PAUL CARVALHO

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EDUCATION

PhD *University of Rhode Island,* Kingston, RI. **2020**.
Department of Biological and Environmental Sciences
Advisor: Dr. Austin Humphries
Thesis: "Potential value of gear-based management for coral reef fisheries and conservation."

MS *California Polytechnic State University*, San Luis Obispo, CA. **2016**.
Department of Biological Sciences - graduated with distinction.
Advisor: Dr. Crow White
Thesis: "The effectiveness of periodically-harvested closures in meeting ecological and socioeconomic fisheries objectives."

BS *California Polytechnic State University*, San Luis Obispo, CA. **2014**.
Department of Biological Sciences.
Advisor: Dr. Sean Lema
Thesis: "Molecular responses to acute salinity challenge in the Amargosa pupfish *(Cyprinodon nevadensis amargosae)*."

WORK/RESEARCH EXPERIENCE

2023-Present **Programming Lead**
Pacific States Marine Fisheries Commission, in support of
Fisheries Resource Analysis and Monitoring Division, NOAA Northwest Fisheries Science Center
Led the development of the Fisheries Spatial Economics Toolbox (FishSET) – an R package for running discrete choice models to better understand fisher behavior. Managed code development, prioritized features to develop and issues to address, provided weekly progress reports. Served as primary contact for the FishSET package and gave demo presentations.

2021-2023 **Postdoctoral Scholar**
Biophysical Ecology Team, NOAA Southwest Fisheries Science Center
Institute of Marine Sciences, University of California, Santa Cruz
Data analyst for salmon acoustic telemetry and predator team. Responsible for designing and maintaining a cloud database. Maintained research website with real-time acoustic telemetry data from studies conducted by academic and government organizations.

2020-2023 **Postdoctoral Scholar**
Fisheries Assessment and Modeling Team, NOAA Southwest Fisheries Science Center
Institute of Marine Sciences, University of California, Santa Cruz
Joint postdoc appointment with NOAA and UCSC. Developing a Management Strategy Evaluation (MSE) for Central Valley fall Chinook to evaluate the tradeoffs between hatchery practices, fisheries, water management, and the maintenance of healthy Chinook populations.

2020-2020 **Postdoctoral Fellow**
Department of Fisheries, Animal and Veterinary Sciences, University of Rhode Island

Modeled gear-based fisheries management strategies for Indonesian fisheries and analyzed long-term fisheries-independent trawl data from Narragansett Bay, RI.

2020-2020 **Graduate Research Internship**
Division of Marine Fisheries, Rhode Island Department of Environmental Management
Investigated the impact of daily and weekly aggregate fisheries quotas on total catch and catch rates of black sea bass and summer flounder in Rhode Island.

2012-2014 **Research Technician**
Biology Department, California Polytechnic State University, San Luis Obispo
Worked as a field technician on California Collaborative Fisheries Research Program for monitoring nearshore rockfish populations.

2012-2014 **Research Technician**
Biology Department, California Polytechnic State University, San Luis Obispo
Conducted field and lab experiments on the effectiveness of non-toxic marine coatings for preventing biofouling. Analyzed data and prepared reports for Principal Investigators.

WORKSHOPS AND WORKING GROUPS

2019 National Socio-Environmental Synthesis Center, "Teaching Socio-Environmental Synthesis with Case Studies," Annapolis, Maryland.

2018 United States Agency for International Development (USAID) Indonesia, "Training on scientific communication – essentials of writing scientific articles and research proposals," Bogor, Indonesia.

2017 National Socio-Environmental Synthesis Center, "Graduate student workshop on socio-environmental synthesis," Annapolis, Maryland.

2015 Cal Poly San Luis Obispo / Wildlife Conservation Society, "Periodically-harvested closures in Melanesia," Big Sur, California.

2014 Wildlife Conservation Society, "Vulnerability index of coral reef fishes," Glasgow, Scotland.

PUBLICATIONS

Innes-Gold, A., **Carvalho, P.G.**, Correa-Garcia, S., Marcoux, S., McManus, L., Oleson, K., Stokes, K., and Madin, E. Modeling the interactive effects of sea surface temperature, fishing effort, and spatial closures on reef fish populations. (*in review*)

Shen, E.W., Borbee, E.M., **Carvalho, P.G.**, Setiawan, F., Subhan, B., Madduppa, H., Humphries, A.T., and Lane., C.E. (2024). Preliminary characterization of coral reef diversity using environmental DNA in a hyper-diverse context. *Regional Studies in Marine Science*. https://doi.org/10.1016/j.rsma.2024.103432.

