar of Michigan, September 24, 1982.

"Monitoring Well Design and Installation", proceedings of the Second National Symposium on Aquifer restoration and Ground Water Monitoring, May 26-28, 1982, pp. 194-197

"Contamination Study - Geophysical Techniques", paper presented at the 6th Conference on Ground Water Contamination, East Lansing, Michigan, March 6, 1981

"Land and Groundwater Contaminants", paper presented at Symposium on Hazardous and Toxic Materials and their Disposal, Engineering Society of Detroit, April 22, 1980

"The Ott/Story Chemical Company Case", paper presented with Mr. Gary Klepper, Michigan Department of Natural Resources at the Fifth National Ground Water Quality Symposium, Las Vegas, Nevada, October 9, 1980

"Ground Water Resource Management: Chemical Spills, Contaminants", paper presented at Annual Meeting, Michigan Section, American Water Works Association, Southfield, MI, September 27, 1978

"Use It Wisely", Guest Editorial, Journal of Groundwater, September/October, 1977

"Hydrogeologic and Geophysical Methods and Considerations for Locating Underground Water Supplies", 1976-77

"Ground Water Contamination", paper presented at Seminar on Principles and Applications of Ground Water Hydraulics, East Lansing, Michigan, February 13, 1975.

"The Cost of Geophysical Exploration", The Water Well Journal, v. 28, No. 8, 1974

ROBERT C. MINNING, L.P.G.

PRESENTED PAPERS AND PUBLICATIONS

"Effects of Ground Disposal of Sewage Sludge on Ground Water Supplies", paper presented at 34th Annual Meeting, Michigan Section, American Water Works Association, Grand Rapids, Michigan, September 13, 1973

"The Earth Resistivity Method", The Water Well Journal, v. 27, Nos. 6 & 7, 1973

"Drainage Hydrology of Land Disposal Sites", paper presented at Seminar of Principals and Applications of Ground Water Hydraulics, East Lansing, Michigan, December 7, 1972, published in Symposium Proceedings

"Aquifer Exploration and Development: Case Histories", paper presented at Seminar on Principles and Applications of Ground Water Hydraulics, East Lansing, Michigan, February 11, 1972

ROBERT C. MINNING, L.P.G.

SELECTED PROFESSIONAL EXPERIENCE

Expert Witness in the matter **Robert G. Tuomela, et al v Ford Motor Company, et al.**, Court File No. D96-9333-NO, Circuit Court, County of Dickinson, Michigan. The project involved a private home owner and neighbors who experienced the intrusion of methane into their homes and properties. The accumulation of methane in one home resulted in an explosion and severe injury to the owner. The other homeowners experienced evacuations and relocations, intensive and lengthy investigations within their homes, on their properties, and in the area. Responsibilities included advising the homeowners and their counsel on the source(s) of the methane, the migration pathway(s) in the soil and groundwater flow system, review and comment on work plans, data, reports, and applicability of proposed remediation systems prepared by consultants to Ford Motor Company and Kingsford Products, Inc. Represented homeowners by providing expert witness testimony at mediation hearing.

Expert Witness in the matter **RSR Corporation, and Quetmetco, Inc. v Avanti Development, Inc. et al.**, Court File No. IP 95-C-1359-M/S, United States District Court, Southern Indiana, Indianapolis Division. The project involved lead contamination of soils in a residential neighborhood from activities conducted at a battery recycling, lead smelter and lead oxide facility. Lead concentrations in the soil surrounding approximately 256 private homes exceeded criteria (>400 ppm) and had to be removed. Responsibilities included reviewing and commenting on testing procedures, analytical data, reports, remedial actions, and response cost allocation for counsel representing a third party defendant.

Project Director, Remedial Investigation/Feasibility Study, Motor Wheel Superfund Site. Project site was an active gravel mining operation; landfilling of various wastes had taken place in mined-out areas. Efforts included serving as liaison between client and other potentially responsible parties (PRPs) to establish each party's responsibility for the site. Contaminants of concern included chlorinated solvents, numerous inorganic chemicals, and other organic compounds. Represented the client during negotiations with state and EPA personnel regarding a 106 Order and subsequently to define the scope of the investigation, and served as overall point of contact for the RI/FS.

Project Director, Contamination Assessment and Site Characterization at a large manufacturing site, Confidential Client. Conducted contamination assessment at facility with numerous potential sources of contamination. Characterization included groundwater, surface water, various areas of fill materials, soils, wastewater impoundments (liquid and sediment sampling and analysis), and in-plant conditions. Represented the client in negotiations with regulatory agencies and associated contractors. Following the contamination assessment activities, a comprehensive risk assessment was conducted at each area of concern to segregate the area of significant impact and to quantify the associated risk. This effort resulted in the prioritization of site with respect to the need to remediate and established remediation criteria at each area of concern.

Project Director, Remedial Investigation/Feasibility Study at the Verona Wellfield Superfund Site. Thomas Solvent Company, the duties included direction of court-ordered interim remedial actions and

emergency response measures, provided oversight of EPA activities in the RI/FS, proposed remediation contained in the draft Record of Decision (ROD) and throughout the Remedial Action phases. Represented client in community relations with local citizens groups, state and federal litigation, and throughout extensive negotiations and litigation with insurance carriers.

ROBERT C. MINNING, L.P.G.

SELECTED PROFESSIONAL EXPERIENCE

Project Director, Gelman Sciences, Inc., Ann Arbor, Michigan. This multi-faceted project included negotiations with EPA Region V, Michigan DNR and local governmental units on development of a RI/FS for 1,4 dioxane contaminated soil and groundwater. The negotiations eventually led to a favorable consent order for site cleanup. Services also included providing expert witness testimony in successful defense of a suit filed by Michigan DNR (now DEQ).

Project Director, Lake Lansing Dredging Project, Lansing, Michigan. Involved the deepening of Lake Lansing involved negotiations with the Corps of Engineers, EPA Region V and Michigan DNR (now DEQ). Use of hydraulic dredging required complete sediment analysis, spoil site development and reuse plans, long term monitoring program and contractor relations. All aspects were successfully completed.

ROBERT C. MINNING, L.P.G.

SELECTED BUSINESS EXPERIENCE

KECK Consulting Services, LLC – Battle Creek, Michigan

- President – April 2002 – Present

Environmental consulting service business specializing in hydrogeology, geology and geophysics. Expertise is also provided in wetland delineation and permitting, ESA's, water resource exploration and development, soil and groundwater investigations and remediation, and mediation / arbitration related to environmental issues.

R. C. Minning & Associates, Inc. - St. Petersburg, Florida

- President - September 1997 to Present

Environmental consulting and Alternative Dispute Resolution service business, response cost allocation services, specializing in water resource exploration and development, soil and groundwater investigations and remediation, and mediation / arbitration related to environmental issues.

HSA Environmental - Tampa, Florida

- Chief Operating Officer - May 1996 to September 1997

Responsible for the day to day operations of a multidisciplinary environmental consulting business. Organized the company into operating divisions with profit and loss responsibility, developed middle management, implemented corporate and divisional business planning with budgeting and forecasting, streamlined accounting and finance operations, negotiated favorable LOC, revised and negotiated favorable rates for all insurance coverage including health, initiated procedures for financial considerations in employee reviews, and developed incentive compensation plan.

R. C. Minning & Associates - Ft. Myers and St. Petersburg, Florida

- President - January 1995 to May 1996

Developed environmental consulting and alternative dispute resolution business specializing in water resource exploration and development, soil and groundwater investigations and remediation, and mediation / arbitration services related to environmental issues. Developed business plan for startup of a regional engineering and environmental consulting business focused on water resources.

Horizontal Technologies, Inc. - Cape Coral, Florida

- Senior Vice President - October 1993 to January 1995

Developed and implemented a comprehensive business plan to improve financial performance, increase internal controls, and systemize sales and marketing. Prepared annual business plans and budget, and five-year strategic growth plan, and developed corporate package for presentation to

ROBERT C. MINNING, L.P.G.

SELECTED BUSINESS EXPERIENCE

potential investors. Increased revenues over 39 percent, and operating profits by over 200 percent.

Summit Environmental Group, Inc. - Canton, Ohio

- Executive Vice President & Chief Operating Officer - July 1989 to February 1993

Full responsibility for day to day operations of all Summit Subsidiary companies. Played an integral part in the acquisition and integration, and growth of nine private companies into an \$80 million organization with over 1,000 employees, and operating profits in the top ten percent of industry peer group. Participated in planned Initial Public Offering, which due to market conditions did not materialize. Venture capital backers sold company to Earth Tech, Inc. which is in operation as of 1998.

Hunter Environmental Services, Inc. - Gainesville, Florida

- Director - September 1986 to January 1989

Played a key role in the planning, "Road Show", and initial Public Offering. Member of the Board of Directors of a public company with responsibility for planning and executing growth of the organization and maximizing return to shareholders.

- Senior Vice President - Environmental Operations - March 1988 to January 1989
- President - Environmental Science & Engineering - March 1988 to January 1989

Directed and responsible for the integration and operations of 25 subsidiary and branch offices with 820 employees providing multi-disciplined environmental and engineering services nationwide. Annualized revenues of \$66 million with operating profits in upper quartile of industry peer group.

- Vice President & General Manager - Geosciences Division

Directed and integrated activities of five geoscience subsidiaries, and full profit and loss responsibility. Participated in the Initial Public Offering of Hunter Environmental Services, Inc. Increased Division revenues from \$13 million to \$22 million with consistent profitability.

Keck Consulting Services, Inc. (formerly W. G. Keck & Associates, Inc.) - Williamston, Michigan

- Chairman, Chief Executive Officer & President - January 1971 to March 1988
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Directed the development and growth of a hydrogeological and geophysical consulting services firm. Achieved revenue growth from \$20 thousand to over \$9 million. Successfully lead the sale of the company to Hunter Environmental Services.

ROBERT C. MINNING, L.P.G.

SELECTED BUSINESS EXPERIENCE

Keck Geophysical Instruments, Inc. - Williamston, Michigan

- Chairman - 1982 to 1986

- Chairman, Chief Executive Officer & President - 1971 to 1982

Directed to growth and development of a geophysical / electronics instrument manufacturing company from split-off from W. G. Keck & Associates, Inc. to sale to Hunter Environmental Services, Inc.

ROBERT C. MINNING, L.P.G.

SELECTED PROFESSIONAL / BUSINESS ACTIVITIES

City of Treasure Island, Florida

- Commissioner District 3 – March 2007 – March 2009
- Vice Mayor - March 2008 – March 2009
- Mayor – March 2009 -- Present

Barrier Island Government Council (BIG-C)

- President- 2014-present
- Vice Chair – 2012 – 2014
- Secretary/Treasurer- 2010-2012

Tampa Bay Regional Planning Council

- Member-2008 – present
- Secretary /Treasurer- 2011-2012
- Vice Chair – 2012 – 2013
- Chair-2013-2014

Agency on Bay Management – Tampa Bay Regional Planning Council

- Member-2008-present
- Chairperson-2013-Present

Madeira Beach Fundamental School – Madeira Beach, Florida
School Advisory Council

- Chairperson – 2009 - 2010
- Vice Chairperson – 2010 – 2011

Southside Fundamental Middle School – St. Petersburg, Florida
School Advisory Council

- Member-2008 to 2009

Pasadena Fundamental Elementary School – St. Petersburg, Florida
School Advisory Council

- Member-2003 to 2008
- Chairperson-2005 to 2008

City of Treasure Island, Florida – Beach Stewardship Committee

- Appointed as Member – 1999 to 2007
- Chairperson – April 2000 to March 2007
- Commission Representative – March 2007 – March 2009

East Lansing - Meridian Water and Sewer Authority, Meridian Township, Ingham County, Michigan

- Appointed as Trustee representing Meridian Township - 1983 to 1988

Ingham County Solid Waste Management Planning Committee, Ingham County, Michigan

- Appointed as Member - 1980 to 1988

Groundwater Monitoring & Remediation

- Member of Editorial Board - 1981 to 1986

Journal of Groundwater

- Member of Editorial Board - 1976 to 1979

The Professional Geologist

- Associate Editor – 2000 to Present

University of Wisconsin-Extension, Madison, Wisconsin

- Instructor in Hydrogeology for Technical Institute of Water Wells Design - 1976 to 1987

Pan American Health Organization / World Health Organization

- Special Consultant in Hydrogeology on projects in Georgetown, Guyana, and in the ten largest cities in Haiti - 1973 to 1977

Indian Health Service, Department of Health Education and Welfare

- Instructor in Geophysics for Short Course in Water Well Construction - 1973 to 1
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Resume

David J. Decker, P.E., LEED AP

Consulting Coastal / Environmental Engineer

Background Information

Address: 430 Neptune Road, Juno Beach, FL 33408

Telephone: 561-371-9067

Email: davidjamesdecker@gmail.com

Education: B.S. Ocean Technology, Florida Institute of Technology

Registrations: P.E. Florida, No. 34217, 1983

LEED Accredited Professional, 2009

ASCE \ COPRI Member

Publication: Deepwater Port Development, Balancing Benefits and Impacts, ASCE 1989

Professional Positions Held

June 2017 – Present	Private Practice – David J Decker, P.E., Consulting Engineer maintaining continuing relationships supporting numerous clients
July 2012 – May 2017	Director – Calvin, Giordano & Associates, Inc. Sr. Professional supporting the rapid growth of CGA. CGA acquired East Bay Group
February 2000 – July 2012	Founder and Managing Partner – East Bay Group, LLC Lead Staff, Client and Business Relationships for the Firm
Sept. 1989 – February 2000	Vice President / Project Manager helping establish South Florida presence for Applied Technology and Management
Nov 1983 – August 1989	Gee & Jenson Engineers, Architects and Planners, Inc. Professional Growth Positions including staff engineer, project manager, client manager and branch office manager

Business Experience

- Over 25 years working in consulting coastal engineering in South Florida and the Caribbean, providing marine improvements supporting waterfront development
- Over 20 years' experience managing consulting engineering offices and working with technical staff specializing in coastal, environmental and water resources engineering.
- Developed a relationship-oriented service style, with a broad public and private client base, including users, suppliers and marine contractors.
- Perform design feasibility and risk analyses projecting costs, storm vulnerability, recurrence intervals, regulatory constraints and coastal resiliency.
- Extensive experience with planning, design, environmental permitting and preparation of environmental documents such as FONSI, EIS, EAs, Beach Management plans and associated mitigation and monitoring efforts.
- Experience with project funding including grant procurement, Exim Bank financing, ad valorem and non - ad valorem assessments.
- Served as Engineer of Record on several bond issues for municipalities and Chapter 298 Special Districts
- Developed successful South Florida consulting engineering practices from the ground up on two occasions.
- Extensive experience coordinating with local, state, federal and international officials to procure permits and to support planning and design efforts.

