



Marie-Christine Rufener

Quantitative Ecologist

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I am a quantitative ecologist with broad experience in statistical modeling and data analysis, all so far applied to the management of natural resources. I have dealt with both spatial and time series data in either data-poor or data-rich contexts, where R-software has been my main programming platform for the past 8 years. As a fast learner and self-taught for many subjects, I am always eager to learn new programming skills and statistical methods to disentangle complex data structures, and hence provide comprehensive and statistically sound insights for objective decision-making.

PROFESSIONAL EXPERIENCE

Jul. 2020-Dec. 2020
(6 m.)

Research Assistant (Graduate level)

Technical University of Denmark (DTU Aqua - Denmark)

Section for Ecosystem based Marine Management

- **Project:** NORDFO (North Sea Resource Distribution and Fishery Opportunities) project
- **Specific tasks:** (i) Data collection of the North Sea fish & fisheries, including cleaning and analysis; (ii) Data collection of environmental data from the North Sea; (iii) Mapping the spatio-temporal distribution of the North Sea fisheries resources through advanced statistical model
- **Project leader:** Francois Bastardie

Mar. 2019-Jun. 2019
(3 m.)

Research Visit

Commonwealth Scientific and Industrial Research Organisation (CSIRO – Australia)

Marine and Atmospheric Research Division

- **Project:** Marine Spatial Planning Tools (MSPTOOLS) with direct contributions to PhD study
- **Specific tasks:** Evaluation of cost-effective fisheries monitoring programs
- **Advisor:** Sean Pascoe
- **Project leaders:** Francois Bastardie & J. Rasmus Nielsen

May 2017
(1 m.)

Research Assistant (Graduate level)

Technical University of Denmark (DTU Aqua - Denmark)

Section for Ecosystem based Marine Management

- **Project:** (i) Marine Spatial Planning Tools (MSPTOOLS) & (ii) Ecosystem Approach to Spatial and Temporal Management of Fisheries and Aquaculture in Coastal Areas (ECOAST)
- **Specific tasks:** Compilation of Danish commercial fisheries data of the western Baltic Sea region
- **Project leaders:** Francois Bastardie & J. Rasmus Nielsen

Oct. 2012-Dec. 2013
(2 ys. 3 m.)

Research Assistant (Undergraduate level)

Federal University of Rio Grande do Norte (UFRN DOL – Brazil)

Laboratory of Fisheries Biology

- **Project:** (i) Study of the demersal fish community along the Rio Grande do Norte basin, (ii) Viability and sustainability of artisanal gillnet fisheries on the north coast of Rio Grande do Norte state, (iii) Fisheries exploration on the east coast of Rio Grande do Norte state: structure, functioning and sustainability
- **Specific tasks:** (i) Processing of biological samples; (ii) Organizing and cleaning fisheries data; (iii) Evaluation of factors driving abundance and distribution of fishery resources through geostatistical methods
- **Project leader:** Marcelo Francisco de Nóbrega

Abr. 2012-Sep. 2012
(6 m.)

Research Assistant (Undergraduate level)

Federal University of Rio Grande do Norte (UFRN DOL – Brazil)

Laboratory of Cephalopods and Benthic organisms

- **Project:** Museum of marine organisms
- **Specific tasks:** (i) Processing of biological samples; (ii) Identification of benthic organisms; (iii) Organize the museum of marine organisms
- **Project leader:** Tatiana Silva Leite

Abr. 2011-Mar. 2012
(1 ys.)

Research Assistant (Undergraduate level)

Federal University of Rio Grande do Norte (UFRN DOL – Brazil)

Laboratory of Coastal Management

- **Project:** Environmental monitoring of the coast of Natal: emphasis on the analysis of physical and chemical parameters and pollution indicators
- **Specific tasks:** (i) Collection of water samples and coastal sediments (ii) Processing of water and coastal sediment samples
- **Project leader:** Maria Cristina B. De Araújo

EDUCATION

2017-2020
(3 ys.)

