BRIAN STOCK

Northeast Fisheries Science Center
National Marine Fisheries Service
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EDUCATION

2019 Ph.D. Marine Biology, Scripps Institution of Oceanography, UC San Diego

2009 B.S. Mathematical Biology, Harvey Mudd College

EMPLOYMENT

2019 – 2020, NRC Postdoctoral Fellow, Northeast Fisheries Science Center, NOAA Fisheries

2020 – current, Scientist I, Stock Assessment Methods and Model Development, Ocean Associates, Inc.

PUBLICATIONS

Stock BC and Miller TJ. The Woods Hole Assessment Model (WHAM): a general state-space assessment framework that incorporates time- and age-varying processes via random effects and links to environmental covariates. *Fisheries Research*. In press. Pre-print here.

2021 **Stock BC**, Xu H, Miller TJ, Thorson JT, and Nye JA. Implementing two-dimensional autocorrelation in either survival or natural mortality improves a state-space assessment model for Southern New England-Mid Atlantic yellowtail flounder. *Fisheries Research.* https://doi.org/10.1016/j.fishres.2021.105873.

2021 **Stock BC**, Heppell SA, Waterhouse L, Dove IC, Pattengill-Semmens CV, McCoy CM, Bush PG, Ebanks-Petrie G, and Semmens BX. Pulse recruitment and recovery of Cayman Islands Nassau Grouper (*Epinephelus striatus*) spawning aggregations revealed by *in situ* length-frequency data. *ICES Journal of Marine Science*. https://doi.org/10.1093/icesjms/fsaa221.

2020 **Stock BC**, Ward EJ, Eguchi T, Jannot JE, Thorson JT, Feist BE, and Semmens BX. Comparing predictions of fisheries bycatch using multiple spatiotemporal species distribution model frameworks. *Canadian Journal of Fisheries and Aquatic Science* 77(1): 146-163.

2019 **Stock BC**, Ward EJ, Jannot JE, Thorson JT, and Semmens BX. The utility of spatial model-based estimators of unobserved bycatch. *ICES Journal of Marine Science* 76(1): 255-267.

2018 Blake WH, Boeckx P, **Stock BC**, Smith HG, Bodé S, and others. A deconvolutional Bayesian mixing model approach for river basin sediment source apportionment. *Scientific reports* 8(1):13073.

2018 **Stock BC**, Jackson AL, Ward EJ, Parnell AC, Phillips DL, Semmens BX. Analyzing mixing systems using a new generation of Bayesian tracer mixing models. *PeerJ* 6:e5096. https://doi.org/10.7717/peerj.5096

2017 Upadhayay HR, Bodé S, Griepentrog M, Huygens D, Bajracharya RM, Blake WH, Dercon G, Mabit L, Gibbs M, Semmens BX, **Stock BC**, Cornelis W, Boeckx P. Methodological perspectives on the application of compound-specific stable isotope fingerprinting for sediment source apportionment. *Journal of Soils and Sediments* 17(6):1537-1553.

2016 **Stock BC** and Semmens BX. Unifying error structures in commonly used biotracer mixing models. *Ecology* 97(10): 2562-2569. https://doi.org/10.1002/ecy.1517

2016 deVries MS, **Stock BC**, Christy JH, Goldsmith GR, and Dawson TE. Specialized morphology corresponds to a generalist diet: linking form and function in smashing mantis shrimp crustaceans. *Oecologia* 128(2): 429–442.

2010 Lewallen S, Williams TD, Dray A, **Stock BC**, Mathenge W, Oye J, Nkurikiye J, Kimani K, Müller A, and Courtright P. Estimating incidence of vision-reducing cataract in Africa. *Archives of Ophthalmology* 128(12):1584-1589.