References

Richard V. Reikenis, PE, President

Reikenis & Associates, LLC

801 South Olive Ave., Suite 105, West Palm Beach, FL 33401

Telephone: 561-818-5381

Email: rick@reikenis.com

Lloyd Cheong, President

Envirologic, International, Ltd.

6 West Atlantic Drive, Freeport, Grand Bahama Island, Bahamas

Telephone: 954-727-3965

Email: envirologic@coralwave.com

Project Experience Summary

Presented below is a list of representative projects in which Mr. Decker was involved either as a project manager or in a technical / engineering capacity. The list has been compiled to demonstrate the breadth of coastal / waterfront projects experience obtained during his career. Additional specific information can be provided for the listed projects upon request

COASTAL/ WATERFRONT PROJECTS

- Old Bahama Bay, West End, Grand Bahama Mixed Use Resort w/sand shore and marina
- Marina Redevelopment, City of Ft. Pierce 200+ slip public marina
- Town of Lake Park, Waterfront Marina Redevelopment
- Gorda Cay, Castaway Cay Planning Cruise Ship Berth Siting
- Grand Bahama Port Authority, Grand Bahama Freeport Harbor Expansion Studies
- Cayman Utility Company, Grand Cayman Cooling Water Impact Assessments
- Discovery Bay, Lucaya, Grand Bahama Island Beach Restoration & coastal structures
- Lake Worth Inlet, Management Plan Inlet & Navigation planning & funding

PORTS AND DREDGING PROJECTS

- Atlantic Drydock, Jacksonville Permitting & Dredge Spoil Management
 - COE and CPA, Port Canaveral Alternatives Long Term Spoil Management
 - NAVFAC, Kings Bay Georgia Trident Wharf Configuration Study
 - Canaveral Port Authority, Planning Preparation Chap 380 Comprehensive Plan
 - Port Manatee, Manatee County, FL Deepening and Widening Entrance Channel
 - Port Canaveral Planning and Funding Entrance Channel Deepening and Widening
 - Port of Palm Beach, Planning and Permitting Maintenance Dredging and Spoil Placement
 - Port La Dania, Broward County Deepen and Widening Dania Cut-off Canal
 - Florida Ports Council, Tallahassee, FL Rulemaking for long term maint. dredging
 - Port Canaveral, West Turning Basin EIS, permitting, mitigation, port expansion
 - Bell Channel Bay, Lucaya, Grand Bahama EIA /design for dredging channel and harbor
 - The Barcadare, Georgetown, Grand Cayman Harbor wave and tranquility evaluations
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CARIBBEAN PROJECTS

- St. James Parrish, Barbados Recreational Beach Management
 - Four Seasons Hotel, Nevis, BWI Storm Flood Damage Remediation
 - Provo, Turks and Caicos Setback & Erosion Protection Structures
 - Lyford Cay, Bahamas Historic Shoreline location studies
 - Bimini Bay, Bimini Islands, Bahamas EIS for the Bimini Bay project
 - Princess Hotel, Hamilton Bermuda Dolphin Basin Improvements
 - Ritz Carlton Resort, Grand Cayman Storm flood level and circulation studies
 - Isla Palenque Resort, Boca Brava, Panama Planning-design waterfront development
 - Freeport Harbor Port Expansion, Bahamas Harbor expansion const. with Envirologic
 - Little Hog Cay, Abaco Islands, Bahamas Development Proposal and project EIS
 - Grand Bahama Power Company, Freeport Thermal Plume /cooling water impact study
 - Grand Bahama Port Authority, Freeport Hurricane damage assessment /three inlets
 - Grand Bahama Port Authority, Freeport Plans and specs to repair damaged inlets
-

Tom T. John

President, Tom John, Professional Engineer, PA.

6250 Cape Hatteras Way N.E. #2 St Petersburg, FL 33702

727.403.8736 tom@tomjohneng.com tjengr@msn.com

EDUCATION

University of South Florida - Graduate Studies, Chemical/Environmental Engineering

Cleveland State University - Graduate Studies, Chemical Engineering

Worcester Polytechnic Institute - Master of Science, Chemical Engineering (1975)

University of Massachusetts - Bachelor of Science, Chemical Engineering (1972)

Professional Short Courses: "Biological Macromolecules (MMI)"; "Heterogeneous Catalysis (ACS)";
"Interpretation and Use of Rate Data (AIChE)"; "Developing and Implementing Air Toxic Control Programs
(EPA/STAPPA/ALAPCO)"; "Utilization of Geographic Information Systems (FES)"

LICENSES AND REGISTRATIONS

Professional Engineer – Florida, Alabama

Certifications

Homeland Security Confidential Data Certification

EXPERIENCE SUMMARY

Mr. John has over 40 years of engineering and consulting experience in various research, applied industrial, and environmental compliance positions. His background has included such assignments as production improvements in various chemical process applications, design, specification, and feasibility studies on catalytic reactors and packed bed absorbers (including zeolite and carbon), and computer modeling and simulation, as well as recommendations for and review and evaluation of various types of air and water quality controls, waste minimization and recovery, and process/chemistry alternatives. In the spring of 2018, he co-taught a senior level class in "Chemical Plant Process Safety" for the Chemical Engineering Department, University of South Florida.

Since beginning his consulting company in September of 1990, his projects have included numerous permitting and computer emission modeling efforts for both minor and major sources and for criteria and air toxic compounds; environmental impact statements for proposed industrial sites; accidental release modeling and off - site consequence analysis; emission monitoring design and specification; specification of pollution control equipment and permitting for particulate, VOC, SOx and NESHAP sources; design and permitting of water treatment systems; facility safety, OSHA and hazardous waste/chemical environmental audits; development of hazardous waste disposal strategies and procedures; regulatory reporting at all levels; and development of computer data bases for environmental information management.

Tom John, P.E.

Mr. John has prepared the air and waste segments of environmental impact statements in the United States, the Kingdom of Saudi Arabia, and the Bahamas. He has prepared air construction, FESOP, and Title V permit applications, storm water and industrial discharge permit applications, developed emissions inventories, and performed facility environmental audits/reviews for numerous clients. He has provided environmental management and record keeping support for clients throughout Florida, Georgia, the Carolinas, Indiana, Arizona, California, Ohio, and Iowa, and has developed or assisted in the development of Contingency Plans, Procedural Manuals, Safety Training Manuals, Storm Water Pollution Prevention and Spill Prevention Control and Countermeasures Plans for numerous facilities. He has been involved in several Supplemental Environmental Projects for industrial/commercial clients through the E.P.A.

He has assisted companies in developing and implementing facility Risk Management Plans, Integrated Contingency Plans, and in identifying and minimizing the potential for accidental releases and off - site consequences through the use of active and passive mitigation techniques and refined computer modeling.

Mr. John has prepared permit applications for and performed reviews of existing and proposed waste to energy plants and incinerators for ability to comply with new regulations, has permitted biohazardous (and standard) incinerators, prepared specifications for their pollution control and data logging equipment, and has been an expert witness in Administrative Hearings.

He has presented seminars on identifying and complying with environmental regulations, and on computer modeling of facility emissions and Air Toxics evaluation. He has taught graduate and undergraduate courses in chemical engineering, environmental engineering and regulatory topics at the University of South Florida. While teaching at the University, he developed classes in *Adsorption on Solid Sorbents* and *Molecular Sieve Adsorption*, and developed chemical engineering laboratory/unit operations laboratory classes stressing the creative application of engineering principles. He has also developed and presented seminars on chemical engineering, environmental engineering and process instrumentation/measurements. Mr. John has been an invited speaker at the US-Asia Environmental Partnership seminar in Seoul, Korea.

From October of 1988 through December of 1990 at Stone & Webster Engineering, Mr. John was Lead Engineer/Project Manager for projects with electronic and synthetic chemical production facilities involving emission inventory development, emission modeling and permitting of air sources containing VOC/air hazardous compounds.

Tom John, P.E.

While at Stone & Webster, he accepted a site assignment with Florida Power & Light in the Civil Specialist Group of Power Plant Engineering, West Palm Beach office. His responsibilities included reviewing proposed engineering additions/modifications to existing plants for environmental/regulatory impacts. He was also involved in evaluating the permitting impacts of various engineering options associated with power plant refurbishment, repowering, and conversion to combined cycle operation. He assisted in evaluating and reviewing PSD/site certification applications for accuracy and completeness. These reviews covered all major topic areas - air, noise, industrial and hazardous waste, surface water, tanks - at all levels - Federal, State, local/county, and Water Management District.

Mr. John's former position with the Florida Department of Environmental Protection, from 1985 - 1988, involved the review and evaluation of operating and construction permit applications of air pollution sources for a myriad of commercial, industrial and power generating facilities throughout the State. He has experience with and has reviewed applications involving air emissions from municipal resource recovery facilities, coal, oil, and gas fired power plants, as well as different types of industrial boilers and combustion sources.

These reviews included technical evaluation of pollution control equipment, site inspections, and examination of operating records, monitoring data, annual operating reports, permit- required testing procedures, data, and conclusions to determine compliance with State and Federal regulations. As a result of these activities he is very familiar with the various permitting requirements and engineering options available for pollution control. He has conducted and reviewed numerous air emissions evaluations involving hazardous and air toxic compounds from sources including air strippers and incinerators, as well as more conventional air emissions. As a result of his association with the Florida Department of Environmental Regulation, he is familiar with the procedures and requirements for permitting and compliance at both the State and Federal level.

From 1980 through 1985, he taught in the Chemical and Mechanical Engineering Department at the University of South Florida. Prior to that, he was employed by Dow Chemical Company as a research/process engineer in the Chlorobenzenes and Derivatives area.

Tom John, P.E.

SEMINAR COURSES PRESENTED AND WORKBOOKS DEVELOPED

"An Overview of Environmental Regulations"

"Self Audit Manual of Regulatory Compliance - Inventories and Emissions"
in association with the Small Business Assistance Program, FDEP.

"Minimizing, Managing and Controlling Pollution in the Environmental Era"

"Principles of Chemical Engineering"

"Fundamentals of Process Measurements and Instrumentation," with Jack Ready

PUBLICATIONS AND PRESENTATIONS

"Determining Environmental Compliance - Boatbuilders, Repair Yards, and Marinas," with William Meyers
(Pursuit Boats), presented at IBEX, October, 2008

"Complying with MACT," Professional Boat Builder, No. 60, August - September, 1999

"The Styrene Emissions Story," Professional Boat Builder, No. 53, June - July, 1998

"Boilers and Industrial Furnaces - Fuel Choices and Emissions Impacts," presented at the U.S. - Asia
Environmental Partnership Seminar, Seoul, Korea, May 12, 1998.

"Accidental Release Regulations," Clean Air Act Compliance and Odor Control Seminar, Florida Water
Environment Association, Tampa, FL, December 7, 1995.

"Preparing for Title V Impacts and Requirements," presented at the Composite Fabricators Association
Division meeting, Adamsville, Tennessee, February 24, 25, 1995; and Washington, D.C., March 17, 18,
1995.

"Environmental Compliance - Permits, Reports, and Recordkeeping," presented at Composites '94 National Composite Fabricators Association meeting, Orlando, Florida, October 22, 1994.