PhD in Quantitative Ecology

Technical University of Denmark (DTU Aqua - Denmark)

Section for Ecosystem based Marine Management

- **Thesis:** Integrating commercial fisheries and scientific survey data: Advances, new tools and applications to model the fish and fishery dynamics
- **Advisor:** Francois Bastardie
- **Co-advisors:** J. Rasmus Nielsen; Kasper Kristensen

2014-2016
(2 ys.)

MSc in Biological Oceanography

Federal University of Rio Grande (FURG IO – Brazil)

Laboratory of Environmental Statistics

- **Thesis:** Bayesian spatial modelling to predict essential fish habitats of the lane snapper (*Lutjanus synagris*) along the Rio Grande do Norte coast
- **Advisor:** Paul Gerhard Kinas

2010-2013
(4 ys.)

BSc in Biological Sciences

Federal University of Rio Grande do Norte (UFRN DOL – Brazil)

Laboratory of Fisheries Biology

- **Thesis:** Bathymetric distribution of the ichthyofauna from the continental slope of Rio Grande do Norte, Brazil
- **Advisor:** Marcelo Francisco de Nóbrega

TECHNICAL SKILLS

Programming

R		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Python		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Matlab		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
C++		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Linux		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Bash		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Makefile		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
LaTeX		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Go		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
CSS		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>

Statistical Modeling

LR		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
GLM		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
GAM		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
GLVM		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Multivariate analysis*		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
BRTs		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Spatial data analysis**		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Time-series analysis		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>

LR=Linear Regression, GLM=Generalized Linear Model, GAM=Generalized Additive Model, GLVM=Generalized Latent Variable Model, BRT=Boosted Regression Trees

* Includes methods such as: Ordination analysis (nMDS (Non-metric Multidimensional Sclaing), PCA (Principal Component Analysis), RDA (Redundancy Analysis), Canonical Correspondence Analysis (CCA)), Cluster analysis, Multivariate Analysis of (Co)Variance (MANOVA/MANCOVA), Multivariate Generalized Linear Model (MGLM), among ohters.

** Geostatistics, point-process models and aerial models

Version Control

GitHub		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Softwares

QGIS		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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ArcGIS		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Microsoft Excel		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Others

Data collection		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Data management		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Data visualization		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Data mining		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Big data		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Survey design		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Mathematics		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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Statistics		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
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LANGUAGES

- **English** | Understands well; speaks well; reads well; writes well
 - *Professional working proficiency*
- **German*** | Understands well; speaks well; reads well; writes well
 - *Professional working proficiency; Includes fluency in Swiss German*
- **French** | Understands well; speaks well; reads well; writes reasonably
 - *Native or bilingual proficiency*
- **Portuguese** | Understands well; speaks well; reads well; writes well
 - *Native or bilingual proficiency*
- **Spanish** | Understands reasonably; speaks reasonably; reads reasonably; writes reasonably
 - *Limited working proficiency*
- **Danish** | Understands reasonably; speaks reasonably; reads reasonably; writes reasonably
 - *Limited working proficiency*

GRANTS

- Jun. 2017-Jul. 2020 | **PhD Scholarship**, DTU Aqua and EU Research projects funds, Denmark
- Oct. 2019 | **Travel grant for ISEM conference attendance**, Otto Mønsted fund
- Mar. 2019-Jun. 2019 | **Grant to conduct external research stay at CSIRO**, Otto Mønsted fund
- Jul. 2018 | **Travel grant for IIFET conference attendance**, Otto Mønsted fund
- Mar. 2014-Feb. 2016 | **MSc Scholarship**, National Council for Scientific and Technological Development fund, Brazil
- Oct. 2012-Dec. 2013 | **Scientific Initiation Scholarship**, National Council for Scientific and Technological Development fund, Brazil
- Abr. 2012-Sep. 2012 | **Scientific Initiation Scholarship**, National Council for Scientific and Technological Development fund, Brazil
- Abr. 2011-Mar. 2012 | **Scientific Initiation Scholarship**, National Council for Scientific and Technological Development fund, Brazil

