Daniel Vilas

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PROFILE

Research scientist focused on marine ecology, fisheries science, and ecosystem modeling for management applications. My work examines how ecological, climatic, and anthropogenic drivers shape marine populations and food-web dynamics and translates this knowledge into operational tools for fisheries assessment and marine conservation. I develop mechanistic and statistical models that integrate ecological, environmental, and fisheries data to support ecosystem-based management, climate-adaptive decision-making, and sustainable fisheries. Extensive experience working across Europe and the United States in interdisciplinary and policy-relevant research environments.

EDUCATION

PhD in Fisheries and Aquatic Sciences, 2022, University of Florida, Gainesville, FL, USA. *Dissertation*: "*Spatiotemporal ecosystem dynamics on the West Florida Shelf: prediction, validation, and application to red tides*". Advisor: David Chagaris.

MSc *Oceanography and Marine Management*, 2016, University of Barcelona, Barcelona, Spain. *Thesis*: "*Seasonal and spatial variability of fish, cephalopod, and crustacean community in the Northwestern Mediterranean Sea and environmental and anthropogenic relationship*". Advisor: Marta Coll.

BS Biology, 2011, University of Barcelona, Barcelona, Spain.

RESEARCH EXPERIENCE

2024-present

Research Scientist, University of Florida, IFAS Nature Coast Biological Station, Gainesville, FL, USA.

- Operationalized spatiotemporal ecosystem models for management applications on the West Florida Shelf.
- Assessed ecosystem and population-level impacts of red tides to support stock assessment and catch advice for reef fish.
- Integrated ecosystem and climate model outputs to evaluate uncertainty propagation under future scenarios.
- Developed open-source, reproducible R workflows to process satellite, survey, fishing effort, and red tide data for ecosystem modeling.
- Designed models of intermediate complexity that balance ecological realism and computational efficiency for operational use.

2022-2024

Postdoctoral Researcher. University of Washington and NOAA Alaska Fishery Science Center, Seattle, WA, USA.

- Developed and evaluated climate-adaptive multispecies survey designs for the Bering Sea bottom trawl survey.

- Built species distribution models as operating models and applied simulation-based approaches to test alternative survey designs.
- Quantified trade-offs among survey cost, spatial coverage, and abundance estimation under climate-driven range shifts.
- Collaborated with survey scientists, quantitative ecologists, and managers to support adaptive monitoring under climate change.
- Contributed to NOAA data modernization efforts through documented, reproducible modeling workflows.

2019-2022
Research Assistant, University of Florida, IFAS Nature Coast Biological Station, Gainesville, FL, USA.

- Developed and calibrated spatiotemporal ecosystem models of the West Florida Shelf using Ecopath with Ecosim and Ecospace.
- Quantified age-specific red tide mortality for reef fish and linked ecosystem model outputs to operational stock assessment frameworks.
- Applied statistical, machine learning, and spatiotemporal modeling approaches to assess environmental and fishing impacts.
- Designed reproducible workflows for model parameterization, calibration, sensitivity analysis, and validation using high-performance computing.
- Developed an R Shiny application (RedTideVIS) to communicate ecosystem impacts and uncertainty to managers and stakeholders.

2016-2019
Research Assistant, Institute of Marine Sciences, Barcelona, Spain.

- Contributed to ecosystem modeling studies across the Mediterranean, Arctic, and deep-sea systems within European research projects.
- Processed ecological and fisheries data, parameterized ecosystem models, and analyzed simulation outputs.
- Assessed impacts of environmental variability, fishing pressure, and marine protected areas on ecosystem structure and functioning.
- Collaborated with international research teams and contributed to policy-oriented project deliverables.

TECHNICAL SKILLS

Ecosystem and Fisheries Modeling

- Ecosystem-based approaches to fisheries assessment and management.
- Ecopath with Ecosim and Ecospace, food-web and ecosystem models.

Statistical and Spatiotemporal Modeling

- GLM, GAM, delta-GLM, LME.
- Species distribution models, VAST, sdmTMB, INLA.
- Machine learning, random forests, boosted regression trees.

Data and Computational Skills

- R, spatial and temporal data analysis.
- Reproducible workflows, model calibration, and validation.
- Integration of environmental, fisheries, and survey datasets.

Applied Marine Science

- Climate impacts, ecosystem resilience, and uncertainty analysis.

- Survey design, stock assessment support, and decision-support tools.

PUBLICATIONS

Vilas, **D.**, Barnett, L. A. K., Punt, A. E., Oyafuso, Z. S., DeFilippo, L. B., Siple, M. C., Hennessey, S. M., Kotwicki, S. (*in review*). Expanding spatial coverage of survey designs can improve abundance estimation in a warming Arctic. Deep Sea Research II.