"Estimating Mass Flux Across an Air-Liquid Interface," presented at National Air & Waste Management Association Florida meeting, Daytona Beach, September 19, 1994.

"Environmentality - Positive Impacts of Environmental Regulations," presented at Society of Women Engineers "Paradigms For Progress" meeting, Cocoa Beach, June 2, 1994.

"Accidental Release Modeling Under Title III of the Clean Air Act Amendments," presented at the AIChE National Meeting, Miami, Florida, November 2-6, 1992.

"Use of Computer Models for Risk Assessment under Title III of the Clean Air Act Amendments," presented at the AIChE Florida meeting, May 24-25, 1992

"Dealing with Today's Toxic Emission Regulations," presented at the International Boatbuilder's Exhibition and Conference, Ft. Lauderdale, Florida, February 5-7, 1992

"Effect of Model Selection on Estimation of Maximum Ambient Concentration from Air Strippers," presented to Annual Florida Section Meeting, Air and Waste Management Association, Daytona Beach, September 23-25, 1990.

"Information Flow Requirements for the Environmental Manager," presented to the Hazards Communication session, AIChE Health and Safety Symposium, Orlando, FL, March 18-22, 1990.

"Modeling of Gaseous Emissions from Landfills and Other Area Sources," presented at the ASCE/NCEE National Meeting, Austin Texas, July 10-12, 1989

"Use of Electron Microscopy and Surface Analysis in Determining Carbon Adsorbent Variations due to Severe Regeneration Conditions," presented to the Fourth Annual Meeting, Florida Society for Electron Microscopy, Tampa, Florida, February 24-25, 1986.

"Alternative Goals of the Unit Operations Teaching Laboratory" and "Fundamentals of Measurement and Instrumentation in the Chemical Engineering Laboratories," with Jack Ready, presented at the 1986 ASEE Conference, Cincinnati, Ohio, June 23-24, 1986.

"Removal of Ammonium Ions from Drinking Water Utilizing Clinoptilolite," Collette Brousard and Tom, T. John, presented at AIChE Southern Regional Conference, Tampa, Florida, 1982.

"Effluent Fluctuations in Packed Bed Absorbers Due to Binary Competitive Sorption," Tom T. John, and R. Scott Stagner; presented to IASTED International Symposia, Alternative Energy Sources and Technology, Boston, Massachusetts, July 7-9, 1982.

"Supplemental Home Heating Using Heat of Absorption of Water on Zeolites," Tom T. John and D. Brakke; presented to International Association of Science and Technology for Development Symposium, May 20-22, 1981, San Francisco.

**YEARS OF
PROFESSIONAL
EXPERIENCE:**

Total: 27
ATM: 15

**AREAS OF
SPECIALIZATION**

- Coastal Engineering
- Coastal Analysis and Numerical Modeling
- Beach Nourishment Design and Permitting
- Coastal Structures
- Environmental Restoration
- Project Management and Construction Administration

EDUCATION

- PhD, Ocean Engineering
- MS, Ocean Engineering
- BS, Ocean Engineering

**PROFESSIONAL
REGISTRATIONS**

- Professional Engineer, Florida, No. 58072, 2002

AFFILIATIONS

- Southeast Florida Coral Reef Initiative (SEFCRI) Team Member
- Florida Shore and Beach Preservation Association
- American Shore and Beach Preservation Association

SUMMARY OF QUALIFICATIONS

Dr. Jenkins is a recognized expert in the field of coastal engineering and serves as Coastal Engineering Principal of ATM's Coastal Engineering Team. He has an extensive background in modeling of dynamic coastal systems including a PhD within the field. This background has been further expanded by his work on a broad range of coastal engineering projects for more than 25 years.

Dr. Jenkins has directed, designed, and permitted several beach nourishment and coastal construction projects, and during his career he has directed the placement of over 15 million cubic yards of cumulative nourishment volume through multiple nourishment efforts. Dr. Jenkins has served as the engineer of record for numerous coastal structure design, evaluation and permitting projects both within the United States and internationally. Projects have included rock groins and revetments, composite groin structures, breakwaters and geotube structures.

Dr. Jenkins has significant experience in the permitting of coastal and estuarine projects within the United States, Bahamas, and Caribbean. This includes development of environmental assessments, (EA) and environmental impact studies (EIS) domestically and environmental impact assessments (EIA) studies internationally. Dr. Jenkins maintains successful proactive relationships with multiple federal, state, and international regulatory agencies within the field.

PROJECT EXPERIENCE

Orion Environmental Impact Assessment, Turks and Caicos: Principal for the preparation of the project environmental impact assessment.

Amanyara Dune Assessment, Turks and Caicos: Study principal.

Amanyara Coastal Assessment 1 & 2, Turks and Caicos: Study principal.

Carnival Grand Turk Berth Dredging, Turks and Caicos: Study principal.

Seven Mile Beach, Cayman Islands: Study principal.

Northlake Dredge Feasibility, Grand Turk, Turks and Caicos: Performed an engineering evaluation of the expansion of the navigation channel and implementation of jetty structures to improve navigability and access. Directed initial field investigations in support of project development. Directed conceptual design of marina and access channel improvements.



Beach Design, Third Turtle, Providenciales, Turks and Caicos: Conducted design analysis and beach renourishment design for an existing nourishment project.

Special Inspector, Thompson Cove Beach and Dune Restoration, Providenciales, Turks and Caicos: Served as government representative (special inspector) for the inspection of a beach and dune restoration project that included breakwater, dune geotube and beach nourishment elements. Duties included field inspection and coordination with Owner and government representatives regarding construction and conformance to the project EIA.

Third Turtle Beach, Structures, and Inlet Maintenance, Providenciales, Turks and Caicos: Provided the design and engineering of a beach nourishment, new groin, and jetty structures, and the maintenance dredging of the existing inlet channel. Efforts included development of a supplemental environmental impact assessment (SEIA) and development of maintenance and EMP protocol as well as construction observation and review.

Beach Enhancements, Resort Development, Central Bahamas: Directed beach and groin designs for a major resort development within the Central Bahamas. Provided EIA support, marina, and dredging engineering efforts.

Bimini Inlet Channel Dredging, North Bimini, Bahamas: Development of dredge fill disposal and environmental protection plans for design of an improved navigation channel.

Beach Enhancement and EIA Development, Big Stirrup Cay, Bahamas: Developed alternatives to address existing beach erosion issues including EIA project support.

Beach Design and Stabilization, Rose Island, Bahamas: Developed engineering and approval documentation for the creation and stabilization of a recreational beach for Rose Island, Bahamas. The design includes the construction of a terminal groin structure to retain placed beach material.

EIA Development and Beach Enhancements, Ginn Sur Mer, Grand Bahama: Directed the beach assessment and coastal impact studies in support of EIA approval for this major development project. Developed coastal enhancement alternatives to mitigate impacts from the construction of two new stabilized coastal inlets. Design includes beach nourishment, jetty and groin design, and construction.

Coastal Engineering EIS Support, Port Moin, Costa Rica: Supported the successful acquisition of the environmental permit for Port Expansion. Work involved the coastal engineering review of the project and development of monitoring and mitigation protocols for construction and coastal protection.

Four Seasons Resort Storm Protection and Shoreline Stabilization, Anguilla, BWI: Conducted the design and analysis of a breakwater structure to reduce wave impacts to existing upland structures and the design of beach stabilization alternatives.

Goat Head Hill Coastal Feasibility Assessment, Antigua: Provided coastal assessment of property.

Coco Plum Island Resort Beach Assessment, Providencia, Belize: Conducted site inspection and analysis of an erosive beach under consideration for future development. The study included an assessment of underlying coastal process and development of remediation alternatives including beach nourishment and coastal structures.



Playa Angosta, Panama: Performed a coastal assessment and developed alternatives for beach restoration and enhancement for a planned coastal development.

Beach Marina and EIA Development, Anguilla: Project included site assessment, engineering design, and EIA support for a proposed major marina development including coastal enhancements and construction of a new, stabilized inlet cut.

Coastal Development and Storm Vulnerability Study, Esmeralda Peninsula, Dominican Republic: Due diligence of coastal property and design support for development plan. Study included assessment of site storm vulnerability, erosion potential, critical environmental resources, and construction design recommendations.

Beach and Marina Design and Impact Study, Samana, Dominican Republic: Project included site assessment and design development for a major marina development with coastal stabilization and enhancement.

Sand Search Geotechnical Investigations, Boca Raton, FL: Project manager for the investigation of nearshore sand sources for future beach nourishment. Effort included direction of field efforts, cultural resource survey, data analysis, and delineation of sand resources.

2016 Phipps Nourishment Project, Palm Beach, FL: Engineer of record for the construction of a 1 million-cubic yard beach nourishment project utilizing a nearshore sand source. Responsibilities included design and oversight of the stockpiling and placement of 25,000 cubic yards as a dune feature in Reaches 3 and 8.

Town-wide Annual Beach Physical Monitoring, Palm Beach, FL: Project manager for the collection and analysis of annual beach monitoring data. Responsibilities included evaluation of project performance of multiple Town nourishment efforts. ATM has provided annual monitoring services to the Town of Palm Beach since 2009.

2016 Jupiter Island Nourishment Project Support, Jupiter Island, FL: Engineer of record for the design, permitting, and construction of the 2016 Jupiter Island Nourishment Project. This effort included execution of modifications to the federal and state project permits, engineering design, bid, and project construction support. This project involved the nourishment of the beach utilizing 1.5 million cubic yards of sand from an offshore sand source via hopper dredge.

2015 Mid-Town Nourishment; Phipps and Reach 8 Truck Haul Combined Projects, Palm Beach, FL: Engineer of record for the design, permitting, and construction administration for the 900,000-cubic yard renourishment of Mid-Town using an offshore borrow area and the truck haul placement of 130,000 cubic yards of sand in Phipps and Reach 8.

Mid-Town Project Mitigation Reef Design and Construction, Palm Beach, FL: Directed the design, permitting, and construction of a 4-acre mitigation reef to offset hardbottom impacts associated with beach nourishment.

Red Reef Park Post-Sandy Emergency Dune Nourishment, Boca Raton, FL: Directed the design, permitting, and construction of a post Sandy emergency dune nourishment project utilizing an upland sand source and beach conveyors in Red Reef Park.



Boca Del Mar Coastal Construction Control Line Permit Review, Boca Raton, FL: Conducted a technical review of proposed coastal construction for the City of Boca Raton.

Palm Beach Waterway Project, Palm Beach, FL: Directed the development of a maintenance dredging project to provide dedicated boat access for town residents.

Reach 1 and 2 Design Analysis, Palm Beach, FL: In conjunction with the FDEP Beach Management Agreement assessed the re-design of the US Army Corps of Engineers inlet maintenance template to place material farther south. Work included the assessment and minimization of potential impact to nearshore hardbottom.

Sand Search, Palm Beach, FL: Work included the geotechnical investigation of potential offshore sand sources for future Town renourishment projects. Study included initial investigations through final borrow area delineation and consultation with FDEP and State Historic Preservation Office.

Post-Hurricane Sandy Emergency Dune Construction, Sebastian Inlet, FL: Supported the design, permitting, and construction of an emergency dune project following Hurricane Sandy. The project consisted of the placement of approximately 30,000 cubic yards of beach compatible sand from the DMMA dredge containment facility and an upland source to repair the pre-storm dune condition over approximately two miles of shoreline.

FDEP Task Force Member Joint Coastal Permit (JCP) Rapid Improvement Task Force: Served as the only outside team member on the FDEP's JCP Rapid Process Improvement (RPI) initiative. This effort was focused on identifying and implementing improvements to the Joint Coastal Permitting process.

2012 Sebastian Inlet Maintenance Dredging, Sebastian Inlet, FL: Directed the design, bidding, and construction of the maintenance dredging of the inlet sand traps and adjacent navigation channel. The project involved the dredging and beach placement of approximately 150,000 cubic yards of beach compatible material.

Sebastian Inlet Sand Trap Expansion, FL: Directed the design, permitting, and construction of the expansion of the inlet sand trap to provide increased capacity for trapping beach compatible sand for transfer to adjacent downdrift beaches.

Comprehensive Sand Source Investigation, Palm Beach, FL: Directed the delineation and field investigation of all potential beach nourishment borrow sources in the vicinity of the Town.

Physical Monitoring and Seagrass Surveys, FL: Directed the collection of county-wide physical monitoring beach and bathymetric data in support of various county coastal projects and the collection of seagrass monitoring data in support of the South Lake Worth Inlet Maintenance Dredging Project.





