

Information and application packet for
ENVS 3073: Ecology and Environmental Issues in the Bahamas
May 1 – 15, 2023

Please read the information contained in the attached documents (as numbered below) and contact Dr. Tarah Wright (email: tarah.wright@dal.ca) if you have any questions. Dr. Wright will be your contact person for anything pertaining to this course:

1. Course poster
 2. ENVS 3073 Syllabus with draft schedule for May 2023
 3. Fee statement for ENVS 3073
 4. Application Form
 - a. To apply for this course, please complete the application form and send the forms to Dr. Tarah Wright
- NOTE: Space is limited in the course (maximum 15 students) and applications will be considered beginning November 15, 2022. Students will be informed of their successful application by December 15.

ENVS 3073

Ecology and Environmental Issues in the Bahamas

May 1-15, 2023

(Bahamas field trip portion: May 7-15)



Spend time at the Cape Eleuthera Institute in this hands-on course studying ecology and environmental issues in the Bahamas.

ENVS 3073 Course Description: This applied field course is a hands-on introduction to the ecology and environmental issues directly pertinent to the Bahamas and small Caribbean Islands. This course includes introductory lectures in Canada followed by an 8-day, place-based and experiential field trip to the Cape Eleuthera Institute - a facility that promotes a connection between people and the environment – where students will be immersed in both the natural and cultural landscape of South Eleuthera. While on island, participants will collect and analyze data from a wide spectrum of investigations currently underway at the Cape Eleuthera Institute, including turtle and fisheries research, sustainable energy, and food production systems. In addition, students will be introduced to, and asked to problematize the various sustainability solutions that can be implemented at the local, regional and global level. Evaluation includes lectures, tests, field notebooks, class field projects, presentations, and reports.



Credits: 3 credit hours (equivalent to one semester-long course) at the third-year level
Cost: Tuition for a regular 3-credit hour ENVS course PLUS an auxiliary fee to cover airfare, travel and living expenses in the Bahamas (for details, please contact tarah.wright@dal.ca).
Prerequisites: ENVS 1100.03 and ENVS 1200.03 (with a grade of B- or higher in each) or SUST 1000.06 or SUST 1001.06 (with a grade of B- or higher), An introductory course in statistics (STAT 1060.03 or similar) is recommended. Must be at least a 3rd year student OR have permission of the instructor.

Funding: Students may be eligible for international experience scholarships and bursaries. Please see: https://www.dal.ca/campus_life/ile/financial-support.htm for more information for more information.

To apply or request more information, please contact:
tarah.wright@dal.ca



**Applications considered beginning Nov 15. All offers made by December 15.
Deposits due January 10**

ENVS 3073
Ecology and Environmental Issues in the Bahamas
DRAFT SYLLABUS FOR MAY 2023

COURSE DESCRIPTION

This applied field course is a hands-on introduction to the ecology and environmental issues directly pertinent to the Bahamas. This course includes introductory lectures in Canada followed by an 8-day, place-based and experiential field trip to the Cape Eleuthera Institute - a facility that promotes a connection between people and the environment – where students will be immersed in both the natural and cultural landscape of South Eleuthera. While on island, participants will collect and analyze data from a wide spectrum of investigations currently underway at the Cape Eleuthera Institute, including turtle and fisheries research, sustainable energy, and food production systems. In addition, students will be introduced to, and asked to problematize the various sustainability solutions that can be implemented at the local, regional and global level. Evaluation includes lectures, tests, field notebooks, class field projects, presentations, and reports. FORMAT: Field-intensive, Lectures, Labs, International experience.

Prerequisites: ENVS 1100.03 and ENVS 1200.03 (with a grade of B- or higher in each) or SUST 1000.06 or SUST 1001.06 (with a grade of B- or higher), An introductory course in statistics (STAT 1060.03 or similar) is recommended. Must be at least a 3rd year student OR have permission of the instructor.

Credits: 3 credit hours (equivalent to one semester-long course).

Cost: Tuition for a regular 3-credit hour ENVS course PLUS an auxiliary fee to cover airfare, travel and living expenses.