RELEVANT COURSES

PhD and MSc courses

- 2019 | **Non-standard model building with TMB** – Technical University of Denmark, Lyngby, Denmark (5 ECTS)
- 2018 | **Mathematical biology** – Technical University of Denmark, Lyngby, Denmark (5 ECTS)
- 2015 | **Advanced techniques for habitat modeling of aquatic organisms through Generalized Additive Models (GAMs)** – Federal University of Rio Grande, Brazil (2 ECTS)
- 2014 | **Probabilistic models in Science and Engineering** – Federal University of Rio Grande, Brazil (2 ECTS)
- 2014 | **Bayesian decision analysis** – Federal University of Rio Grande, Brazil (2 ECTS)
- 2014 | **Experimental statistics** – Federal University of Rio Grande, Brazil (2 ECTS)
- 2014 | **Multivariate statistics** – Federal University of Rio Grande, Brazil (2 ECTS)
- 2014 | **Generalized Linear Models (GLMs)** – Federal University of Rio Grande, Brazil (2 ECTS)

Training courses

- 2017 | **Spatial analysis of ecological using R** – PR Statistics, Glasgow, Scotland (3 ECTS)
- 2017 | **Bayesian network analysis including the sociocultural dimension** – ICES, Copenhagen, Denmark (2 ECTS)
- 2016 | **An introduction to INLA and SPDE** – University of València, València, Spain (30 hs.)

Short courses

- 2015 | **Geostatistics applied to fisheries resources management** – Federal University of Rio Grande do Norte, Natal, Brazil (20 hs.)
- 2015 | **Generalized Additive Models with p-splines** – Estadual University of São Paulo, São Paulo, Brazil (4 hs.)
- 2015 | **Special topics in Multivariate Statistics** – Estadual University of São Paulo, São Paulo, Brazil (4 hs.)
- 2015 | **Unmasking R** – Federal University of Rio Grande, Brazil (12 hs.)
- 2014 | **Carpentry software in Brazil** – Federal University of Rio Grande, Brazil (16hs.)

Note: Only the most relevant courses were listed.

COURSES TAUGHT & TEACHING ASSISTANCE

Courses taught

- **Fisheries data integration: a spatio-temporal SDM framework with the LGNB model**
April 2021 (4hs.)
University of València, Spain
- **Making maps with R software**
May 2015 (2hs.)
Federal University of Rio Grande, Brazil

Teaching assistance

- **Fisheries system – management modelling**
December 2018 (2 days)
Technical University of Denmark, Denmark
Level: Master
- **Ecology**
Feb.-Mar. 2018 (4 days)
Technical University of Denmark, Denmark
Level: Bachelor
- **Statistical inference**
November 2014 (1 day)
Federal University of Rio Grande, Brazil
Level: Bachelor

WORKSHOPS, WORKING GROUPS & RESEARCH GROUPS

Workshops

- 2019 | **3rd Workshop on Marine Spatial Planning Tools (MSPTOOLS)** project – Technical University of Denmark, Lyngby, Denmark
- 2018 | **2nd Workshop on Marine Spatial Planning Tools (MSPTOOLS)** project – University of Washington, Seattle, USA
- 2010 | **Workshop on Biodiversity Education** – Federal University of Rio Grande do Norte, Natal Brazil

Working Groups

- 2018 | **ICES Working Group on Spatial Fisheries Data (WGSFD)** – JNCC, Aberdeen, Scotland