BRIAN J. BALCOM

Senior Scientist III, Benthic Ecologist, Environmental Impact Analyst

YEARS OF EXPERIENCE

With this firm: 38 With Other Firms: 4

EDUCATION

M.S., Biology
Univ. of Southern California
1980

B.S., Biological Sciences
Univ. of Southern California
1975

KEY QUALIFICATIONS

Mr. Balcom is a benthic ecologist with over 40 years' experience in biological baseline studies and assessments of the potential effects of man's activities on the marine environment. Mr. Balcom has provided marine biological technical expertise, impact assessment capabilities, and management oversight on numerous multidisciplinary assessments of proposed activities in U.S. domestic and international waters. His project experience has included applied marine research efforts, oil and gas and marine minerals operations, naval shock trial testing, environmental baseline characterization, and literature and data syntheses. Mr. Balcom has specific expertise with drilling muds and cuttings, resource sensitivity, oil spill effects, and underwater noise. For international projects, he has managed impact assessments in compliance with country-specific regulations, international conventions and protocols and International Finance Corporation/World Bank Group requirements. Mr. Balcom has international experience in the Mediterranean, Arabian Gulf, Caribbean, north Atlantic, Indian Ocean, and north Pacific as well as onshore in the Middle East, West Africa, and South America. For domestic projects, he has conducted impact assessments in compliance with National Environmental Protection Act (NEPA) and Council on Environmental Quality (CEQ) requirements and protective legislation including the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and California Environmental Quality Act (CEQA).

Mr. Balcom has managed large multidisciplinary teams during several contracts, including completion of Environmental Impact Statements (EISs), Environmental Assessments (EAs), Environmental Impact Reports, and biological surveys for various projects. He has extensive experience with NEPA and CEQA regulations and legislation for listed and protected species, including incidental take and Level A and B harassment assessments and authorizations (IHAs, LOAs).

RELEVANT PROJECT EXPERIENCE

Project Manager, Primary Author, and Lead Impact Analyst - ESIA for proposed exploratory drilling operations offshore Mauritania (2018 to Present)

Senior Author - Critical Habitat Assessment (IFC Performance Standard 6) for a proposed LNG development project offshore Mauritania and Senegal (2018 to Present)

Project Manager and Co-Author - Analysis of disposal options for drilling muds offshore Mexico (2018).

Reviewer and Technical Consultant - EIA for proposed ocean plastic cleanup in the Great Pacific Garbage Patch (2017 to Present)

Project Manager, Primary Author, and Lead Impact Analyst - EIAs for proposed seismic survey operations and multibeam echosounding and coring operations offshore Morocco (2016 to 2017)

Project Manager and Technical Lead - Programmatic EIS for BOEM's 5-Year Leasing Program, 2017-2022 (2015 to 2017).



BRUCE D. GRAHAM

Senior Scientist II, Marine Biologist, Environmental Impact Analyst

YEARS OF EXPERIENCE

With this firm: 30 With Other Firms: 5

CERTIFICATIONS

Diving Emergency Management Provider, DAN
Scientific Diver, AAUS
Open Water SCUBA Diver, NAUI
Enriched Air (Nitrox) Specialty, PADI

EDUCATION

M.S., Biological Sciences
Florida Institute of Technology
1983

B.S., Biological Sciences
University of New Hampshire
1979

KEY QUALIFICATIONS

Mr. Graham is a marine biologist with over 30 years of experience in field studies of benthic communities. He has served as Project Manager and/or Chief Scientist on numerous marine programs, including habitat assessment and restoration, multidisciplinary baseline studies, and environmental monitoring programs. He has conducted impact assessments; implemented baseline studies with sample collection, processing, and analysis; and has been responsible for the interpretation and synthesis of data in conjunction with document preparation. Impact assessment experience includes proposed activities in U.S. domestic (i.e., federal and state) and international waters, including oil and gas exploration (seismic and exploratory drilling) and development activities. He has conducted extensive benthic community assessments using photographic analyses in areas that include the Atlantic Ocean, Gulf of Mexico, Antigua, Sea of Okhotsk (Russia), Federated States of Micronesia, U.S. Virgin Islands, and Taiwan. Mr. Graham has provided marine biological technical expertise, environmental impact assessment capabilities, and management oversight on numerous multidisciplinary damage assessments of activities in U.S. domestic (i.e., Federal and State) and international waters, including Antigua, Colombia, Federated States of Micronesia, Mexico, Puerto Rico, the U.S. Virgin Islands, the Bahamas, and the Turks and Caicos. He has developed and field-tested new methods for biological reattachment and transplantation as well as substrate stabilization and augmentation as a means of accelerating habitat recovery. Mr. Graham has more than 20 years of experience in coral reef restoration, having personally reattached more than 10,000 reef biota specimens. Mr. Graham has also conducted Habitat Equivalency Analyses (HEA) associated with resource damage from natural gas pipeline installations and vessel groundings. Tasks associated with HEA have included selection and scaling of appropriate restoration/mitigation options.

RELEVANT PROJECT EXPERIENCE

Chief Scientist - Environmental Baseline Surveys to support Environmental Impact Statements for oil and gas exploration in Perdido and Salinas Basins, Gulf of Mexico (2018)

Chief Scientist/Impact Analyst - Environmental Baseline Surveys to support Environmental Impact Statements for oil and gas exploration offshore Senegal and Mauritania (2016 to 2017)

Project Manager/Chief Scientist - Damage Assessment, Restoration, and Monitoring of the M/T Margara Grounding offshore Puerto Rico (2006 to 2014)

Project Manager/Chief Scientist - Damage Assessment, Restoration Planning, and Compensatory Scaling of the M/Y White Cloud Anchor Damage offshore Providenciales Island, Turks and Caicos (2013 to 2015)



ERIN C. HODEL

Senior Scientist I, Marine Biologist, Nearshore Hardbottom Specialist

YEARS OF EXPERIENCE

With this firm: 12 With Other Firms: 4

CERTIFICATIONS

Diving Emergency Management Provider, DAN
Scientific Diver, AAUS
Rescue SCUBA Diver, PADI
Underwater Navigator, Enriched Air (Nitrox), and Shark Conservation Specialties, PADI
Florida Boating Safety Course, FWC
America’s Boating Safety Course, U.S. Power Squadron

EDUCATION

M.S., Marine Biology
Nova Southeastern University
2007

B.S., Biology
University of Missouri
2001

KEY QUALIFICATIONS

Ms. Hodel is a marine biologist with 16 years of experience in marine environmental science. She serves as the Programs Director of the Ports, Harbors, and Beaches division at CSA Ocean Sciences Inc. (CSA), charged with managing a wide range of marine environmental monitoring and mitigation programs and projects related to beach restoration, dredging, inlet and port maintenance and development, and coastal infrastructure. She has served as a Project Manager, Chief Scientist, and/or Field Scientist primarily on benthic marine studies concerning coral reef, seagrass, nearshore hardbottom, and estuarine habitats. Studies have included habitat characterization and mapping, habitat damage assessment, and monitoring and restoration programs. She has extensive experience conducting multi-year monitoring programs of nearshore hardbottom habitats in relation to beach nourishment and dredging projects, with participation in 10 beach nourishment monitoring programs in Florida (Brevard, Broward, Indian River, Martin, Sarasota, and St. Lucie Counties). She has also participated in numerous coral reef and seagrass monitoring surveys, damage assessments, and restoration projects, with an emphasis on coral and seagrass relocation. She is also skilled in coral health and sediment stress assessments. Ms. Hodel has over 14 years of experience as a scientific diver with over 4,500 logged dives. She holds an American Academy of Underwater Sciences (AAUS) Scientific Diver and Professional Association of Diving Instructor’s (PADI) Rescue Diver certifications as well as specialty certifications in Nitrox and underwater navigation (PADI). She is skilled in the collection of underwater video and still camera data, identification of coral reef and hardbottom biota, and coral reef and seagrass restoration techniques.

RELEVANT PROJECT EXPERIENCE

Project Manager/Lead Field Scientist - Martin County Shore Protection and Beach Nourishment Projects
(2010 to Present)

Field Scientist St. Lucie County South Beach and Dune Restoration Project (2012 to Present)

Project Manager/Lead Field Scientist - Bonner Bridge Seagrass Mitigation Project, Outer Banks, NC
(2017 to Present)

Project Manager/Lead Field Scientist - Ft. Pierce Inlet Sediment Tracer Study (2016 to 2017)

Field Scientist - Fort Pierce Beach Shore Protection Project (2007 to 2016)

Field Scientist - Indian River County Sector 3 Beach and Dune Restoration Project (2007 to 2016)



Senior Scientist, Marine Biologist

Education

*Master of Science in
Marine Biology/
Ichthyology, Florida
Atlantic University,
1984*

*Bachelor of Science
in Zoology, University
of Florida, 1978*

Mr. Snyder is an experienced marine ecologist and fish biologist. He has more than 30 years of experience with environmental projects worldwide. During his tenure with CSA, he has served as field scientist, data analyst, subject matter expert, and project manager. Mr. Snyder has managed and participated in ichthyofaunal surveys of freshwater, estuarine, shelf, and reef environments. He has sampled fish from a variety of habitats ranging from the continental slope to freshwater streams for various environmental assessments and monitoring studies. He has collected fishes in freshwater streams and lakes with seine, gillnet, and electroshocker. These collections often supported larger studies of contaminant levels in local fishes. Mr. Snyder has sampled estuarine fishes with trawls, seines, and gillnets to assess assemblage composition and dynamics in relation to environmental factors. He has sampled fishes in Florida's St. Johns River to characterize the ichthyofauna along a broad riverine gradient. He studied the response of fish assemblages to water flows and levels in the Loxahatchee River, Florida, using electroshocking gear for the South Florida Water Management District.

Mr. Snyder has assessed demersal soft bottom fish assemblages on the continental shelf with trawls and towed camera systems. He has managed field efforts that included trawling, sediment profile imaging, and grab sampling on the continental shelf for assessments of sand deposits proposed as borrow sites for beach nourishment offshore of Alabama, Florida, New Jersey, New York, and North Carolina. Mr. Snyder has visually censused reef fish assemblages off southeast and southwest Florida, Louisiana (oil and gas platforms), the Federated States of Micronesia (Guam and Pohnpei), Grand Cayman Island, Puerto Rico, and the Bahamas using quantitative and qualitative methods. He has monitored reef fish assemblages on nearshore natural and artificial reefs off east Florida including Broward, Palm Beach, Martin, St. Lucie, and Brevard counties. He has participated in coral reef damage assessment and restoration projects in south Florida, the Florida Keys, and the Federated States of Micronesia. He has characterized fish assemblages on a mesophotic reef trend in the northern Gulf of Mexico from videotapes taken by a remotely operated vehicle (ROV). Mr. Snyder has used ROVs to survey fishes from slope habitats offshore North Carolina and the northern Gulf of Mexico. These deep water surveys supported National Resources Damage Assessment (NRDA).

Mr. Snyder is a subject matter expert specializing in fish and fisheries. He has contributed in that capacity to numerous environmental documents including both domestic (environmental assessments, environmental impact assessments) and international (environmental impact assessments and environmental, social, and health impact assessments) settings. Impacts assessed include exploration, production, decommissioning or oil and gas operations. Harbor expansion or widening. Seismic surveying including seismic noise and electromagnetic surveys. He summarized commercial and recreational fisheries data for environmental documents from Florida, southern California, the southeastern United States, Alaska, Trinidad and Tobago, Guyana, Uruguay, West Africa (Morocco, Mauritania, Senegal), and the Persian Gulf. He recently evaluated fishery-related issues for oil and gas operations in Senegal and Mauritania. He has prepared Essential Fish Habitat (EFH) assessments for several environmental impact statements and environmental assessments. Mr. Snyder is approved by the US Army Corps of Engineers as an independent technical reviewer for EFH assessments.

During his 30 years with CSA, he has studied the effects of oil and gas exploration on deepwater fishing operations and has prepared assessments concerning the impact of operational noise including seismic activities on fish and fisheries. He



recently participated in surveys of mesopelagic fishes using a 10 m MOCNESS net as part of a team responding to the Deepwater Horizon (DWH) accident and oil spill in the Gulf of Mexico. He was involved in NRDA of mesophotic reefs in the northern Gulf of Mexico following the DWH accident. He was chief scientist for a month-long survey of fishes and epibiota on these mesophotic reefs in 2014. Mr. Snyder recently participated in water column and benthic monitoring following an oil spill in the Mississippi Canyon lease block area of the northern Gulf of Mexico.

Mr. Snyder has assessed impacts of cooling water intake on fish eggs and larvae for Gulf Landing and Port Dolphin LNG Deep Water Port projects in the Gulf of Mexico. These assessments used Southeast Area Monitoring and Assessment Program (SEAMAP) ichthyoplankton data to estimate daily intake rates for various fish taxa including federally managed species. Population level effects were estimated using a modified empirical transport model. He collaborated with a physical oceanographer to develop a preliminary bio-physical connectivity model for another project. He recently examined the potential effects of cooling water intake on fish eggs, larvae, as well as zooplankton for a proposed LNG facility offshore of Mauritania and Senegal (west Africa). For this project field-collected plankton data are being used as input into a modified empirical transport model to understand effects on local species. He has worked with commercial fishermen assessing the impacts of shrimp trawling on inshore fish populations in Florida. He also has investigated the life history of the bigeye scad, an important baitfish in southern Florida. Mr. Snyder is presently collaborating with researchers from University of Florida to study of the movements of immature bull sharks in the Loxahatchee River, Florida using acoustic telemetry.