Auxiliary fee: ~\$5000

Course Objectives/Learning Outcomes

After completing this course, students will be able to:

1. Describe and compare different tropical terrestrial and aquatic ecosystems
2. Identify a variety of common tropical plant, bird, coral, fish, and other aquatic species in the Bahamas
3. Demonstrate knowledge of sustainable systems used on CEI campus (including how to make biodiesel, permaculture, photovoltaic energy production and rainwater systems)
4. Identify relevant ethical issues when conducting field research with wildlife (specifically with lionfish, turtles and sharks)
5. Demonstrate use of a taxonomic key
6. Describe the major environmental issues facing island nations in the Caribbean
7. Demonstrate knowledge of, and postulate various sustainability solutions implemented within the Bahamas to tackle environmental issues
8. Demonstrate best practice for writing field notes
9. Exhibit excellence in effective teamwork
10. Proficiently analyze field data
11. Demonstrate excellence in report writing

COURSE MATERIALS

Required readings: Required readings will be posted on the course website. A preliminary list of readings is included below.

Other class materials:

- You will need one write-in-the-rain field notebook to record your field observations. To write in these field notebooks, we recommend using a “write-in-the rain” pen or just pencils. Bring several pencils and erasers.
- You will need a clipboard for writing lecture notes and for filling out data sheets in the field. We recommend a covered clipboard to keep your paper in better condition.
- A small tablet (e.g., iPad or similar) or a small portable computer would be helpful but is not essential.

COURSE POLICIES

It is important to keep up with work. Late assignments will be deducted at a rate of 10% per day. Deductions will be made for unexcused absences (1% per day or 0.5% per half day > 30 minutes) and lateness (0.25% for 5-30 minutes late). Excused absences include those for sickness or emergencies, but do NOT include those due to work or attending other classes.

Student responsibilities

This class is hands-on, so you must participate fully in all activities, including attending all classes and field activities.

- (1) **Attendance is mandatory.** You are expected to attend all lectures, labs and field trips both in Canada and in the Bahamas.
- (2) **Participation.** You are expected to participate and cooperate in all class activities and follow rules at the field station and those provided by the instructors.
- (3) **Safety precautions.** You must adhere to all safety guidelines including those that will be discussed in the first week of classes. Whenever out of sight of the instructors or the field centre where we will be staying, you must use the buddy system--stay in groups of 2 or more--AND inform the instructors of where you are going and when you will return.
- (4) **Cell phone use.** In order to remove unnecessary distractions and promote mindfulness of their surroundings and experiences, students are prohibited from using cellphones from the beginning of breakfast time until after the post-dinner lecture is completed. It is the student's responsibility to leave their cellphones in their bedroom. Students are encouraged to give up their cellphones entirely for the whole week (the instructor will happily hold them for safe keeping).

COURSE ASSESSMENT

- 2 Readiness Assessment Quizzes: 20%
- 2 Individual Presentations: 10%
- 3 Written Field Assignments (Coral identification, aquaponics, sustainable systems) 15%
- Participation: 15%
- Field Notebooks: 20%
- Field group presentation and report: 20%

Conversion of numerical grades to Final Letter Grades follows the [Dalhousie Common Grade Scale](#)

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Schedule Details: This course aims to provide students with a strong foundation in ecology and the environmental issues associated with living on a small island like the Bahamas, and first-hand-experience with data collection in the field. Students will learn through lectures, readings, discussions, guided field trips, field exercises, and research projects. The first week in Halifax will focus on an introduction to the Bahamian terrestrial and marine ecosystems, Bahamian environmental issues, and pre-departure activities with the International Centre. Classes in Halifax will consist of presentations and discussions, exercises, student-led discussions, and student presentations. The first week of class will be intense and will culminate in a lecture exam, to ensure students are well prepared for the trip to the Bahamas.

In Eleuthera we will spend 8 days at the Cape Eleuthera Institute. Students will collect research data, analyze the data, and prepare presentations and reports on our findings. This part of the class is intense and meets all day (typically more than 8 hours per day). Some leisure time will also be scheduled. See schedule for details of activities and locations for each day. Note that the schedule may need to be modified due to weather and other unforeseen circumstances. Additional lectures, sampling techniques, and local conservation issues will be presented in the Bahamas. Expect to be quizzed on the material presented in the Bahamas.