Research Groups

- 2016 - Present | **Statistical Modeling Ecology Group ([SMEG](#))**

PUBLICATIONS

Peer-reviewed

- **Rufener, M.-C.**; Kristensen, K.; Nielsen, J. R.; Bastardie, F. (2021). Bridging the gap between commercial fisheries and survey data to model the spatiotemporal dynamics of marine species. *Ecological Applications*, IN PRESS (doi pending).
- Bastardie, F.; Danto, J.; **Rufener, M.-C.**; van Denderen, P. D.; Eigaard, O. R.; Dinesen, G. E.; Nielsen, J. R. (2020). Reducing fisheries impacts on the seafloor: a bio-economic evaluation of policy strategies for improving sustainability in the Baltic Sea. *Fisheries Research*, 230: 105681. doi: [10.1016/j.fishres.2020.105681](https://doi.org/10.1016/j.fishres.2020.105681)
- Nóbrega, M. F.; Garcia, J.; **Rufener, M.-C.**; Oliveira, J. E. L. (2019). Demersal fishes of the northeast Brazilian continental shelf: Spatial patterns and their temporal variation. *Regional Studies in Marine Science*, 27: 100534. doi: [10.1016/j.rsma.2019.100534](https://doi.org/10.1016/j.rsma.2019.100534)
- Ivanoff, R.; Pennino, M. G.; **Rufener, M.-C.**; Vooren, C. M.; Kinas, P. G. (2019). Modelagem espacial bayesiana para riqueza de elasmobrânquios do extremo sul do Brasil. *CEPSUL- Biodiversidade e Conservação Marinha*, 8: e2019002. doi: [10.37002/revistacepsul.vol8.790e2019002](https://doi.org/10.37002/revistacepsul.vol8.790e2019002) (In portuguese)
- Rezende, G. A*.; **Rufener, M.-C***; Ortega, I.; Ruas, V. M.; Dumont, L. F. C. (2019). Modelling the spatio-temporal bycatch dynamics in an estuarine small-scale shrimp trawl fishery. *Fisheries Research*, 219: 105336. doi: [10.1016/j.fishres.2019.105336](https://doi.org/10.1016/j.fishres.2019.105336)
* Equal authorship
- Ruas, V. M.; **Rufener, M.-C.**; D'Incao, F. (2018). Distribution and abundance of post-larvae and juvenile pink shrimp *Farfantepenaeus paulensis* (Pérez Farfante, 1967) in a subtropical estuary.

Journal of the Marine Biological Association of the United Kingdom, 99(4): 923-932. doi: [10.1017/S0025315418000942](https://doi.org/10.1017/S0025315418000942)

- Pennino, M. G.; **Rufener, M.-C.**; Thomé-Souza, M. J. F.; Carvalho, A. R.; Lopes, P. F. M.; Sumaila, U. R. (2018). Searching for a compromise between biological and economic demands to protect vulnerable habitats. *Scientific Reports*, 8(1): 7791. doi: [10.1038/s41598-018-26130-z](https://doi.org/10.1038/s41598-018-26130-z)
- **Rufener, M.-C.**; Kinas, P. G.; Nóbrega, M. F.; Oliveira, J. E. L. (2017). Bayesian spatial predictive models for data-poor fisheries. *Ecological Modelling*, 348: 125-134. doi: [10.1016/j.ecolmodel.2017.01.022](https://doi.org/10.1016/j.ecolmodel.2017.01.022)
- Belarmino, P. H. P.; Silva, S. M.; **Rufener, M. C.**; Araújo, M. C. B. 2014. Resíduos sólidos em manguezal no rio Potengi (Natal, RN, Brasil): relação com a localização e usos. *Revista de Gestão Costeira Integrada*, 14(3): 447-457. doi: [10.584/rgci451](https://doi.org/10.584/rgci451). (In Portuguese)

Submitted for peer-review

- **Rufener, M.-C.**; Pascoe, S.; Bastardie, F.; Nielsen, J. R. Getting more for less: benchmarking the cost-effectiveness of fishery-dependent and -independent monitoring programs. Under review in *Canadian Journal of Fisheries and Aquatic Sciences*
- **Rufener, M.-C.**; Bastardie, F.; Kristensen, K.; Nielsen, J. R. A spatio-temporal framework for evaluating and minimizing economic and stock impacts of fishing closures – insights from the western Baltic cod fishery. To be submitted.

Conference Proceedings

- Nielsen, J. R.; Pallisgaard, B.; Andersen, M.; Dickey-Collas, M.; Pascoe, S.; Holland, D.; Thébaud, O.; Curtis, H.; Thunberg, E.; Mildenerger, T.; **Rufener, M.-C.**; Nowlis, J.; Yuniarta, S.; Bastardie, F. (2018). Challenges in implementing stock assessment, economic fishery analysis, and risk assessment for sustainable management strategies of data poor stocks. In: The International Institute of Fisheries Economics & Trade (IIFET), 2018, Seattle. Proceedings of the International Institute of Fisheries Economics & Trade (IIFET). ([url](#))