He also managed a project that investigated the potential conflict between deepwater fisheries and oil and gas operations in the Gulf of Mexico. He managed a project that investigated the ecological functions of nearshore hard bottom along the east coast of Florida for the Florida Department of Environmental Protection.

Prior to joining CSA, Mr. Snyder participated in an ecological study of the fish fauna associated with the discharge canals at Florida Power and Light's nuclear power plant at Crystal River, Florida. He also served as Research Assistant on a U.S. Fish and Wildlife Service (USFWS) project investigating the biology and impacts of introduced fishes in Florida. Mr. Snyder's thesis work entailed monthly collections of seagrass fishes from two estuarine sites near Jupiter Inlet, Florida. He was also Chief Field Scientist and vessel operator during an ichthyoplankton survey of the Loxahatchee River Estuary, Florida. In addition, he worked as a commercial fisherman in Jupiter, Florida for 13 years. Mr. Snyder is an accomplished underwater photographer; his underwater fish photographs have appeared in regional field guides as well as technical and popular publications. He recently co-authored (with George H. Burgess) *Marine Fishes of Florida* (Johns Hopkins University Press, 2016). His diving experience includes more than 1,600 dives; he is experienced in benthic photography and videotaping, *in-situ* identification of coral reef fishes, reattachment and transplanting both hard corals and octocorals, and the collection of various types of sediment samples.

EXPERIENCE

1984 to Present: CSA Ocean Sciences Inc. – Senior Scientist

- Chief Scientist and project manager for nearshore hard bottom survey Patrick Air Force Base, Florida (Rhoads and Brito, 2018 to present),



- Project scientist and author for Environmental and Social Impact Assessment off Mauritania for the Greater Tortue/Ahmeyim gas production project (Phase 1). Responsible for assessing affected environment and potential impacts of oil and gas operations on fish and fisheries. Met with regulators and fisheries representatives. British Petroleum (2018-Present)
- Project scientist for assessment of Abo Cove, Guam (2018 to present)
- Subject matter expert for fish and fisheries sections in Environmental Impact Assessment for a Controlled Source Electromagnetic Survey in Surinam (2018)
- Subject matter expert for fisheries conflict in Uruguay (2017)
- Chief Scientist for National Resource Damage Assessment cruise responding to an oil spill in Mississippi Canyon Block 209 (LLOG Exploration, LLC, 2017)
- Project Scientist Water column monitoring for oil spill response near Mississippi Canyon Block 209 (LLOG Exploration, LLC, 2017)
- Project manager for Brevard County Mid Reach Beach Restoration Program hard bottom monitoring. Hardbottom epibiota and fishes are being monitored at four fill areas and one reference area off Brevard County's Mid Reach. Monitoring data include quantitative photography and visual fish assessments. Data have been collected annually since 2013 to provide pre-construction information from which to assess potential impacts of the beach construction which is expected for 2018. Also contributed to Uniform Mitigation Assessment Methodology analysis leading to design of a mitigation reef. Mitigation reefs will be deployed during summer 2017 and monitored with quantitative photography and visual assessment (Olsen Associates, 2006 to Present).
- Project Scientist for Environmental Baseline Survey off Mauritania and Senegal, Africa (Kosmos Energy, 2016).
- Subject Matter Expert, author and reviewer for Fishes and Essential Fish Habitat sections of the Final Programmatic EIS for the 2017-2022 Oil and Gas Leasing Program (Bureau of Ocean and Energy Management, 2014 to 2016).
- Project Scientist for South Siesta Key Beach Nourishment Project, Sarasota, Florida (Humiston and Moore, 2015 to present).
- Chief Scientist for Natural Resource Damage Assessment Mesophotic Reef Survey. A month-long survey of to assess distribution and abundance of fishes and sessile invertebrates on the Mississippi Alabama Pinnacles trend following the Deep Water Horizon Oil Spill. Over 500 video transects were samples using a remotely operated vehicle over sixteen mesophotic reef features. In addition, selected fishes and octocorals were collected and for aging analyses (Exponent, Inc., 2010 to 2015).
- Project scientist for Environmental and Social Impact Assessment off Mauritania and Senegal, Africa. Responsible for assessing affected environment and potential impacts of oil and gas operations on fish and fisheries. Evaluated available information and met with regulators and fisheries representatives. Kosmos Energy (2016-Present).
- Project scientist for Seismic Environmental and Social Impact Assessment off Mauritania, Africa. Responsible for assessing affected environment and potential impacts of seismic exploration on fish and fisheries. Kosmos Energy, (2016-Present).



- Field scientist for a project to collect data to provide additional information and to help the U.S. Navy assess the impacts of a proposed dredging project on marine resources in Apra Harbor, Guam. Extensive diver field surveys were conducted at more than 200 sites within and outside the harbor from fall 2010 through fall 2011 to collect still photographs; video; macroinfaunal samples; and in situ diver identifications of coral, macroalgae, other marine invertebrates, fishes, and turtles. Data were utilized to assist in characterizing reef and hard bottom communities that could be impacted by dredging activities. This project is being conducted as a subcontract to HDR/E2M, Inc. (2010 to 2012).
- Field scientist on the Cardno ENTRIX team responding to the Deepwater Horizon accident and oil spill in the Gulf of Mexico on behalf of BP Exploration & Production (2010 to 2011). Participated in water column sampling, bongo and neuston sampling, 1 m and 10 m MOCNESS sampling, and ROV survey of mesophotic reefs (2010 to 2012).
- Chief scientist and project manager for an evaluation of ecological function and mitigation of nearshore hard bottom in southeast Florida. This project entailed two phases: the first was a synthesis of available ecological information on nearshore hardbottom habitat off east Florida. The second phase was a field evaluation of certain ecological functions of nearshore hardbottom and how well these functions are replicated by mitigation reefs (Florida Department of Environmental Protection, 2007 to 2014).
- Chief scientist and project manager for an assessment of relationships between fish assemblages and dry season flow and stage levels on the riverine reach of the northwest fork of the Loxahatchee River, Florida (South Florida Water Management District, 2008).
- Chief scientist and project manager for monitoring of hard bottom adjacent to fill and borrow areas for a beach nourishment project offshore Venice, Florida (Coastal Technology Corporation, 2005 to 2013).
- Monitored fish assemblages associated with artificial mitigation reefs and natural hard bottom in conjunction with a beach nourishment project offshore Phipps Park in Palm Beach, Florida (Coastal Planning and Engineering, 2005 to 2009).
- Managed field data collection and the preparation of draft sections of an environmental impact statement for Brevard County Mid Reach shoreline protection project (Olsen Associates, 2005 to 2007).
- Field Scientist for a monitoring study of coral and seagrass habitats off Key West, Florida (U.S. Navy, 2003 to 2005).
- Monitored fish assemblages near epibiotic survey transects established to assess effects of a beach nourishment project on nearshore hard bottom habitat off Mid-Town Palm Beach, Florida (Coastal Planning and Engineering, 2001 to 2009).
- Managed a fish and epibiotic monitoring program designed to assess the efficacy of artificial reefs as a means of mitigating the effects of beach nourishment projects on nearshore hard bottom habitat off Palm Beach County, Florida. Quantitative data on fish and invertebrate assemblages associated with artificial reefs and natural reefs were collected during summer months. Preliminary analyses indicated that fish assemblages on artificial reefs differed from those on natural reefs (Palm Beach County Department of Environmental Resources Management, 2001 to 2004).
- Managed field surveys for three projects designed to characterize the biota associated with sand deposits proposed as borrow sites for beach nourishment projects offshore of New York and New Jersey. Data collected included temperature, salinity, dissolved oxygen, sediment grain size, sediment profile imagery infauna, epifauna, and demersal fishes (Minerals Management Service, 2000 to 2002).

- Managed field surveys for three projects designed to characterize the biota associated with sand deposits proposed as borrow sites for beach nourishment projects offshore of eastern Florida. Data collected included temperature, salinity, dissolved oxygen, sediment grain size, infauna, epifauna, hard bottom characterization, and demersal fishes (Minerals Management Service, 1999 to 2001).
- Analyzed potential interactions between bluewater fishing and deepwater oil and gas operations in the Gulf of Mexico. Fisheries and energy industry information was gathered to assess the potential for problems in the rapidly expanding deepwater oil and gas effort. Current and past conflicts reported in domestic and international waters were examined as well. Areas of potential future conflict were predicted using Geographic Information Systems analyses (Minerals Management Service, 1998 to 2000).
- Managed field surveys for three projects designed to characterize the biota associated with sand deposits proposed as borrow sites for beach nourishment projects offshore of Alabama, New Jersey, and North Carolina. Data collected included temperature, salinity, dissolved oxygen, sediment grain size, sediment profile images (New Jersey and North Carolina only), infauna, epifauna, and demersal fishes (Minerals Management Service, 1997 to 1999).
- Participated as a field scientist on numerous photodocumentation surveys in the Gulf of Mexico and off the U.S. east coast. Identified fishes from photographs and trawl collections (Various clients, 1984 to Present).
- Assessed Essential Fish Habitat for an environmental assessment document pertaining to maintenance dredging operations within the Key West ship channel and turning basin (U.S. Navy, 2003).
- Contributing author of a synthesis document on the effects of explosive removals of offshore structures in outer continental waters of the United States (Minerals Management Service 2002 to 2003).
- Analyzed video and still photographic data collected from a deep reef trend in the northeastern Gulf of Mexico. Over 50 hours of videotape collected by remotely operated vehicle were reviewed to identify and quantify fishes associated with the hard bottom features. Prepared report section on deep reef fishes associated with the deep reef trend (Minerals Management Service, 1997 to 2001).
- Directed a literature search for physical, chemical, geological, biological, socioeconomic, and technological aspects of deepwaters (>200 m) in the Gulf of Mexico. Also prepared a chapter in the final synthesis report on deepwater fishes and fisheries (Minerals Management Service, 1997 to 2000).
- Prepared a characterization and trends of recreational and commercial fisheries from the Florida panhandle. This project summarized available recreational and commercial fisheries data from Florida's panhandle for the 1983 to 1993 period. The results will assist federal managers in preventing conflicts between fisheries and oil and gas exploration and development proposed for the panhandle outer continental shelf (National Biological Service, 1995 to 1998).
- Collected water, sediment, and photographic samples in the Sea of Okhotsk, Russia. Data were collected prior to and following the drilling of an exploratory oil well on the shelf offshore of Sakhalin Island, Russia. The results were used to assess the effects of exploratory drilling operations on the local benthic and pelagic environment (Exxon Neftgas Limited, 1996).
- Investigated impacts of roller-frame shrimp trawling on habitat and water quality in Pine Island Sound, Florida. This project contributed information concerning by-catch and habitat impacts of live bait shrimp trawling in shallow seagrass beds (Florida Department of Natural Resources, 1991 to 1993).



- Investigated by-catch impacts of food shrimp trawling in the lower St. Johns River, Florida (Florida Department of Natural Resources, 1991 to 1993).
- Sampled fish assemblages from various habitats in the lower St. Johns River, Florida as part of a pilot study evaluating the use of an Index of Biological Integrity as a water quality measure (St. Johns River Water Management District, 1990 to 1993).
- Analyzed age, growth, and reproduction data from monthly collections of bigeye scad (*Selar crumenophthalmus*) from southeastern Florida waters. The project contributed information to the baitfish investigations of the Florida Marine Research Institute (Florida Department of Natural Resources, 1990 to 1992).
- Participated as field scientist on reconnaissance of Mississippi Canyon Area Block 807 using the research submersible Johnson-Sea-Link (Shell Offshore Inc., 1991).
- Sampled ichthyoplankton assemblages off Cape Hatteras, North Carolina in conjunction with proposed exploratory drilling. Also participated in a benthic survey using a remotely operated vehicle (Mobil Exploration & Producing U.S. Inc., 1989 to 1991).
- Sampled fishes from Nine Mile Creek, New York, using electrofishing gear (Allied Chemical, 1990).
- Lead scientific diver for the Farfield cruise of the EXXON Valdez shoreline ecology program, Kodiak Island and Alaska Peninsula (Arthur D. Little, 1990).
- Conducted ichthyofaunal studies of Lake Maggiore, a eutrophic lake near St. Petersburg, Florida. Also participated in vegetation mapping and bathymetric surveys of the lake. The data will be used to calibrate a model for lake restoration (City of St. Petersburg, 1990).
- Information Collection Task Manager for the project entitled "Synthesis of Available Biological, Geological, Chemical, Socioeconomic, and Cultural Resource Information for the South Florida Area" (Minerals Management Service, 1988 to 1990).
- Conducted a literature review to analyze the feasibility of ichthyofaunal reconstruction as a means of restoring water quality in Lake Apopka, Florida (St. Johns River Water Management District, 1988).
- Conducted an ichthyofaunal survey of the St. Johns River estuary, Florida to provide needed baseline information on fish community dynamics and to document the occurrence of Ulcerative Disease Syndrome in estuarine fishes (Florida Department of Environmental Regulation, 1987 to 1988).
- Censused and photographed reef fishes at Grand Cayman Island (Florida Museum of Natural History, 1986).