Tentative schedule Dalhousie (May 1-5)

Day 1 (Canada)	<ul style="list-style-type: none"> • Activity: Introduction to the course and ourselves • Lecture: Introduction to Bahamian terrestrial and marine ecosystems • Lab: Instructions and sign up for Bahamian ecology profiles (including coral reefs, tropical terrestrial ecosystems, mangroves); start work on these assignments with instructors' assistance
Day 2 (Canada)	<ul style="list-style-type: none"> • Student presentations on Bahamian ecology profiles • Lab: Introduction to field data collection for Bahamas and hands on activities; making field observations and notebook entries
Day 3 (Canada)	<ul style="list-style-type: none"> • Introduction to environmental issues (guest speakers Kristal Ambrose, Nick Higgs). • Lab: Instructions and sign up for Bahamian environmental issue profiles (including plastics, coral bleaching, invasive species, food security,); start work on these assignments with instructors' assistance
Day 4 (Canada)	<ul style="list-style-type: none"> • Pre-departure activities (with International Centre)
Day 5 (Canada)	<ul style="list-style-type: none"> • Student presentations on Bahamian environmental issue profiles • Formative Evaluation and Quiz

Tentative Schedule Bahamas (May 7 – 15)

Day 1 (Bahamas)	Travel day, and arrive at CEI Orientation
Day 2 (Bahamas)	Lecture: Sustainable systems/campus tour and scavenger hunt Activity: Swim checkout/reef ball snorkel Evening Lecture: Fish identification
Day 3 (Bahamas)	Lecture: Coral reef micro-fragmentation, and nursery reared coral fragments Field work: Snorkel at tunnel Rock (coral species identification activity) Evening Lecture: CEI Staff to provide overview of their own research areas
Day 4 (Bahamas)	Down Island Field Trip including Leon Levy Native Plant Reserve, Ocean Hole, Queens Baths, The Glass Window, Sapphire Hole, and Cathedral Caves
Day 5 (Bahamas)	Morning Lecture: Invasive Species Lesson Afternoon Activiti: Lionfish Dissection Evening Lecture: The problem of turtles and plastics in the Bahamas

Day 6 (Bahamas)	Turtle Seining Research Day Bonfire at sunset beach
Day 7 (Bahamas)	Morning lecture and tour: Permaculture and aquaponics Afternoon Field: working with CSD permaculture and aquaponics teams
Day 8 (Bahamas)	Lecture: Issues related to sustainable fisheries in the Caribbean Lab: Open aquaculture cage snorkel and fish observation Evening: Student's Final presentations
Day 9	Back to airport and return to Canada

Lodging:

We will be staying at the Island School in Deep Creek, Eleuthera Bahamas which is attached to the Cape Eleuthera Institute. Dalhousie University already has a MOU signed with the Cape Eleuthera Institute. The buildings and grounds at The Island School incorporate systems and design principles that minimize our ecological footprint through the conservation of collected resources like energy and water with ongoing projects that include (and that we will learn about): a biodiesel production plant to run all campus vehicles; cisterns for rain water collection; solar panels and solar hot water heaters, a wind turbine, aquaponics for the dining hall's leafy greens; the "poo-poo garden" that processes and recycles human waste to fertilize plants at the center of campus, a biodigester for fertilizer production; and pigs, goats, ducks and chickens that consume dining hall food waste.

Preliminary List of Readings

Books (chapters TBA)

- Davin, Thomas B, and Anna P Brannet. Coral Reefs. New York: Nova Science, Incorporated, 2009. Web.
- Brokaw, Nicholas, Todd Crowl, Ariel Lugo, William McDowell, Frederick Scatena, Robert Waide, and Michael Willig. A Caribbean Forest Tapestry. New York: Oxford UP, 2012. The Long-Term Ecological Research Network Ser. Web.

Journal Articles (students assigned different readings depending on their focus)