Vilas, **D.**, Barnett, L. A. K., Punt, A. E., Oyafuso, Z. S., DeFilippo, L. B., Siple, M. C., Zacher, L. S., Kotwicki, S. (2024). Optimized stratified random surveys best estimate multispecies abundance in a rapidly changing ecosystem. *ICES Journal of Marine Science*, fsae158. https://doi.org/10.1093/icesjms/fsae158

Vilas, **D.**, Buszowski, J., Sagarese, S., Steenbeek, J., Siders, Z., Chagaris, D. (2023). Evaluating red tide effects on the West Florida Shelf using a spatiotemporal ecosystem modeling framework. *Scientific Reports*, 13(1), 2541. https://doi.org/10.1038/s41598-023-29327-z

Vilas, **D.**, Fletcher Jr, R. J., Siders, Z. A., Chagaris, D. (2022). Understanding the temporal dynamics of estimated environmental niche hypervolumes for marine fishes. *Ecology and Evolution*, 12(12), e9604. https://doi.org/10.1002/ece3.9604

Piroddi, C., Coll, M., Macias, D., Steenbeek, J., Garcia-Gorriz, E., Mannini, A., **Vilas**, **D.**, Christensen, V. (2022). Modelling the Mediterranean Sea ecosystem at high spatial resolution to inform the ecosystem-based management in the region. *Scientific Reports*, 12, 19680. https://doi.org/10.1038/s41598-022-18017-x

Vilas, **D.**, Coll, M., Corrales, X., Steenbeek, J., Piroddi, C., Macias, D., Ligas, A., Sartor, P., Claudet, J. (2021). Current and potential contributions of the Gulf of Lion Fisheries Restricted Area to fisheries sustainability in the NW Mediterranean Sea. *Marine Policy*, 123, 104296. https://doi.org/10.1016/j.marpol.2020.104296

Vilas, **D.,** Coll, M., Pedersen, T., Corrales, X., Filbee-Dexter, K., Wernberg, T. (2021). Future trajectories of change for an Arctic deep-sea ecosystem connected to coastal kelp forests. *Restoration Ecology*, e13327. https://doi.org/10.1111/rec.13327

Lloret-Lloret, E., Pennino, M. G., **Vilas**, **D.**, Bellido, J. M., Navarro, J., Coll, M. (2021). Main drivers of seasonal change in biomass distribution of commercial species from the NW Mediterranean Sea. *Marine Environmental Research*, 164, 105227. https://doi.org/10.1016/j.marenvres.2020.105227

Ramirez-Llodra, E., Pedersen, T., Filbee-Dexter, K., Hauquier, F., Guilini, K., Mikkelsen, N., Borgersen, G., Van Gyseghem, M., Vanreusel, A., **Vilas**, **D.** (2021). Community structure of deep fjord and shelf benthic fauna receiving different detrital kelp inputs in northern Norway. *Deep Sea Research Part I: Oceanographic Research Papers*, 168, 103433. https://doi.org/10.1016/j.dsr.2020.103433

Vilas, **D.**, Coll, M., Pedersen, T., Corrales, X., Filbee-Dexter, K., Pedersen, M. F., Norderhaug, K. M., Fredriksen, S., Wernberg, T., Ramírez-Llodra, E. (2020). Kelp-carbon uptake by Arctic deep-sea food webs plays a noticeable role in maintaining ecosystem structural and functional traits. *Journal of Marine Systems*, 203, 103268. https://doi.org/10.1016/j.jmarsys.2019.103268

Vilas, D., Corrales, X., Piroddi, C., Steenbeek, J., Claudet, J., Lloret, J., Calò, A., Di Franco, A., Font, T., Ligas, A., Prato, G., Sahyoun, R., Sartor, P., Guidetti, P., Coll, M. (2020). The effects of marine protected areas on ecosystem recovery and fisheries using a comparative modelling approach. *Aquatic Conservation: Marine Freshwater Ecosystems*, 30. https://doi.org/10.1002/aqc.3368

Corrales, X., **Vilas**, D., Piroddi, C., Steenbeek, J., Claudet, J., Lloret, J., Calò, A., Di Franco, A., Font, T., Ligas, A., Prato, G., Sahyoun, R., Sartor, P., Guidetti, P., Coll, M. (2020). Multi-zone marine protected areas: Assessment of ecosystem and fisheries benefits using multiple ecosystem models. *Ocean & Coastal Management*, 193, 105232. https://doi.org/10.1016/j.ocecoaman.2020.105232