1980 to 1984: Florida Atlantic University – Graduate Student

Research included community analyses of seagrass fishes from near Jupiter Inlet, Florida. Worked as a research assistant on a USFWS project investigating biology and impacts of introduced freshwater fishes in Florida. Involved in collection and curation of larval fishes from the Loxahatchee River estuary, Florida. Served as a research scientist on Cruise 109 of the R/V *OREGON II*, exploratory fishing on Campeche Bank, Mexico.



PUBLICATIONS (Corporate)

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CSA Ocean Sciences Inc. 2018. Brevard County Mid Reach Beach Restoration Monitoring Program- Report 3. Prepared for Olsen Associates, Inc. 29 pp+ apps.

CSA International, Inc. 2014. Mitigating the functions of nearshore hard bottom Mitigating the Functions of Nearshore Hardbottom in East Florida: Field Comparisons of Natural and Artificial Reef Structures. . Prepared for Florida Department of Environmental Protection Division of Water Resource Management, Tallahassee, FL. 93 pp. + apps.

HDR ECO and CSA International, Inc. 2011. Apra Harbor Comprehensive Fish and Turtle Surveys Including the Lockwood Site: Task 5b Fish and Turtle Surveys, Round 2. Draft report. Prepared for Naval Facilities Engineering Command.

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CSA International, Inc. 2010. St. Lucie County South Beach Project: Characterization of Fish Assemblages. Prepared for St. Lucie County Erosion Control, Ft Pierce, FL, 29 pp.

CSA International, Inc. 2009. City of Venice Beach Nourishment Project Year-4 (Artificial Reef) Post-construction Monitoring Report. Prepared for Coastal Technology Corporation. 15 pp. + apps.

CSA International, Inc. 2009. City of Venice Beach Nourishment Project Year-3 Post-construction Monitoring Report. Prepared for Coastal Technology Corporation. 46 pp. + apps.

CSA International, Inc. 2009. Loxahatchee River Freshwater Fish Study Phase II: Relationships Between Fish Assemblages and Dry Season Flow and Stage Levels on the Riverine Reach of the Northwest Fork of the Loxahatchee River. Prepared for South Florida Water Management District, Coastal Ecosystems Division. 28 pp.

CSA International, Inc. 2009. Ecological Functions Of Nearshore Hardbottom in East Florida: A Literature Synthesis. Prepared for the Bureau of Beaches and coastal systems, Florida Department of Environmental Protection, Tallahassee, FL. 186 pp. + apps.

CSA International, Inc. 2008. City of Venice Beach Nourishment Project Year-2 Post-construction Monitoring Report. Prepared for Coastal Technology Corporation, Vero Beach, FL. 46 pp + apps.

CSA International, Inc. 2008. City of Venice Beach Nourishment Project Year-1 Post-construction Monitoring Report. Prepared for Coastal Technology Corporation, Vero Beach, FL. 46 pp. + apps.

CSA International, Inc. 2007. City of Venice Beach Nourishment Project Post-construction Monitoring report. Prepared for Coastal Technology Corporation, Vero Beach, FL. 48 pp + apps.

Prekel, S., A. Delaney, D. Snyder, and C. Kruempel. 2007. Town of Palm Beach Reach 7, Phipps Ocean Park Beach Mitigative Artificial Reef, 36-Month Post-mitigation and FDEP Hurricane Recovery Dune Restoration Project Biological Monitoring report, Boca Raton, FL. Coastal Planning & Engineering, Inc. 71 pp.



- Continental Shelf Associates, Inc. 2006. City of Venice Beach Nourishment Project Pre-construction Monitoring report. Prepared for Coastal Technology Corporation, Vero Beach, FL. 62 pp. + apps.
- Continental Shelf Associates, Inc. 2006. Nearshore Artificial Reef Monitoring Report. July 2006. Prepared for Palm Beach County Department of Environmental Resources Management, West Palm Beach, FL. 43 pp. + apps.
- Continental Shelf Associates, Inc., East Coast Biologists, Inc., and Olsen Associates, Inc. 2006. Brevard County Mid Reach Shore Protection Project: Mitigation Assessment Analysis. Prepared for Brevard County Natural Resources Management Office.
- Continental Shelf Associates, Inc. 2005. Nearshore Artificial Reef Monitoring Report. April 2005. Prepared for Palm Beach County Department of Environmental Resources Management, West Palm Beach, FL.
- Continental Shelf Associates, Inc. 2006. City of Venice Beach Nourishment Project During-construction Monitoring Report. Prepared for Coastal Technology Corporation, Vero Beach, FL. 17 pp. + apps.
- Continental Shelf Associates, Inc. 2003. Hard Bottom Assessment for the City of Venice (Florida) Beach Nourishment Project. Prepared for Coastal Technology Corporation, Vero Beach, FL. 43 pp. + apps.
- Continental Shelf Associates, Inc. 2003. Explosive Platform Removal Information Synthesis Report. Final report (in preparation). OCS Study MMS 2003-070. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 181 pp. + app.
- United States Navy. 2003. Environmental Assessment for Fleet Support and Infrastructure Improvements, Naval Air Station Key West. 131 pp. + app.
- Continental Shelf Associates, Inc. 2003. Environmental Review of the Shell U.S. Gas and Power Gulf Landing Direct Regas Terminal, Gulf of Mexico. March 2003. Prepared for Gulf Landing LLC.
- Continental Shelf Associates, Inc. 2002. Nearshore Artificial Reef Monitoring Report. Final report prepared for Palm Beach County Department of Environmental Resources Management. 48 pp.
- Continental Shelf Associates, Inc. (D.B. Snyder co-author). 2001. Deepwater Program: Bluewater Fishing and OCS Activity: Interactions Between the Fishing and Petroleum Industries in Deepwaters of the Gulf of Mexico. Final report prepared for the Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2002-078. 272 pp.
- Snyder, D.B. 2001. Fish Communities, pp. 8-1 to 8-29. In: Continental Shelf Associates, Inc. and Texas A&M University, Geochemical and Environmental Research Group. Northeastern Gulf of Mexico Coastal and Marine Ecosystem Program: Ecosystem Monitoring, Mississippi/Alabama Shelf; final synthesis report. U.S. Department of the Interior U.S. Geological Survey, Biological Resources Division USGS/BRD/CR-2000-0007 and Minerals Management Service Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2001-080. 428 pp.
- Snyder, D.B. 2000. Fishes and Fisheries, pp. 255-278. In: Continental Shelf Associates, Inc., Deepwater Gulf of Mexico environmental and socioeconomic data search and literature synthesis. Volume I: Narrative Report. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2000-049. 340 pp.
- Continental Shelf Associates, Inc. (D.B. Snyder, co-author). 2001. September 2000 Semi-Annual Coral Monitoring Survey of the Alder Cay Lagoon Coral Transplantation Project. Prepared for Bahamian Department of Fisheries. 56 pp.



Byrnes, M.R., R.M. Hammer, B.A. Vittor, J.S. Ramsey, D.B. Snyder, K.F. Bosma, J.D. Wood, T.D. Thibaut, and N.W. Phillips. 1999. Environmental Survey of Identified Sand Resource Areas Offshore Alabama: Final Report. U.S. Department of the Interior, Minerals Management Service, International Activities and Marine Minerals Division (INTERMAR), Herndon, VA. OCS Report MMS 99-0052. Volume I, main text, 307 pp. Volume II, appendices, 132 pp.

Continental Shelf Associates, Inc. (D.B. Snyder co-author). 1997. Western DAGI-5 Monitoring Program. Final report prepared for Exxon Neftegas Limited. Vol 1, 50 pp.

Continental Shelf Associates, Inc. (D.B. Snyder, principal author, with F.W. Bell and B.E. Stanaland). 1997. Outer Continental Shelf Environmental Studies Program: Characterization and Trends of Recreational and Commercial Fisheries from the Florida Panhandle. Contractor report, USGS/BRD/CR--1997-0001. 77 pp.

Continental Shelf Associates, Inc. (D.B. Snyder, co-author). 1994. An Assessment of the Effects of Recurrent *Codium isthmocladium* Blooms on the Reefs and Reef Fish Populations of Palm Beach and Broward Counties, Florida. Prepared for the Florida Marine Fisheries Commission.

Continental Shelf Associates, Inc. (D.B. Snyder, principal author, with G.H. Burgess). 1994. An Analysis of Fish Populations in Rodman Reservoir and the Lower Ocklawaha River. Prepared for the St. Johns River Water Management District. 56 pp.

Continental Shelf Associates, Inc. (D.B. Snyder, principal author, with G.H. Burgess). 1993. Fish Assemblages Inhabiting an Oligohaline Segment of the Lower St. Johns River, Florida. Prepared for the St. Johns River Water Management District. 76 pp.

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Continental Shelf Associates, Inc. (D.B. Snyder, co-author). 1991. Ichthyoplankton in the Vicinity of Manteo Area Block 467 from June to November 1990. Prepared for Mobil Oil Exploration and Producing Southeast Inc. 65 pp. + app.

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Environmental Science and Engineering, Inc., LGL Ecological Research Associates, and Continental Shelf Associates, Inc. (D.B. Snyder, co-author). 1987. Southwest Florida Shelf Ecosystems Data Synthesis. OCS Study MMS 87-0023. Prepared for the U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA.

Continental Shelf Associates, Inc. (D.B. Snyder, contributing author). 1984. Environmental Assessment of the Palm Beach County Erosion Control Program: Phase 2, North Boca Raton. Prepared for the Board of County Commissioners, Palm Beach County, FL.

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- Snyder, D.B. and G.H. Burgess. 2006. The Indo-Pacific Red Lionfish, *Pterois volitans* (Pisces: Scorpaenidae), New to Bahamian Ichthyofauna. Coral Reefs.
- Byrnes, M.R., R.M. Hammer, T.D. Thibaut, and D.B. Snyder. 2004. Physical and Biological Effects of Sand Mining Offshore Alabama, U.S.A. Journal of Coastal Research, 20(1):6-24.
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- Snyder, D.B., J.E. Randall, and S.W. Michael. 2001. Aggressive mimicry by the Redmouth Grouper (*Aetheloperca rogae*). Cybium, 25(3):227-232.
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- Snyder, D.B. 1999. Mimicry of Initial-Phase Bluehead Wrasse, *Thalassoma bifasciatum* (Labridae) by Juvenile Tiger Grouper, *Mycteroperca tigris* (Serranidae). Revue Francaise d'Aquariologie 26(1-2):17-20.
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- Taylor, J.N., D.B. Snyder, and W.R. Courtenay, Jr. 1986. Hybridization Between Two Substrate Spawning Tilapias in Southern Florida. Copeia 4:903-909.
- Snyder, D.B. 1984. Species Richness, Abundance, and Occurrence of Grassbed Fishes From Jupiter Inlet, Florida. Master's thesis, Florida Atlantic University. 75 pp.

PRESENTATIONS

- Snyder, D.B. and K. C. Lindeman. 2010. Microhabitat use by Newly Settled Grunts (Haemulidae) and Other Taxa on Natural and Artificial Hardbottom in Southeast Florida. Eighth (2010) Florida Artificial Reef Summit, Cocoa Beach, FL.
- Snyder, D.B., M.Y. Hedgepeth, and A. Flanner. 2010. Fish Assemblage Response to Dry Season Flows in the upper Loxahatchee River, Florida. Loxahatchee River Watershed Science Symposium, Jupiter, FL.
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- Burgess, G.H., F.S. Snelson, and D.B. Snyder. 2000. A Comprehensive Survey of Fishes of Southwest Florida. 53rd Annual meeting of the Gulf and Caribbean Fisheries Institute, Biologi, MS.
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- Lindeman, K.C., E.B. Brothers, D.B. Snyder, and J.S. Ault. 1999. Newly-settled Snappers and Grunts: Comparative Growth and Cross-shelf Distributions. International Conference on Scientific Aspects of Coral Reef Assessment, Monitoring, and Restoration. National Coral Reef Institute, 14-16 April, Fort Lauderdale, FL.
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- Marshall, M.J., D.B. Snyder, and K. Daignault. 1993. Roller-frame Trawl Bait Shrimp Fishery Impacts on By-catch, Seagrass Meadows and Habitat Quality in Pine Island Sound, Florida. The 57th Annual Meeting of Florida Academy of Sciences, St. Petersburg, FL.
- Snyder, D.B., M.J. Marshall, and G.H. Burgess. 1992. Fish By-catch From Inshore Shrimp Fisheries in Florida. International conference on by-catch in the shrimp industry, Lake Buena Vista, FL.
- Snyder, D.B. and G.H. Burgess. 1990. Demersal Fish Assemblages in the Lower St. Johns River, Florida. In: Proceedings, American Society of Ichthyologists and Herpetologists 70th Annual Meeting, Charleston, SC.
- Snyder, D.B. 1983. Species Richness, Abundance, and Occurrence of Grassbed Fishes from Jupiter Inlet, Florida. In: Proceedings, American Society of Ichthyologists and Herpetologists 63rd Annual Meeting, Tallahassee, FL (abstract).