Dimarchopoulou, D., Wibisono, E., Saul, S., **Carvalho, P.G.**, Nugraha, A., Mous, P.J., and Humphries, A.T. (2023). Combining catch-based indicators suggests overexploitation and poor status of Indonesia's deep demersal fish stocks. *Fisheries Research*. https://doi.org/10.1016/j.fishres.2023.106854.

Carvalho, P.G., Satterthwaite, W.H., O'Farrell, M.R., Speir, C., and Palkovacs, E.P. (2023). Role of maturation and mortality in portfolio effects and climate resilience. *Canadian Journal of Fisheries and Aquatic Sciences*. https://doi.org/10.1139/cjfas-2022-0171.

Borbee, E.M., Ayu, I.P., **Carvalho, P.G.**, Restiana, E., Setiawan, F., Subhan, B., Humphries, A.T., Madduppa, H., and Lane, C.E. (2022). Rubble fields shape planktonic protist communities in Indonesia at a local scale. *The Journal of Eukaryotic Microbiology*. https://doi.org/10.1111/jeu.12954.

Jane, S., Smith, K., Baker, D., Koch, A., Cutler, E., and **Carvalho, P.G.** (2022). News media and fisheries-independent data reveal hidden impacts of hurricanes. *Ambio*. https://doi.org/10.1007/s13280-022-01732-0.

Carvalho, P.G. and Humphries, A. (2021). Gear restrictions create conservation and fisheries trade-offs for management. *Fish and Fisheries*. doi:10.1111/faf.12607.

Carvalho, P.G., Setiawan, F., Fahlevy, K., Subhan, B., Madduppa, H., Zhu, G., and Humphries, A (2021). Fishing and habitat condition differentially affect size spectra slopes of coral reef fishes. *Ecological Applications.* doi:10.002/eap.2345.

Gorospe, K.D., **Carvalho, P.G.**, Josephs, L.I., and Humphries, A.T. (2019). Sustainable seafood certification labels: the case for and against Atlantic menhaden. *National Socio-Environmental Synthesis Center's Teaching Socio-Environmental Synthesis with Case Studies*. 43 pp. https://www.sesync.org/sustainable-seafood-certification-labels-the-case-for-and-against-menhaden.

Carvalho, P.G., Jupiter, S.D., Januchowski-Hartley, F.A., Goetze, J., Claudet, J., Weeks, R., Humphries, A. and White, C. (2019). Optimized fishing through periodically-harvested closures. *Journal of Applied Ecology*. doi:10.1111/1365-2664.13417.

Humphries, A.T., Gorospe, K.D., **Carvalho, P.G.**, Yulianto, I., Kartawijaya, T., Campbell, S.J. (2019). Catch composition and selectivity of fishing gears in a multi-species Indonesian coral reef fishery. *Frontiers in Marine Science*. 6:378. doi:10.3389/fmars.2019.00378

Lema, S.C., Washburn, E.H., Crowley, M.E., **Carvalho, P.G.**, and Egelston, J.N. (2019). Evidence for a role of arginine vasotocin (AVT) receptors in the gill during salinity acclimation by a euryhaline teleost fish. *American Journal of Physiology-Regulatory, Integrative and Comparative Physiology*. 316, R735-R750.

Lema, S.C., **Carvalho, P.G.**, Egelston, J.N., Kelly, J.T., and McCormick, S.D. (2018). Dynamics of gene expression responses for ion transport proteins and aquaporins in the gill of a euryhaline pupfish during freshwater and high salinity acclimation. *Physiological and Biochemical Zoology*. 91(6), 1148-1171.

TEACHING AND MENTORING EXPERIENCE

Mentor. Working with undergraduate student at UC Santa Cruz on independent research on Central Valley fall Chinook salmon (Winter 2020).

Guest Lecturer. "The Biodiversity Crisis" NRS330, University of Rhode Island (Fall 2018, 2019).

Teaching Assistant. "Marine Ecology" BIO 457, University of Rhode Island (Spring 2019).

Teaching Assistant. "Principles of Biology II" BIO 104, University of Rhode Island (Spring 2018, 2019).

Mentor. Assisted undergraduate student at the University of Rhode Island with ecological modeling and statistics for coral reef fisheries in Indonesia to fulfill independent research credits (Spring 2017).

Teaching Assistant. "Fisheries Science and Resource Management" BIO/MSCI 439, California Polytechnic State University, San Luis Obispo, Professor Crow White (Spring 2016).

Lab Instructor. "Introduction to Organismal Form and Function" BIO 162, California Polytechnic State University, San Luis Obispo, Professor Emily Taylor (Winter 2015).

Lab Assistant. "Phycology" MSCI 437, California Polytechnic State University, San Luis Obispo, Dr. Lisa Needles (Spring 2013).