- Gollner, S., Colaço, A., Gebruk, A., Halpin, P.N., Higgs, N., Menini, E., Mestre, N.C., Qian, P.Y., Sarrazin, J., Szafranski, K. and Van Dover, C.L., 2021. Application of scientific criteria for identifying hydrothermal ecosystems in need of protection. *Marine Policy*, 132:104641.
- Hoefler, S., Mills, S., Pinou, T. and Robinson, N.J. (2021) What the Dead Tell Us about the Living: Using Roadkill to Analyze the Diet and Endoparasite Prevalence in Two Bahamian Snakes. *Ichthyology & Herpetology*, 109(3):685-690.
- Higgs, N.D. (2021) Impact of the the COVID-19 pandemic on a queen conch (*Aliger gigas*) fishery in The Bahamas. *PeerJ*, 9:e11924.
- Schneider, E. V. C., Brooks, E. J., Cortina, M. P., Bailey, D. M., Killen, S. S., Van Leeuwen, T. E. (2021). Design and deployment of an affordable and long-lasting deepwater subsurface fish aggregation device. *Caribbean Naturalist*, 83: 1-16.
- Zeinert, L. R., Brooks, A. M., Couturier, C., & McGaw, I. J. (2021). Potential use of the Caribbean spider crab *Maguimithrax spinosissimus* for biofouling removal on marine aquaculture cages. *Aquaculture*, 737202.
- Shipley O.N., Henkes G.A., Gelsleichter J., Morgan C.R., Schneider E.V.C., Talwar B.S., Frisk M.G. (2021) Shark tooth collagen stable isotopes ($\delta^{15}\text{N}$ and $\delta^{13}\text{C}$) as ecological proxies. *Journal of Animal Ecology*, 00:1-14.
- Queiroz, N., ... Brooks, E.J., Brooks, A. *et al.* (2021) Reply to: Shark mortality cannot be assessed by fishery overlap alone. *Nature* 595, E8-E16. <https://www.nature.com/articles/s41586-021-03397-3>
- Thomas, A., Nicolls, T., Finlayson, M. (2021) Climate Change & The Bahamas: Information Brief.
- Bates A.E., Primack R.B., Duarte C.M... Higgs, N.D. *et al.* (2021) Global COVID-19 lockdown highlights humans as both threats and custodians of the environment. *Biological Conservation*, 20:109175.

- Siegfried T.R., Fuentes M.M.P.B... Robinson, N. et al. (2021) Validating the use of stereo-video cameras to conduct remote measurements of sea turtles. *Ecology and Evolution*, 00: 1– 12.
- Irschick D.J., Bot J., Brooks, A. et al. 2020. Using 3D photogrammetry to create accurate 3D models of sea turtle species as digital voucher specimens. *Herpetological Review*. 51:709-715.
- Talwar B.S., Bouyoucos, I.A., Brooks, E.J., Brownscombe J.W., Suski, C.D., Cooke, S.J., Grubbs, R.D., and Mandelman, J.W. 2020. Variation in behavioural responses of sub-tropical marine fishes to experimental longline capture. *ICES Journal of Marine Science*.
- Hoefler, S., Robinson N.J. 2020. Tail bifurcation in a brown anole, *Anolis sagrei* (Duméril & Bibron, 1837). *Herpetology Notes* 13:333-5.
- Talwar, B.S., Stein, J.A., Connett, S.M., Liss, S.A., Brooks, E.J. 2020. Results of a fishery-independent longline survey targeting coastal sharks in the eastern Bahamas between 1979 and 2013. *Fisheries Research*, 230.
- Trehern, R., Raguse, C., Bigelow, W., Garg, A., Hauptman, H., Brooks, A., Van Leeuwen, T.E., Hawkes, L.A. 2020. The effect of salinity on behavioural interactions between native Schoolmaster snapper (*Lutjanus apodus*) and invasive lionfish (*Pterois spp.*). *Journal of Experimental Marine Biology and Ecology*.
- Trehern, R.H., Garg, A., Bigelow, W.B., Hauptman, H., Brooks, A., Hawkes, L.A. and Van Leeuwen, T.E. 2020. Low salinity negatively affects metabolic rate, food consumption, digestion, and growth in invasive lionfish *Pterois spp.* *Marine Ecology Progress Series*. 644, 157-171.
- Schwanck, T., Schweinsberg, M., Lampert, K., Guttridge, T., Tollrian, R., O’Shea, O. 2020. Linking local movement and molecular analysis to explore philopatry and population connectivity of the southern stingray *Hypanus americanus*. *Journal of Fish Biology*. 1-14.
- Williamson SA, Evans RG, Robinson NJ, Reina RD. 2019. *Synchronised nesting aggregations are associated with enhanced capacity for extended embryonic arrest in olive ridley sea turtles*. *Scientific reports*. 9:9783.
- Steell, S.C., Van Leeuwen, T.E., Brownscombe, J.W., Cooke, S.J., Eliason, E.J. 2019. *An appetite for invasion: digestive physiology, thermal performance and food intake in lionfish (Pterois spp.)*. *Journal of Experimental Biology*, 222 (19):jeb209437.
- Robinson NJ, Lazo-Wasem E, Butler BO, Lazo-Wasem EA, Zardus JD, Pinou T. 2019. *Spatial distribution of epibionts on olive ridley sea turtles at Playa Ostional, Costa Rica*. *PLoS ONE* 14:e0218838.
- Pinou T, Domenech F, Lazo-Wasem EA, Majewska R, Pfaller JB, Zardus JD, Robinson NJ. 2019. *Standardizing sea turtle epibiont sampling: outcomes of the Epibiont Workshop at the 37th International Sea Turtle Symposium*. *Marine Turtle Newsletter* 157:22-32.
- Weiler, B., Van Leeuwen, T., Stump, K.. 2019. *The extent of coral bleaching, disease and mortality for data-deficient reefs in Eleuthera, The Bahamas after the 2014-2017 global bleaching event*. *Coral Reefs*. 38: 831.
- Queiroz, N., Brooks, A., Brooks, E.J, et al. 2019. *Global spatial risk assessment of sharks under the footprint of fisheries*. *Nature*.
- Orrell, D, Schneider, EVC, Eisenbach, O, Garg, A, Bigelow, B, Hauptman, H, O’Shea, O, McGaw, IJ, Van Leeuwen, T.E. 2019. *Evaluation of stone crab (Menippe mercenaria) fisheries practices using simulated fishery scenarios in the laboratory*. *Caribbean Naturalist* 63: 1-17.
- Ambrose, K., Box, C., Boxall, J., Brooks, A., Eriksen, M., Fabres, J., Fylakis, G., Walker, T.R. Spatial trends and drivers of marine debris accumulation on shorelines in South Eleuthera, The Bahamas using citizen science. *Marine Pollution Bulletin*. 142:145-154
- Boyoucos I.A., Talwar B.S., Brooks E.J., Brownscombe J., Cooke S.J., Suski C.D., Mandelman J.W. 2018. Exercise intensity while hooked is associated with physiological status of longline-captured sharks. *Conservation Physiology*.
- McGaw, I.J., Steell S.C., Van Leeuwen, T.E., Eliason E.J. and Cooke, S.J. (2018). *Application of miniature heart-rate data loggers for use in free moving decapod crustaceans: method development and validation*. *Physiological and Biochemical Zoology* 91 (1): 731-739
- Sherman KD, Shultz AD, Dahlgren CP, Thomas C, Brooks EJB, Brooks A, Brumbaugh DR, Gittens L, Murchie K. 2018. Contemporary and emerging fisheries in The Bahamas—Conservation and management challenges, achievements and future directions. *Fish Manag Ecol*. 25:319–331.