PROFESSIONAL CERTIFICATIONS

- American Academy of Underwater Sciences (AAUS)
- Open Water SCUBA Diver – Professional Association of Diving Instructors (PADI)
- Advanced Open Water SCUBA diver-SCUBA Diving International (SDI)
- Rescue Diver- SDI
- Nitrox Certified – PADI
- Multimedia Standard First Aid – American Red Cross
- Cardiopulmonary Resuscitation (CPR) – American Red Cross
- Certified Scientific Diver

PROFESSIONAL AFFILIATIONS

- American Fisheries Society
- American Society of Ichthyologists and Herpetologists



Operations Director

Education

*Bachelor of Science
in Oceanographic
Technology, Florida
Institute of
Technology, 1982*

Mr. Johnson has more than 30 years of experience associated with marine related environmental field studies and technical projects. He has served as Operations Manager, Lead Technician, Lead Diver, Navigator, Electronics Technician, and/or Boat Operator for numerous remote sensing surveys, monitoring programs, and baseline studies throughout Florida, Hawaii, the Gulf of Mexico, Puerto Rico, the Gulf of Alaska, Sea of Okhotsk (Russia), South China Sea (Taiwan), and eastern Indonesia. He is highly regarded as one of CSA Ocean Sciences Inc.'s (CSA's) most experienced and skillful operations personnel and is adept at hands-on problem solving and adapting to complex technical challenges.

Mr. Johnson has conducted a wide variety of field operations requiring the deployment and recovery of various physical oceanographic instrument arrays and moorings. He also has an extensive remote sensing background and has conducted numerous side-scan sonar, subbottom profiler, bathymetry, 3-D imaging and magnetometer surveys for oil industry, engineering firm, government, and commercial clients. He is particularly capable with CSA's navigation systems and is experienced in the use of Remotely Operated Vehicles (ROVs), various computer programs including CSA's Integrated Video Mapping System (IVMS) and Hypack.

He has also conducted numerous water and sediment sample collections, fish sampling, and water column profiles of salinity, temperature, and transmissivity in nearshore and offshore environments. He has been the Operations Manager for current velocity and direction studies, dye studies, benthic sample collections (diver and sampling device), and trawl, seine net, and dredged biological collections. He has extensive operational experience with underwater video and still photography and the towing of CSA's underwater video/still camera system. As Lead Technician, Mr. Johnson has participated in the design, fabrication, testing, and systemizing of much of CSA's specialized sampling and data collection equipment. He is also responsible for much of the maintenance of CSA's in-house sampling equipment and fleet of small survey vessels, and supervising operations staff.

EXPERIENCE

1985 to Present: CSA Ocean Sciences Inc. – Operations Director

- Operations lead for sediment tracer study in Miami Harbor for USACE. Designed and constructed moorings, calibrated and deployed oceanographic sampling equipment, performed equipment maintenance and data downloads at regularly-scheduled intervals and following a major hurricane, processed and organized raw data and recovered equipment. Created and utilized Hypack navigation CAD files to ensure accurate sample collections. Vessel captain, navigator and logistical coordinator for sediment sampling.
- Operations manager for a natural resource damage assessment survey for injuries to a coral reef associated with the grounding of a bulk cargo carrier in eastern Indonesia.
- Lead operations for field and data collection for the Puerto Rico Aqueduct and Sewer Authority associated with a regional wastewater treatment plant. Sampling included the collection of grabs for water and sediment and fish sampling populations around the outfall pipes.
- Operations lead for offshore surveying, data collection, and sampling efforts in support of the Deepwater Horizon Accident Oil Spill Response and Natural Resource Damage Assessment in the Gulf of Mexico.



- Lead Technician for a three-phase Oyster Reef Restoration project under contract to Martin County and funded by the American Recovery and Reinvestment Act of 2009. Field tasks included bathymetric and side-scan sonar surveys within the St. Lucie Estuary and Northwest Fork of the Loxahatchee River to characterize and identify estuarine bottom features and help evaluate the suitability of the permitted restoration sites (Martin County, Florida).
- Lead technician for a side-scan and diver groundtruth survey of proposed seismic survey tracklines in nearshore waters offshore northern Mozambique. Areas surveyed were analyzed and groundtruthed to determine environmental sensitivity to seismic activities using established sensitive habitat criteria (Anadarko AMA-1).
- Lead Technician for a CSA contract with the MMS to conduct a deepwater program to determine the effects of oil and gas exploration and development at selected continental slope sites in the Gulf of Mexico. For this project, physical impacts were determined with deep-towed side-scan sonar/high resolution chirp sonar, and acoustic reflectivity was mapped. The physical/chemical sediment environment was sampled with a box core and sediment profile imaging system. Samples for pore water, redox chemistry, and sediment toxicity (10-day acute test) also were collected. The biological community was sampled with a box corer, still photographs, and bottom traps.
- Lead Technician for a project in which CSA conducted a visual characterization and sediment sample collection survey within multiple areas of the Arabian Gulf offshore Ras Laffan, Qatar. Field tasks included side-scan sonar, magnetometer, and video and still camera surveys of potential test sites. Visual characterizations were conducted at five locations that were previously identified during side-scan sonar studies. Sediment samples were also collected with a Smith-McIntyre grab from a total of 10 stations.
- Lead Technician for a project in which CSA conducted an underwater diver and camera sled video documentation and side-scan sonar survey near Galeota Point, Trinidad, Trinidad and Tobago, West Indies. The objective of the survey was to obtain visual and geophysical data to characterize a swath of seafloor (i.e., presence or absence of hard bottom substrate) along multiple proposed pipeline routes near Galeota Point.
- Operations Manager for survey to relocate hard coral colonies (*Oculina* sp.) along the north slope of the Fort Pierce Inlet Channel and transplant these corals to a suitable offshore location. Seventeen coral colonies greater than approximately 4 inches in diameter were removed from the channel and successfully reattached to a shallow reef adjacent to the inlet. Video data were collected of operations during the project. The success of the coral reattachment is being monitored annually through the collection of video and still photographs of each of the transplanted corals.
- Operations Manager for CSA contract to monitor the condition of 17 *Oculina* coral colonies removed from Fort Pierce Harbor and reattached at a shallow nearshore site. Divers will collect underwater video and still photographs of each of the colonies.
- Operations Manager for CSA contract to monitor the nearshore hard bottom within the influence of a beach renourishment area south of the Fort Pierce Inlet. Video transects will be run along 13 pre-established transects corresponding to Florida Department of Natural Resources benchmarks and positioned perpendicular to the beach. Biological communities observed along the transects will be delineated and mapped using a Differential Global Positioning System (DGPS). The data obtained will be provided to the U.S. Army Corps of Engineers in ARC/INFO format.
- Operations Manager for CSA contract to conduct an environmental monitoring program for the Offshore Operators Committee (OOC) titled Gulf of Mexico Produced Water Bioaccumulation Study.



- Operations Manager for a baseline environmental assessment survey that was conducted along the grounding path of the Turkish freighter FIRAT off Fort Lauderdale, Florida. The survey included the determination of the boundaries of the impact areas and the collection of qualitative data concerning the spatial distribution and severity of the impacted areas using CSA's Integrated Video Mapping System with DGPS navigation. The purpose of the project was to expedite habitat and resource restoration by reattaching viable specimens of hard corals to the substrate impacted during the grounding. The impact area was searched for dislodged and viable coral colonies and 588 hard coral colonies comprising 12 species were successfully reattached to the substrate at 16 sites within the impact area.
- Lead Technician for a project to conduct a diver reconnaissance survey of scleractinian coral colonies greater than 4 inches in diameter on rock habitat within the dredging impact area along the north edge of the Fort Pierce Harbor navigational channel. The survey will provide approximate number and location of coral colonies within the survey area. Notes concerning the presence of wormrock within the survey area will be made. This project is being conducted as a subcontract to Dames & Moore.
- Operations Manager for a CSA contract to conduct a study to monitor environmental conditions of the coral reef zone of the East and West Flower Garden Banks, using study sites and techniques established under the previous three-year MMS-sponsored study. Survey techniques include 35-mm still and video photography of random and permanently marked stations; deployment and measurement of coral growth stations (encrusting and accretionary growth); retrieval and maintenance of recording thermistors; collection and storage of sediment samples; collection and measurement of coral cores for accretionary growth; and field measurements of salinity, dissolved oxygen, and light. The analyzed data will be compared to previous data sets from the two study sites.
- Lead Technician for a CSA contract from the U.S. Department of the Navy to prepare an Environmental Impact Statement (EIS) for underwater explosive testing that will meet approval of the U.S. Environmental Protection Agency. Field tasks included side-scan sonar, magnetometer, and video and still camera surveys of 16 potential test sites.
- Operations Manager during a CSA contract to conduct a three-year, multi-million-dollar study of the potential environmental, economic, and health impacts associated with produced water, produced sand, and other discharges from oil and gas operations in the Gulf of Mexico.
- Lead Technician associated with environmental services provided by CSA for permitting the first development/production operation in the Eastern Gulf of Mexico Planning Area. CSA conducted live bottom surveys in all blocks and along the pipeline corridor using video and still cameras and dredges to identify sensitive areas, characterize biological communities, and make comparisons with previous live bottom survey data. Additional field data for permitting documents and model calculations will be collected over a multi-year period prior to development/production operations. Five instrument moorings were installed to monitor meteorological conditions (i.e., wind speed and direction, air temperature, and barometric pressure) and collect current speed and direction data, water clarity measurements, and suspended sediment samples. Four quarterly surveys were conducted to characterize potential seasonal variability of the benthic environment in live bottom areas and five quarterly surveys in soft bottom areas. Sediment samples were collected to determine grain size, clay mineralogy, and concentrations of trace metals and hydrocarbons. Macroinfauna, demersal fishes, and epibiota were studied using grabs, trawls, and video and still cameras.



- Operations Manager for CSA project to conduct sediment and water sample and water quality including turbidity data collection surveys to collect baseline information regarding potential dredging project sites for almost four years. Samples and data have been collected at 25 locations throughout Florida, Georgia, and Puerto Rico. Both candidate Offshore Dredged Material Disposal Sites and dredging sites have been sampled using CSA's portable vibracoring system mounted on CSA's 25-ft trailerable outboard-powered pontoon barge which supports a 15-ft bow-mounted A-Frame and also a wide variety of grabs and gravity or diver cores using CSA's 23 ft offshore survey vessels. Typically, sediment samples were homogenized after collection to provide representative material for bioassays and a full suite of chemical analyses including pesticides, metals, and hydrocarbons. Water samples were also analyzed and water quality including turbidity data were used to support all analyses. These projects have been conducted under subcontract to PPB Environmental Laboratories, Inc. under Delivery Orders of a Service Contract with the Environmental Resources Branch, Planning Division, U.S. Army Corps of Engineers, Jacksonville District.
- Marine Technician for numerous live-bottom surveys conducted in Gulf of Mexico for Chevron, Texaco, Sohio, Amoco, Shell, Mobil, Conoco, and Union Oil Companies.
- Lead Technician for a second year of environmental baseline sampling at a drillsite and reference areas in the Piltun-Astokhskoye field offshore of Sakhalin Island, Russia. Water current data were collected on two subsurface taut-line moorings, each secured with a dual acoustic release system. Each mooring was instrumented with an Acoustic Doppler Current Profiler and an InterOceans S4 Vector Averaging Current Meter with a pressure recorder. Additionally, water column measurements and sediment and water samples for a broad array of parameters were also collected. The seabed surface and subbottom compositions of the areas surveyed were further characterized with the collection of low frequency "boomer" subbottom profiler data, precision bathymetry/Roxann data, and towed television/still camera system video footage and still photographs.
- Operations Manager for a grounding site (U.S.S. MEMPHIS) survey on a hard bottom reef off Broward County, Florida. Underwater still photographs and video imagery were collected during the survey, and a report was prepared describing the field survey results.
- Lead Technician for surveys offshore Naples, Florida to support the Collier County Beach Restoration Project. The purpose of the surveys is to provide video documentation of all hard bottom areas along pipeline access corridors and dredge pump out stations. Three surveys will be performed for each corridor: 1) pre-pipeline installation; 2) immediately post-pipeline installation; and 3) post-pipeline removal. This project is being conducted as a subcontract to Coastal Engineering Consultants Inc.
- Lead Technician: CSA provided a survey vessel, positioning system, and post-processing of survey data in support of a cultural resource survey within and in the vicinity of the Jupiter Inlet, Jupiter, Florida. This project was conducted as a subcontract to Karell Archeological Services.
- Lead Technician during CSA project to collected bathymetric, RoxAnn, and side-scan sonar data for live bottom mapping services for the Collier County Beach Restoration Project. The suite of oceanographic tools used to collect the data consisted of one of CSA's precision Differential Global Positioning System (DGPS) navigation systems for horizontal control, survey navigation, and data collection; an Odom Echotrac precision survey fathometer interfaced to CSA's RoxAnn Seabed Classification System; a Microtide pressure-recording tide gauge; a Klein dual frequency side-scan sonar system for mapping hard bottom areas; and one of CSA's "drop video" systems that enabled the survey team to rapidly visually groundtruth the side-scan sonar target areas for live bottom versus just hard bottom determinations. The RoxAnn data were collected to further assist in live bottom determinations. This project was conducted as a subcontract to Coastal Engineering Consultants Inc.