PUBLISHED SOFTWARE

2020 Miller TJ and **Stock BC**. The Woods Hole Assessment Model (WHAM), version 1.0. *https://timjmiller.github.io/wham/*

WHAM, an R/TMB package to run state-space age-structured stock assessment models

- Designed to include environmental effects on population processes (recruitment, *M*)
- 2D autocorrelated random effects (recruitment / numbers at age, selectivity, *M*)

2016 **Stock BC** and Semmens BX. MixSIAR GUI User Manual, version 3.1. *https://github.com/brianstock/MixSIAR*

MixSIAR, an R/JAGS package to run Bayesian mixing models:

- Estimates diet—the proportions of source (prey) contributions to a mixture (consumer)
- 28,000+ CRAN downloads and 392 citations as of Jan 2021

CONFERENCE/INVITED PRESENTATIONS (* = MENTORED UNDERGRAD STUDENT)

Stock BC and Miller TJ. The Woods Hole Assessment Model (WHAM): a general state-space assessment framework for time-varying productivity. NOAA National Stock Assessment Science Seminar Series, Jan 2021. https://youtu.be/o8vJvbIaOdE.

*Bender AN, **Stock BC**, Pattengill-Semmens CV, and Semmens BX. Using relative body measurements of Nassau Grouper to predict total length. Poster presented at the Ocean Sciences Meeting, San Diego, CA, Feb 2020.

Stock BC and Miller TJ. The Woods Hole Assessment Model (WHAM): Incorporating environmental covariates into a state-space assessment framework. Presended at the CAPAM workshop on Next Generation General Stock Assessment Models, Wellington, New Zealand, Nov 2019.

Stock BC, Mullen AD, Jaffe JS, Candelmo A, Heppell SA, Pattengill-Semmens CV, McCoy CM, Johnson B, and Semmens BX. 3D advection, diffusion, and mortality of eggs and larvae dispersing from a Nassau Grouper (Epinephelus striatus) spawning aggregation observed with a novel plankton imaging system. Paper presented at the 43rd Annual Larval Fish Conference, Palma de Mallorca, Spain, May 2019.

Stock BC, Ward EJ, and Semmens BX. Can we use random forests for spatiotemporal CPUE modeling? Presented at the CAPAM Spatio-temporal Modelling Workshop, NOAA SWFSC, La Jolla, CA, Mar 2018.

Stock BC, Mullen A, Roberts P, Jaffe JS, Pattengill-Semmens C, McCoy C, and Semmens BX. Mapping fine-scale dispersal of Nassau Grouper (*Epinephelus striatus*) eggs from a spawning aggregation with a novel plankton imaging system. Paper presented at the 70th Annual Gulf and Caribbean Fisheries Institute, Merida, Mexico, Nov 2017.

*Dove IC, **Stock BC**, Waterhouse L, Heppell S, McCoy CM, Pattengill-Semmens C, and Semmens BX. Assessing the recovery of Nassau Grouper via length-frequency analysis from underwater laser caliper video. Poster presented at the 70th Annual Gulf and Caribbean Fisheries Institute, Merida, Mexico, Nov 2017.

Stock BC, Mullen A, Roberts P, Jaffe JS, Pattengill-Semmens C, McCoy C, and Semmens BX. Fine-scale dispersal of eggs from a Nassau grouper (*Epinephelus striatus*) spawning aggregation. Poster presented at the ICES Annual Science Conference, Fort Lauderdale, FL, Sept 2017.

Stock BC, Mullen A, Roberts P, Jaffe JS, Waterhouse L, Pattengill-Semmens C, McCoy C, and Semmens BX. Fine-scale dispersal of eggs from a Nassau grouper (*Epinephelus striatus*) spawning aggregation. Poster presented at the 147th American Fisheries Society Annual Meeting, Tampa, FL, Aug 2017.

Stock BC, Eguchi T, Ward EJ, Jannot JE, Forney E, and Semmens BX. Predicting fisheries bycatch risk for dynamic spatial management. Presented at the National Protected Species Assessment Workshop, NOAA AFSC, Seattle, WA, Jan 2017.

Stock BC, Mullen A, Roberts P, Jaffe JS, Waterhouse L, Pattengill-Semmens C, McCoy C, and Semmens BX. Fine-scale dispersal of eggs from a Nassau grouper (*Epinephelus striatus*) spawning aggregation. Paper presented at the 69th Annual Gulf and Caribbean Fisheries Institute, Grand Cayman, Cayman Islands, Nov 2016.

*Arnold L, **Stock BC**, Waterhouse L, Burton R, McCoy C, Pattengill-Semmens CV, and Semmens BX. Identification of Nassau grouper eggs in the plankton: is size a valid metric? Poster presented at the 69th Annual Gulf and Caribbean Fisheries Institute, Grand Cayman, Cayman Islands, Nov 2016.