- Cruz LM, Shillinger GL, Robinson NJ, Tomillo PS, Paladino FV (2018). Effect of light intensity and wavelength on the in-water orientation of olive ridley turtle hatchlings. *Journal of Experimental Marine Biology and Ecology* 505:52-56.
- Gatto CR, Rotger A, Robinson NJ, Tomillo PS (2018). A novel method for photo-identification of sea turtles using scale patterns on the front flippers. *Journal of Experimental Marine Biology and Ecology* 506:18-24.
- Rees AF, Avens L, Ballorain K, Bevan E, Broderick AC, Carthy RR, Christianen MJA, Duclos G, Heithaus M, Johnston DW, Mangel JC, Paladino F, Pendoley K, Reina R, Robinson NJ, Sykora-Bodie S, Tilley D, Varela MR, Whitman E, Whittock PA, Wibbels T, Godley BJ (2018) The potential of unmanned aerial systems for sea turtle research and conservation. *Endangered Species Research* 35:81-100.
- Christopher S. Bird, Ana Veríssimo, Sarah Magozzi, Kátya G. Abrantes, Alex Aguilar, ..., Edward J. Brooks, et al. (2018), A global perspective on the trophic geography of sharks. *Nature Ecology & Evolution*. doi:10.1038/s41559-017-0432-z
- Papastamatiou, Y. P., Iosilevskii, G., Leos-Barajas, V., Brooks, E. J., Howey, L. A., Chapman, D. D., and Watanabe, Y. Y. (2018), Optimal swimming strategies and behavioral plasticity of oceanic whitetip sharks. *Scientific Reports*. doi:10.1038/s41598-017-18608-z
- O'shea, O. R., Wueringer, B. E., Winchester, M. M. and Brooks, E. J. (2017). Comparative feeding ecology of the yellow ray *Urobatis jamaicensis* (Urotrygonidae) from The Bahamas. *Journal of Fish Biology*. doi:10.1111/jfb.13488
- Williamson SA, Evans RG, Robinson NJ, Reina RD (2017). Hypoxia as a novel method for preventing movement-induced mortality during translocation of turtle eggs. *Biological Conservation* 216:86-92
- Robinson NJ, Figgenger C, Gatto C, Lazo-Wasem EA, Paladino FV, Santidrián Tomillo P, Zardus JD, Pinou T (2017). Assessing potential limitations when characterising the epibiota of marine megafauna: effect of gender, sampling location, and inter-annual variation on the epibiont communities of olive ridley sea turtles. *Journal of Experimental Marine Biology and Ecology* 497:71-77. doi:10.1016/j.jembe.2017.09.012
- Bjørndal K.A., Bolten A.B., Chaloupka M., et al. (2017). Ecological regime shift drives declining growth rates of sea turtles throughout the West Atlantic. *Global Change Biology* 1–13. doi:10.1111/gcb.13712
- Tolentino E.R., Howey R.P., Howey L.A., Jordan L.K.B., Grubbs R.D., Brooks A., Williams S., Brooks E.J., and Shipley O.N. (2017). Was my science project eaten? A novel approach to validate consumption of marine biologging instruments. *Animal Biotelemetry* 5:3. doi:10.1186/s40317-016-0117-4
- O'Shea O. R., Ward C. and Brooks E. (2017). The Caribbean whiptail stingray (*Himantura schmardae*) in The Bahamas: Notes on current distribution and implications for conservation. *Caribbean Naturalist*, 38; 1-8.
- Smith N., Green S., Akins j., Miller S. and Côté S. (2017). Density-dependent colonization and natural disturbance limit the effectiveness of invasive lionfish culling efforts. *Biological Invasions* 1-15 doi:10.1007/s10530-017-1449-6
- Delacy C.R., Olsen A., Howey L.A., Chapman D.D., Brooks E.J. and Bond M. (2017). Affordable stereo-video systems for measuring dimensions underwater- a case study using Oceanic Whitetip sharks (*Carcharhinus longimanus*). *Marine Ecology Progress Series*. doi:10.3354/meps12190
- Bouyoucos I.A., Suski C.D., Mandelman J.W. and Brooks E.J. (2017). The energetic, physiological, and behavioural response of lemon sharks (*Negaprion brevirostris*) to simulated longline capture. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. 207: 65 – 72. doi:10.1016/j.cbpa.2017.02.023
- Bouyoucos I.A., Suski C.D., Mandelman J.W. and Brooks E.J. (2017). Effect of mass and frontal area of external telemetry packages on the behaviour and swimming performance of small-bodied sharks. *Journal of Fish Biology*. 90: 2097–2110. doi:10.1111/jfb.13290
- Haas A.R., Fedler T. and Brooks E.J. (2017). The contemporary economic value of elasmobranchs in The Bahamas: Reaping the rewards of 25 years of stewardship and conservation. *Biological Conservation*. 207: 55 – 63. doi:10.1016/j.biocon.2017.01.007
- Shipley O.N., Howey L.A., Tolentino E.R., Jordan L.K.B., Ruppert J.L.W. and Brooks E.J. (2017). Horizontal and vertical movements of Caribbean reef sharks (*Carcharhinus perezi*): Conservation implications of limited migration in a marine sanctuary. *Royal Society Open Science*. doi:10.1098/rsos.160611