- Operations Manager during a CSA contract to perform a side-scan survey to locate an object which caused damage to a barge in the Big Bend Shipping Channel of Tampa Bay, Florida. The survey was conducted in the main east-west channel and a smaller north-south channel using 100-ft line spacing with 50-m slant range. No significant side-scan sonar targets were located in the two channels. Two to three large targets were located in the turning basin, which connects the two channels. A drop video TV system was used to document one large target. Deliverables included a letter summary, side-scan sonar scrolls, print outs, bathymetric scrolls, and videotape.
- Diver for a CSA project that provided geotechnical seismic profiling, side-scan sonar hard bottom mapping, magnetometer surveying, and benthic sampling services for the Collier County Beach Management Project. Tasks included diver infaunal corers for collection of benthic samples. This project was conducted as a subcontract to Coastal Engineering Consultants Inc.
- Lead Technician for CSA project to conduct a side-scan sonar survey of a proposed borrow area for the Venice Beach Nourishment Project, Phase II. CSA provided acoustical imagery of the bottom topography in the borrow area to reveal the presence of hard bottom, rock outcrops, or exposed shipwrecks. CSA collected high resolution side-scan sonar data with tight survey line spacing using Differential Global Positioning System (DGPS) navigation to enable precision mapping of any targets found. This project was conducted as a subcontract to Coastal Technology Corporation.
- Lead Technician for CSA contract to conduct a side-scan sonar and bathymetric survey of two areas in preparation for future beach renourishment activities. A 26-mile long nearshore area from the Port Canaveral entrance channel south to DNR monument R-141 (south of Melbourne, Florida) and a 2-square mile offshore borrow area were surveyed. Differential GPS was used for vessel positioning.
- Operations Manager for CSA project to conduct a side-scan sonar and diver-held video survey of the bottom in Government Cut at Miami, Florida. The purpose of the survey was to provide attorneys with legal documentation of bottom conditions and any damages that may have been done to a Florida Power & Light Company power cable by a cruise ship anchor dropped and dragged in the vicinity of the cable.
- Lead Technician for CSA contract to conduct a side-scan sonar survey of a debris field located approximately seven miles off the coast of Tampa, Florida. The purpose of the survey was to determine the location and composition of debris within a 1,000 ft square area. Maps were generated from the side-scan sonar data for use during recovery of debris. CSA also provided support personnel and positioning information necessary to direct the dive support barge to debris target sites within the area during recovery operations.
- Operations Manager for CSA project to conduct a submarine archeological investigation for the Baltimore Harbor and Anchorages Project using a CHIRP subbottom profiler interfaced with CSA's Differential Global Positioning System (DGPS) navigation system. This project was conducted as a subcontract to R. Christopher Goodwin & Associates, Inc..
- Operations Manager for CSA contract to conduct precision bathymetric and subbottom profile mapping to establish the boundary conditions for three acoustic model test sites 100 miles offshore of the southwest coast of Florida in water depths ranging from 300 to 400 ft. The survey team used CSA's computerized Navigation and Data Acquisition System (NADAS) to interface, control, and record the data from a Differential Global Positioning System, a precision survey echosounder, and a CHIRP subbottom profiling system. This project was conducted as a subcontract to General Offshore Corporation.



- Technician for CSA project to conduct the project titled "Coast of Florida Study - Region III, Mapping and Classification of Hard Bottom Areas in Coastal Waters." The survey covered the region from the northern Palm Beach County Line down to the northern edge of Biscayne National Park. CSA collected approximately 920 line miles of side-scan sonar and bathymetric data offshore of Palm Beach, Broward, and Dade Counties, Florida. These data were ground truthed using CSA's underwater video and still camera system. All survey tasks were horizontally controlled using a Differential Global Positioning System. The survey data were used to map the area between the nearshore 10-ft depth contour out to the 100-ft depth contour.
- Lead Technician during project to conduct a live bottom survey at a drillsite located off St. George Island, Florida. The survey involved towing of CSA's video/still camera system along transects radiating from the proposed drillsite.
- Technician during project where core samples were obtained by vibracoring at four locations in the Intracoastal Waterway of southeast Florida. This project was conducted as a subcontract to CSA Marine Services, Inc.
- Operations Manager for CSA project to collect a series of vibracore samples from a depth of -6 ft below the present sediment at five stations in Port Canaveral and three reference composite stations offshore Cape Canaveral. The sediment samples were tested for toxicity to satisfy requirements for a proposed expansion of Port Canaveral involving dredging.
- Operations Manager during seagrass survey for a Florida Power & Light Company utility corridor near Grant, Florida on the Indian River. The survey was conducted using the RoxAnn Seabed Identification System in conjunction with a bathymetric survey. The RoxAnn system processed acoustic echosounder data and determined seabed type (i.e., sand, silt, seagrass, hard bottom, etc.). These data were post-processed using visual ground truthing information to complete a seagrass map for the utility corridor.
- Technician during for a project involving fish community data collection from four sites in the lower St. Johns River during a pilot sampling program. Following data analysis and interpretation, the final report included evaluations of different sampling gear (seine, trawl, electroshocker, and gillnet) as well as the utility of community-level data as an indicator of water quality.
- Lead Technician during a field survey within the Fort Pierce Inlet, Florida. The survey included mapping of seagrass beds in the port berthing area, collection of benthic samples from a shoal adjacent to the spur channel, a visual assessment of wormrock reefs in the inlet, and documentation of other natural resources in the area. This project was conducted as a subcontract to Gulf Engineers & Consultants, Inc.
- Lead Technician during a live bottom survey in Destin Dome Blocks 15/16 and 99/100 was conducted as a requirement for drilling clearance. The survey was conducted using CSA's towed underwater color television and still camera system. Quantitative photographs and dredge samples were taken along live bottom areas to characterize the biological communities within the survey area.
- Technician during a monitoring program that was conducted in Mobile Bay Blocks 111, 112, 114, and 115 at the mouth of Mobile Bay, Alabama. The program included the collection of underwater video and still photographs within 1,000 ft of each drillsite location. Water quality data including temperature, salinity, dissolved oxygen, transmissivity, and total suspended solids were collected at the drillsite and at eight surrounding stations in each block. Water quality data were collected quarterly until drilling was completed, while both video/still photographic data and water quality data were collected on pre-drilling and post-drilling surveys.



- Technician for a CSA contract to conduct a live bottom survey in Destin Dome Area Blocks 51 and 52. Videotape and still photographic data were collected along with dredge samples. A live bottom survey report was prepared. CSA also prepared an Environmental Report and an Oil Spill Contingency Plan.
- Technician during a project where Water current speed and direction measurements were collected throughout the water column using an InterOcean S-4 solid-state electromagnetic current meter. Two profiles were taken in the vicinity of the platform. Two hundred and two water samples were also collected at various sites and depths around the discharge. These samples were analyzed for sulfides. Current velocity data were presented in tabular form, as speed versus direction plots, as polar plots, and as straw plots.
- Technician during a survey at a potential beach nourishment borrow site off the southeastern end of Amelia Island, Florida. Infaunal samples were collected at five borrow site stations and at two stations each both north and south of the site. Trawl samples were taken north of, south of, and within the borrow sites. Samples were analyzed and a summary report was written presenting the data for inclusion in an Inlet Management Plan.
- Operations Manager for a side-scan sonar survey to map hard bottom areas along the dredge anchor corridor offshore the Miami Ship Channel at the Port of Miami. The survey utilized precision navigation. Divers returned to the hard bottom areas to document the communities using still photography and underwater video. This work was completed under a subcontract to Post, Buckley, Schuh, & Jernigan, Inc..
- Operations Manager for a biological monitoring program off the west coast of Florida following the conduct of a beach renourishment program.
- Operations Manager for a biological baseline sampling program off the west coast of Florida prior to the conduct of a beach renourishment program.
- Operations Manager and Chief Navigator for a biological bottom survey collecting video and bathymetric data off the Florida Keys.
- Lead Diver for sediment chemical analysis, Exxon Valdez, Gulf of Alaska.
- Operations Manager for thermal discharge study in South China Sea for Taiwan Power.
- Lead Technician in carbon black spill in Mississippi River, New Orleans, Louisiana.
- Lead Technician for drogue study conducted in Admirals Cove, Florida to determine water quality in canals.
- Scientific Diver and Technician for a large multidisciplinary monitoring program in Mississippi Sound.
- Lead Technician in mooring deployment and operation, recovery for current meter and seabird mooring.
- Lead Technician for baseline survey in Mobile Bay, Alabama. Duties included collection of side-scan sonar, bathymetry, and magnetometer data. Trawl and diver-collected biological samples were also collected.
- Lead Technician for dredge site disposal survey in St. Petersburg, Florida consisting of primarily diver-conducted samplings.
- Participated in hydrographic dye study at Pirates Cove, Martin County, Florida.
- Lead Technician in navigation, reef photography, sample collection, and station placement for beach renourishment monitoring program in Jupiter, Florida.
- Operations Manager and Boat Operator for an ichthyological monitoring program of the St. Johns River Estuary.
- Lead Diver in placement of artificial seaweed units placed off Highlands Beach, Florida.
- Lead Technician in bathymetric survey at Turnberry Isle, Florida.



FRANK R. JOHNSON

- Conducted underwater hand-held video inspection on classified government equipment at AUTECH facility, Andros Island, Bahamas.
- Lead Technician and Diver for underwater diver-collected seagrass, sediment samples, and underwater photography in the Gulf of Mexico.
- Conducted water quality and sample collection survey for FDER permit application in Jupiter, Florida.
- Commercial diving, underwater inspection, and marine construction tasks while working as a lead diver for CSA's commercial diving affiliate, CSA Marine Services, Inc.

PROFESSIONAL CERTIFICATIONS

Nationally Certified SCUBA Diver – National Association of Underwater Instructors (NAUI)

Hazardous Waste Operations and Emergency Response (OSHA, 1910.120)

Multimedia Standard First Aid – American Red Cross

Cardiopulmonary Resuscitation (CPR) – American Red Cross

Certified Scientific Diver – CSA



REX E. BAUMBERGER, JR.

Project Scientist II, Marine Biologist, Nearshore Hardbottom Specialist

YEARS OF EXPERIENCE

With this firm: 9 With Other Firms: 9

CERTIFICATIONS

Diving Emergency Management Provider, DAN
Scientific Diver, AAUS
Advanced SCUBA Diver, NAUI
NITROX Enriched Air Diver
Florida Boating Safety Course

EDUCATION

M.S., Marine Biology
Florida Atlantic University
2008

B.S., Biology
Florida Atlantic University
2001

KEY QUALIFICATIONS

Mr. Baumberger is a marine biologist with over 18 years of experience in marine environmental science, with a strong background in field studies of sub-tropical and tropical marine communities and coastal ecosystems. Since joining CSA Ocean Sciences Inc. (CSA) in 2010, he has served as a Field Scientist and Project Manager on a diverse range of marine environmental surveys concerning coral reef and nearshore hardbottom habitats. He has extensive experience conducting and managing multi-year monitoring programs of nearshore hardbottom habitats in Florida prior to and following beach restoration projects, playing a major role in eight projects within Broward, Indian River, Martin, Sarasota, and St. Lucie Counties. He also has experience conducting damage assessments, seagrass mapping and monitoring surveys, designing and implementing reef restoration plans, and conducting restorations on coral reefs in southeast Florida, Guam, and Oman. He has conducted reattachment of sponges, octocorals, and stony corals in Florida and abroad. He is skilled in the identification of flora and fauna of the western Atlantic, Pacific, and Arabian Gulf; the collection of underwater video and still camera data; identification of hardbottom and reef taxa; and underwater restoration, mapping, and damage assessment techniques including uniform mitigation assessment method. Mr. Baumberger has over 17 years of experience as a scientific diver with over 2,500 logged dives. Mr. Baumberger is adept in small boat operations and regularly presents research at scientific conferences.

RELEVANT PROJECT EXPERIENCE

Field Scientist - Martin County Shore Protection Project (2012 to Present)

Field Scientist - St. Lucie County South Beach and Dune Restoration Project (2012 to Present)

Project Manager/Lead Field Scientist - Fort Pierce Beach Shore Protection Project (2010 to 2017)

Project Manager/Lead Field Scientist - Indian River Co. Sector 3 Beach and Dune Restoration Project (2010 to 2016)

Field Scientist - St. Lucie Crossroads Seagrass Survey (2016)

Project Manager/Lead Field Scientist - Siesta Key Beach Nourishment Project Hardbottom Monitoring (2015 to 2016)

Project Manager/Lead Field Scientist - Hillsboro/Deerfield Beach Renourishment Project (2010 to 2015)