*Cohn BC, **Stock BC**, Waterhouse L, Heppell S, Pattengill-Semmens CV, Bush PG, McCoy CM, Johnson BC, and Semmens BX. Using in-situ length data to test a data-poor stock assessment model and assess stock status of protected aggregating fish species *Epinephelus striatus*. Poster presented at the 69th Annual Gulf and Caribbean Fisheries Institute, Grand Cayman, Cayman Islands, Nov 2016.

Candelmo A, Pattengill-Semmens CV, McCoy CM, Waterhouse L, **Stock B**, Sparke T, Semmens BX. Survival of Nassau and tiger grouper early life stages from a Little Cayman spawning aggregation. Poster presented at the 69th Annual Gulf and Caribbean Fisheries Institute, Grand Cayman, Cayman Islands, Nov 2016.

deVries MS, **Stock BC**, and Christy JH. A vicious coral reef predator: morphological specialization broadens the diet of a mantis shrimp. Presented at 13th International Coral Reef Symposium, Honolulu, Hawaii, June 2016.

Blake W, Smith H, Navas A, Bodé S, Goddard R, Kuzyk ZZ, Lennard A, Lobb D, Owens P, Palazon L, Petticrew E, Gaspar L, **Stock B**, Boeckx P, and Semmens B. Application of hierarchical Bayesian unmixing models in river sediment source apportionment. Poster presented at the European Geosciences Union (EGU) General Assembly 2016, Vienna, Austria, April 2016.

Stock BC, Ward EJ, Eguchi T, and Semmens BX. Spatial prediction of fisheries bycatch. Presented at the National Protected Species Toolbox Mini-Symposium, NOAA Science Center, Silver Spring, MD, Nov 2015.

Stock BC, Waterhouse L, Heppell S, Pattengill-Semmens C, Semmens BX, Bush P, and McCoy C. Using *in situ* length data to determine stock status of protected aggregating fish species: a case study of Nassau grouper (*Epinephelus striatus*). Paper presented at the 68th Annual Gulf and Caribbean Fisheries Institute, Panama City, Panama, Nov 2015.

Stock BC, Ward EJ, Eguchi T, Jannot JE, Forney E, and Semmens BX. Predicting bycatch in space: Comparison of different approaches. Paper presented at the 145th American Fisheries Society Annual Meeting, Portland, OR, Aug 2015.

Stock BC, Semmens BX, Ward EJ, Parnell A, Jackson AL, Phillips DL, Bearhop S, and Inger R. Use and abuse of mixing models (MixSIAR). Paper presented at the 100th ESA Annual Convention, Baltimore, MD, Aug 2015.

Stock BC, Semmens BX, Ward EJ, Moore JW, Parnell A, Jackson AL, Phillips DL, Bearhop S, and Inger R. MixSIAR: advanced stable isotope mixing models in R. Paper presented at the 99th ESA Annual Convention, Sacramento, CA, Aug 2014.

Semmens BX, **Stock BC**, Ward EJ, Moore JW, Parnell A, Jackson AL, Phillips DL, Bearhop S, and Inger R. MixSIAR: A Bayesian stable isotope mixing model for characterizing intrapopulation niche variation. Paper presented at the 98th ESA Annual Convention, Minneapolis, CA, Aug 2013.

PATENTS

Butterfield RD, **Stock B**, Strait M, Dudley H, and Rosenthal S. 2010. Model-Based Infusion Site Monitor. WO/2010/129720. Filed May 5, 2010 and issued Nov 11, 2010.

FELLOWSHIPS AND FUNDING

2020 *NOAA Northeast Fisheries & Climate* ($146,239)
2019 *NRC Postdoctoral Fellowship*
2017 *UCSD Frontiers of Innovation Scholars Program* ($25,000)
NSF Graduate Research Internship Program ($5,000)
2014 *NSF Graduate Research Fellowship* ($132,000)
NMFS-Sea Grant Fellowship in Population and Ecosystem Dynamics ($96,249-declined)
Contract with Ocean Associates (NMFS) ($37,617)

WORKSHOPS AND TRAININGS (LED/HOSTED)