- Wilding T.A., Gill A.B., Boon A., Sheehan E., Dauvin J.C., Pezy J.P., O’Beirn F., Janas U., Rostin L. and De Mesel I. (2017). Turning off the DRIP (‘Data-rich, information-poor’)—rationalising monitoring with a focus on marine renewable energy developments and the benthos. *Renewable and Sustainable Energy Reviews*, 74, pp.848-859. doi:10.1016/j.rser.2017.03.013
- Eaton L., Sloman K.A., Wilson R.W., Gill A.B. and Harborne A.R. (2016). Non-consumptive effects of native and invasive predators on juvenile Caribbean parrotfish. *Environmental Biology of Fishes*. 99(5), 499-508. doi:10.1007/s10641-016-0486-9
- Ashe J. L., Feldheim K. A., Fields A. T., Reyier E. A., Brooks E. J., O’Connell M. T., Skomal G., Gruber S. H. and Chapman D. D. (2015). Local population structure and context-dependent isolation by distance in a large coastal shark. *Marine Ecology Progress Series*. 520:203-216.
- Harborne A. R., Talwar B. and Brooks E. J. (2015). The conservation implications of spatial and temporal variability in the diurnal use of Bahamian tidal mangrove creeks by transient predatory fishes. *Aquatic Conservation: Marine and Freshwater Ecosystems*. doi:10.1002/aqc.2538.
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- Côté, I.M., Darling E.S., Malpica-Cruz L., Smith N.S., Green S.J., Curtis-Quick J. and Layman C. (2014). What Doesn’t Kill You Makes You Wary? Effect of Repeated Culling on the Behaviour of an Invasive Predator. *PLoS ONE* 9(4):e94248. doi:10.1371/journal.pone.0094248.
- Shultz, A.D., Zuckerman Z.C., Stewart H.A. and Suski C.D. (2014). Seasonal blood chemistry response of sub-tropical nearshore fishes to climate change. *Conservation Physiology*. 2: 1-12.
- Tamburello, N. and Cote I.M. (2014). Movement ecology of Indo-Pacific lionfish on Caribbean coral reefs and its implications for invasion dynamics. *Biological Invasions*. doi:10.1007/s10530-014-0822-7.
- Thomas C., Auscavitch S., Brooks A. and Stoner A. (2014) Assessing Essential Queen Conch (*Strombus gigas*) Habitat in Eleuthera, The Bahamas: Population Declines Suggest the Urgent Need for Changes in Management. Conference paper: 67th Gulf and Caribbean Fisheries Institute, Christ Church, Barbados
- Green, S.J., Akins J.L., Maljkovic A. and Côté I.M. (2012). Invasive lionfish drive Atlantic coral reef fish declines. *PLoS ONE* 7:3.
- Barbour A.B., Allen M.S., Frazer T.K. and Sherman K.D. (2011). Evaluating the potential efficacy of invasive lionfish (*Pterois volitans*) removals. *PLoS ONE* 6(5).
- Oronti A., Danylchuk A.J., Elmore C.E., Auriemma R and Pesle G. (2011). Assessing the feasibility of sponge aquaculture as a sustainable industry in The Bahamas. *Aquaculture International*. 20: 295-303.
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- Nowell L., Miller S. and Shultz A. (2010). The Cape Eleuthera Institute Flats Ecology and Conservation Program. *Physiology Section Winter 2010 Newsletter: The American Fisheries Society*. 10: 11-13.
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- Danylchuk A.J., Bachand J.M. and Maxey C.B. (2004). The Cape Eleuthera Island School: immersion, involvement, ownership, and legacy as principles to enhance education in marine science and beyond. *Proceedings of the Gulf Caribbean Fisheries Institute*. 57: 984-990.