Vilas, **D.**, Pennino, M. G., Bellido, J. M., Navarro, J., Palomera, I., Coll, M. (2020). Seasonality of spatial patterns of abundance, biomass and biodiversity in a demersal community from the NW Mediterranean Sea. *ICES Journal of Marine Science*, 77(2), 567–580. https://doi.org/10.1093/icesjms/fsz197

Lloret, J., Biton-Porsmoguer, S., Carreño, A., Di Franco, A., Sahyoun, R., Melià, P., Claudet, J., Sève, C., Ligas, A., Belharet, M., Calò, A., Carbonara, P., Coll, M., Corrales, X., Lembo, G., Sartor, P., Bitetto, I., **Vilas**, **D.**, Piroddi, C., Prato, G., Charbonnel, E., Bretton, O., Hartmann, V., Prats, L., Font, T. (2020). Recreational and small-scale fisheries may pose a threat to vulnerable species in coastal and offshore waters of the western Mediterranean. *ICES Journal of Marine Science*, fsz071. https://doi.org/10.1093/icesjms/fsz071

PROJECTS

CEMFish. Develop Climate-Ready Ecosystems Models: Climate-Ecosystem Modeling for FISHeries. Project coordinator: Howard Townsend (NOAA, USA). 2024-2026. USA Government.

Operationalizing the West Florida Shelf ecosystem model and application to red tides, stock assessment, and catch advice for Gulf of Mexico reef fish. Project coordinator: David Chagaris (University of Florida, USA). 2024-2029. USA Government.

Combining the eastern Bering Sea shelf and slope surveys. Project coordinator: Lukas DeFilippo (NOAA, USA). North Pacific Research Board. 2023-2024

Adapting monitoring to a changing seascape: increasing the efficiency, flexibility, and continuity of bottom trawl surveys in the Bering Sea and beyond. Project coordinator: Lewis Barnett (NOAA, USA). USA Government. 2022-2024

Ecological Function and Recovery of Biological Communities within Dredged Ridge-Swale Habitats in the South-Atlantic Bight. Project coordinator: Debra Murie (University of Florida, USA). 2020-2024. USA Department of the Interior, Bureau of Ocean Energy Management.

Ecosystem Modeling to Improve Fisheries Management in the Gulf of Mexico. Project coordinator: David Chagaris (University of Florida, USA). 2017-2022. NOAA RESTORE Science Program.

MERCES: Marine Ecosystem Restoration in Changing European Seas. Project coordinator: Roberto Danovaro (Università Politecnica della Marche, Italy). 2016-2020. EU Horizon.

FutureMARES: Climate Change and Future Marine Ecosystem Services and Biodiversity. Project coordinator: Myron Peck (University of Hamburg, Germany). 2020-2024. EU Horizon.

SAFENET: Sustainable Fisheries in EU Mediterranean waters through network of MPAs. Project coordinator: Joachim Claudet (CNRS, France). 2015-2018. EU DGMARE.

KELPEX: Kelp export: fuel for adjacent communities in changing arctic ecosystems. Project coordinator: Eva Ramirez-Llodra (NIVA, Norway). 2016-2018. Government of Norway.

ECOTRANS: Dynamics and ecological role of small pelagic fishes in the Northwestern Mediterranean: Energy transfer from planktonic organisms to top predators. Project coordinator: Isabel Palomera (ICM-CSIC, Spain). 2012-2015. Government of Spain.

OTHER PROFESSIONAL ACTIVITIES

- Member, Gulf Ecosystem Initiative Workgroup (NCEAS), addressing ecological impacts of marine artificial structures on reef fish communities.
- Contributor, ICES WKUSER (Workshop on Unavoidable Survey Effort Reduction).

- Peer reviewer for journals: ICES Journal of Marine Science, Scientific Reports, Marine Policy, Fisheries Research, Oceanologia, Estuarine, Coastal and Shelf Science, Frontiers in Marine Science.
- Reviewer of grants and reports: California Sea Grant, EU Ocean State Report.
- Mentored MSc and PhD students in fisheries science, ecosystem modeling, and applied marine research.

TEACHING AND OTHER RESEARCH EXPERIENCE

- Teaching assistant for courses in ecosystem modeling (Ecopath with Ecosim) and Bayesian species distribution modeling (USA and Spain).
- Laboratory and field training in fisheries biometrics, tagging, otolith and diet analysis, and data processing.
- Science communication and outreach at Nature Coast Biological Station, University of Florida.
- Field and research experience in marine monitoring programs, including cetacean photo-identification (Spain) and sea turtle monitoring (Costa Rica).
- Mentored students in field and lab research techniques.