PRESENTATIONS

Carvalho, P.G., Haynie, A.C., and Pfeiffer, L., 2024. "FishSET: Fisheries Spatial Economics Toolbox." Marine Socio-Ecological Systems Symposium. Yokohama, Japan.

Carvalho, P.G., Satterthwaite, W., O'Farrell, M., Speir, C., Bellanger, M., and Palkovacs, E., 2023. "Role of maturation and mortality in portfolio effects and climate resilience." 57th American Fisheries Society California-Nevada Chapter Annual Meeting. Long Beach, CA.

Carvalho, P.G., Satterthwaite, W., O'Farrell, M., Speir, C., Bellanger, M., and Palkovacs, E., 2021. "Can restoring age structure buffer Sacramento River fall Chinook populations against increasing climate variability?" 151st American Fisheries Society Annual Meeting. Baltimore, Maryland (virtual attendance).

Carvalho, P.G., Satterthwaite, W., O'Farrell, M., Speir, C., Bellanger, M., and Palkovacs, E., 2021. "Can restoring age structure buffer Sacramento River Chinook salmon against climate variability?" Western Society of Naturalists Meeting. Virtual conference

Carvalho, P.G. and Humphries, A.H. 2017. "The potential for gear-based solutions in coral reef fisheries conservation and management." 24th Coastal and Estuarine Research Federation Conference. Providence, Rhode Island.

Carvalho, P.G., Jupiter, S.D., Januchowski-Hartley, F.A., Goetze, J., Claudet, J., Langlois, T., Weeks, R., and White, C. 2016. "Periodically harvested closures emerge as optimal fisheries management strategies when fish behavior is considered." 35th AAUS Diving for Science Symposium. Narragansett, Rhode Island.

Carvalho, P.G., Jupiter, S.D., Januchowski-Hartley, F.A., Goetze, J., Claudet, J., Weeks, R., and White, C. 2016. "Periodically harvested closures emerge as optimal fisheries management strategies when fish behavior is considered." 13th International Coral Reef Symposium. Honolulu, Hawaii.

Carvalho, P.G., Jupiter, S.D., Januchowski-Hartley, F.A., Goetze, J., Claudet, J., Langlois, T., and White, C. 2015. "Periodically harvested closures: potential optimal fisheries management strategies." 27th International Conference for Conservation Biology. Montpellier, France.

Carvalho, P.G., Januchowski-Hartley, F.A., Jupiter, S.D., and White, C. 2014. "Effectiveness of periodically harvested closures in meeting fisheries and cultural objectives." Western Society of Naturalists. Tacoma, Washington.

Egelston, J.N., **Carvalho, P.G.**, and Lema, S.C. 2013. "Molecular responses to acute salinity challenge in the Amargosa pupfish *(Cyprinodon nevadensis amargosae).*" Cal Poly College of Science Math - Student Research Conference. San Luis Obispo, California.

GRANTS, FELLOWSHIPS AND AWARDS

2020	Fulbright Student Research Award – Philippines*
2019	National Socio-Environmental Synthesis Center (SESYNC) Graduate Research Fellow ($2,000)
2017	The Nature Conservancy, Global Marine Initiative Fellowship Award ($24,000)
2016	Cal Poly State University Graduate Presentation Award ($500)
2015	National Science Foundation Graduate Research Fellowship Award (~$180,000)
2014	Cal Poly State University Graduate Presentation Award ($500)
2014	California State University Grant ($6,700)
2014	Tenera Environmental Inc. Scholarship ($600)

SOCIETY MEMBERSHIP

American Association for the Advancement of Science
American Academy of Underwater Sciences
American Society of Naturalist
Central Coast Biology Society
Coastal and Estuarine Research Federation
International Society for Reef Studies
Society for Conservation Biology
Western Society of Naturalist

ADDITIONAL EXPERIENCE, KNOWLEDGE, AND SKILLS

- Reviewer for *Ambio, Journal of Applied Ecology, Coral Reefs, Theoretical Ecology, and Ecological Modelling*
- Proficient at a variety of programming languages: R, Matlab, SQL, Python, some Java and C.
- Volunteer for Science and Math Investigative Learning Experiences (SMILE) program at the University of Rhode Island, teaching marine biology to fourth grader students.
- Volunteer for Cal Poly Pier Open House – public outreach to share biological sciences with the community.

* Declined the award due to COVID

REFERENCES

Austin Humphries, PhD
Associate Professor
University of Rhode Island
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Will Satterthwaite, PhD
Research Ecologist
Fisheries Ecology Division
National Oceanic and Atmospheric Administration
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Fisheries Resource Analysis and Monitoring Division
National Oceanic and Atmospheric Administration
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