FEE STATEMENT

Auxiliary Fee

- The auxiliary fee for this course is \$5000.
- This fee includes accommodations and all meals at the Cape Eleuthera Institute, local transportation in the Bahamas, lab access, snorkelling equipment, bike rental, and boat access.
- This fee does not include: course fees, airfare and baggage fees to/from Rock Sound Bahamas, meals while in transit, mandatory travel and health insurance, and personal purchases

Deposit

- The deposit for this course is tentatively \$2500 and is due January 10, 2023 with the remainder due in April, 2023.
- You will be notified by email when it is time to pay.
- In most cases, this deposit is non-refundable. The deposit paid will be credited to the auxiliary fee for the course.

ENVS 3073.03 Ecology and Environmental Issues in the Bahamas Course Application Form

Full Name of traveler (exactly as listed on passport): _____

Country issuing passport: _____ Expiration date (write out month): _____

Home address (as appears on Passport): _____

Birth date: _____ Passport number: _____

Email(s): _____ Phone(s): _____

Why you think you are a suitable candidate for this course? (Tell us a bit about yourself and the reasons you are applying for this course).

What are your expectations and hopes for this experience? _____

What skills might you be able to offer to the group in this field course?

Explain personal concerns regarding the foreign field trip of this course, if you have any.

The Bahamas trip will involve substantial walking on and off trails as well as swimming and snorkeling. Please describe your experience and level of comfort with these activities.

Do you have first aid training? If so, what level? _____

Do you have a swim and/or scuba certification? If so, what level? If not, please describe your ability/comfort in the water.

Please provide the **name**, **email** and **phone** numbers for two referees who can be contacted to submit a reference on your behalf. Referees must not be related to the applicant, and at least one must be an academic reference (i.e. lab instructor, professor). Applicants should make sure their referees are aware that they may be contacted.

Academic Referee: _____

Second Referee: _____