2020 *Stock assessments with random effects and environmental covariates*, UMass Dartmouth, Nov 10
2018 *Intro to R for marine ecology*, UC San Diego, Aug 8-10
2017 *Intro to R for marine ecology*, UC San Diego, Aug 1-3
Ecological data analysis, Yelapa, Mexico, Mar 23-Apr 2
Content at: https://github.com/brianstock/StatsClass_public
2015 *Bayesian mixing models (MixSIAR)*, UC San Diego, July 27-31
2014 *The guts of MixSIAR*, Northwest Fisheries Science Center, Seattle, Aug 29

WORKSHOPS AND TRAININGS (ATTENDED)

2018 *Automated Image Analysis (VIAME software)*, SWFSC, La Jolla, Aug 21-23
2017 *Template Model Builder (TMB)*, SWFSC, La Jolla, Oct 10-12
2015 *Decision Analysis in Natural Resource Management*, UW Friday Harbor Lab, Sept 25-30
2014 *Motorboat Operator*, UC San Diego, Dec 4-9
Numerical Computing for Natural Resources, Hatfield Marine Science Center, Sept 26-30
Open Science for Synthesis, NCEAS, Santa Barbara, July 21-Aug 8
2013 *Introduction to Fisheries Stock Assessment*, CAPAM/SIO, Dec 9-13

NMFS RTR: Marine Resources Population Dynamics, Univ. of Florida, June 8-22
Scientific Diver, UC San Diego, Sept 7-20

STUDENT RESEARCH MENTORING

2019	Arona Bender	"Can we generate fish length data from underwater video? A case study of Cayman Islands Nassau Grouper," June-Aug
2018	India Dove	"Evaluating the recovery of Nassau Grouper via length-frequency analysis from underwater laser caliper and stereo video," June-Aug
2017	Kayla Martinez-Soto	"Egg morphometrics and fertilization rates of Nassau Grouper and Tiger Grouper in the Cayman Islands," June-Aug
	India Dove	"Assessing the recovery of Nassau Grouper via length-frequency analysis from underwater laser caliper video," June-Aug
2016	Lauren Arnold	"Plankton near a spawn cloud of Nassau grouper eggs," June-Aug
	Brian Cohn	"Tag counts on a Nassau grouper spawning aggregation," June-Aug
2015	Bethany Fowler	"Passive acoustic monitoring of grouper in the Cayman Islands," June-Aug
	Jarvon Stout	"Fingerprinting fish: Computer-aided pattern matching of the Nassau Grouper (*Epinephelus striatus*)," June-Aug
	Patricia Villalobos	"Length distribution analysis of a Nassau grouper (*Epinephelus striatus)* spawning aggregation in the Cayman Islands," June-Aug

GRADUATE STUDENT MENTORING

2016	Gwendal Le Fol (MAS)	"Finfish bycatch in the California large mesh drift gillnet fishery"
	Daniel Metz (PhD)	Peer mentor program

CLASSROOM TEACHING EXPERIENCE

2017	*Guest Lecturer* (1 lecture), SIO 187: Statistical Methods in Marine Biology
2014	*Guest Lecturer* (2 lectures), SIO 187: Statistical Methods in Marine Biology
2013	*Teaching Assistant*, SIO 187: Statistical Methods in Marine Biology
2010 – 2012	*Secondary Math/Computer Teacher*, U.S. Peace Corps, Uganda

REVIEWER

Applied Ichthyology, Aquaculture Research, Deep Sea Research II, Ecography, Ecological Applications, Fish and Fisheries, Functional Ecology, ICES Journal of Marine Science, Journal of Applied Ecology, Limnology and Oceanography: Methods, Marine Ecology Progress Series, Methods in Ecology and Evolution, Oregon Sea Grant, PLOS One, Scientific Reports

RELEVANT FIELD SKILLS

AAUS Science Diver, 250 dives primarily on:
- Nassau Grouper spawning aggregation, Cayman Islands, 90-100 feet
- Hydrophone array, La Jolla, CA, 45-75 feet

Underwater fish length measurement (diver-operated laser calipers and stereo video)
Plankton sampling (boat- and diver-towed nets, underwater microscopy)
Coastal oceanography (satellite-tracked drifter deployments, CTD casts)
Proficiency in spoken and written Spanish
Extensive international travel experience