Book chapters

- Oliveira, J. E. L.; **Rufener, M.-C.**; Nóbrega, M. F.; Garcia Junior, J. 2013. Teaching and research in fisheries science: actual and future perspectives. In: Chellappa, S.; Marinho-Sorianno E.; Câmara, M. R.; Amado, A. M. (Eds.). Aquatic Sciences: 50 years of research in Rio Grande do Norte, Brazil, v. 1, pp. 1-210. ([url](#)) (In portuguese)
- Leite, T. S.; **Rufener, M.-C.**; Barbosa, J. C.; Pires, A. R.; Oliveria, R. G. 2013. Molluscs and reef environments in the Rio Grande do Norte State, Brazil. In: Chellappa, S.; Marinho-Sorianno E.; Câmara, M. R.; Amado, A. M. (Eds.). Aquatic Sciences: 50 years of research in Rio Grande do Norte, Brazil, v. 1, pp. 1-210. ([url](#)) (In portuguese)

Technical Reports

- Nielsen, J. R.; **Rufener, M.-C.**; Kristensen, K.; Bastardie, F. (2019). The correlation between spatial distribution of fisheries and resources – integrated spatial and bio-economic fisheries management evaluation (MSPTOOLS). DTU Aqua Report, 55 pp. ([url](#))
- ICES. (2018). Report of the Working Group on Spatial Fisheries Data (WGSFD), 11-15 June 2018, Aberdeen, Scotland, UK. ICES CM 2018/HAPISG:16, 79 pp. ([url](#))

CONFERENCES

- 2019 | **The International Society for Ecological Modelling (ISEM) Global Conference** – Salzburg, Austria
- 2018 | **The International Institute of Fisheries Economics & Trade (IIFET)** – Seattle, USA
- 2015 | **60th Brazilian International Society of Biometry Reunion (RBras)** – Presidente Prudente, Brazil
- 2015 | **21th Brazilian Ichthyology Conference (EBI)** – Recife, Brazil
- 2014 | **21th Probability and Statistics Symposium (SINAPE)** – Natal, Brazil

Talks

- 2019 | **Pooling fishery-dependent and -independent data to model species spatio-temporal dynamics: a framework for data boosting and multiple bias correction**, ISEM
- 2018 | **Coupling commercial fisheries and survey data: a practical solution to boost the amount of information in data-poor context**, IIFET

Posters

- 2015 | **Bayesian estimation for length at first maturity of the Lane Snapper *Lutjanus synagris* (Linnaeus, 1758) in the Rio Grande do Norte coast, Brazil**, RBras
- 2014 | **Characterization of the ichthyofauna captured by bottom gillnets in the Rio Grande do Norte's coast**, EBI

Note: Only relevant conferences, talks and posters were listed.

ADDITIONAL EXPERIENCE

Reviewer of scientific journals

- | | |
|---|---|
| • Fisheries Oceanography
2020-Present
3 reviews | • Journal of Marine Systems
2018-Present
2 reviews |
| • Progress in Oceanography
2018-Present
1 review | • Ecological Modeling
2017-Present
1 review |

* Verified on  **publons**

Tool development

- **Database integration**
Description: Statistical tool to integrate datasets with different sampling designs (opportunistic and survey-based). The main purpose of the tool is to use a wide range of datasets to model more precisely the spatio-temporal abundance dynamics by filtering out the relative bias of each data

source. Tested on fisheries data and possibly applicable to other wildlife populations upon appropriate calibration. ([url](#))

- **Cost-effective sampling**

Description: Statistical tool to evaluate cost-effective sampling designs based on spatio-temporal statistical model and Data Envelopment Analysis (DEA) techniques. Tested on fisheries data collection programs with possible extension to other types of data collection programs. ([url](#))

- **Hotspot persistency**

Description: Statistical tool to evaluate a species' spatial abundance hotspot persistency over time. The application highlights persistent sensitive abundance areas as a means to inform management and conservation solutions. The tool is applicable to wildlife abundance data of any demographic state (juveniles/adults, male/female, etc.). Tested on fish populations, but is applicable to other wildlife populations upon calibration. ([url](#)) (under development)

REFERENCES

- **Francois Bastardie**

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- **J. Rasmus Nielsen**

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- **Paul G. Kinas**

Professor at Federal University of Rio Grande (FURG)

Email: pgkinas@gmail.com ; paulkinas@furg.br