MAURICE GOODMAN

Marine Ecology & Biogeography

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Maurice-Goodman

SUMMARY

As a Research Scientist with the UW Punt lab and NOAA Alaska Fisheries Science Center, my work uses a variety of statistical and computational approaches to examine climate impacts on population and predator-prey dynamics in coastal marine systems to inform conservation and fisheries management. Prior to my current role, I earned my PhD at Stanford's Hopkins Marine Station and worked as a data analyst and field technician for community ecology and behavioral ecology labs at Cal Poly, San Luis Obispo. I'm also passionate about teaching, community outreach and engagement, and open science practices.

EDUCATION

2024 **PhD, Biology** — **Stanford University**
Committee: Giulio De Leo, Fiorenza Micheli, Elliott Hazen, Stephanie Brodie, Barnabas Daru

2017 **BS, Biological Sciences, Cum Laude** — **California Polytechnic State University SLO**
Concentration in Marine Biology, Minor in Statistics

PUBLICATIONS

In Review **Goodman, M.C.** et al. *Market-driven declines in reef shark abundance on remote central-Pacific atolls highlight challenges to shark conservation in an era of globalization.* Marine Ecology Progress Series

In Review **Goodman, M.C.** et al. *Spatial responses to pH, oxygen, and an oceanographic index increase the extent of projected range shifts in the Bering Sea.* Fish and Fisheries

In Review Kumagai, J., **Goodman, M.C.**, et al. *Trophic cascades in marine protected areas promote resilience of kelp forests to marine heatwaves.* Global Change Biology

In Press Gissi, E., **Goodman, M.C.**, et al. *Sex-based species interactions matter in ecological communities.* Trends in Ecology and Evolution

In Press Rempel, H.S. et al. *Ecological drivers of parrotfish coral predation vary across spatial scales.* Marine Ecology Progress Series

2023 Faiad, S.M., Williams, M.A., **Goodman, M.**, et al. *Temperature affects predation of schistosome-competent snails by a novel invader, the marbled crayfish Procambarus virginalis.* PLoS One, 18(9). doi.org/10.1371/journal.pone.0290615

2022 Andrzejaczek, S., Lucas, T., **Goodman, M.**, et al. *Diving into the vertical dimension of elasmobranch movement ecology.* Science Advances, 8(33). doi.org/10.1126/sciadv.abo1754

2022 **Goodman, M.C.** et al. *Shifting fish distributions impact predation intensity in a sub-Arctic ecosystem.* Ecography, doi.org/10.1111/ecog.06084

2022 McCalla, L.B. et al. *Effectiveness of a Constructed Wetland with Carbon Filtration in Reducing Pesticides Associated with Agricultural Runoff.* Archives of Environmental Contamination and Toxicology, doi.org/10.1007/s00244-021-00909-0

2021 O'Leary, J.K., **Goodman, M.C.**, Walter, R.K., Willits, K., Pondella, D.J., & Stephens, J. *Effects of Estuary-Wide Seagrass Loss on Fish Populations.* Estuaries and Coasts, doi.org/10.1007/s12237-021-00917-2

2020 O'Leary, J.K., **Goodman, M.**, Tuda, A., Machumu, M., & West, L. *Opportunities and challenges in achieving co-management in marine protected areas in East Africa: a comparative case study.* Journal of the Indian Ocean Region, 16(3). doi.org/10.1080/19480881.2020.1825201

2019 Hart, L., **Goodman, M.C.**, Walter, R.K., Rogers-Bennett, L., Shum, P., Garrett, A.D., Watanabe, J.M., & O'Leary, J.K. *Abalone recruitment in low-density and aggregated populations facing climatic stress.* Journal of Shellfish Research, 39(2), 359-373. doi.org/10.2983/035.039.0218

2019 **Goodman, M.C.**, Hannah, S.M., & Ruttenberg, B.I. *The relationship between geographic range extent, sea surface temperature, and adult traits in coastal temperate fishes.* Journal of Biogeography, 46(7), 1438-1450. doi.org/10.1111/jbi.13595

OTHER RESEARCH WORKS

Book Chapter O'Leary, J.K., Bockman, E.E., **Goodman, M.**, Grimsditch, G., Madej, M.A., Mohammed, A., & Tyburczy, J. (2024). *Conserving and Managing Estuaries during Climate Change. In Book: Climate Change and Estuaries.* doi.org/10.1201/9781003126096

Manuscript Lippert, M., **Goodman, M.C.**, Adams, N. (2021). *Comparative effects of Chemical and Physical Sunscreen on Fertilization of Purple Sea Urchins (Strongylocentrotus purpuratus).* Cal Poly Digital Commons, digitalcommons.calpoly.edu/biosp/44

Technical Report O'Leary, J.K., Tuda, A., Machumu, M., Nyunja, J., & **Goodman, M.C.** (2017). *Technical report to the Western Indian Ocean Marine Science Association. Developing a model for strategic adaptive management of MPAs in the Western Indian Ocean.* 34 pp.

PROFESSIONAL EXPERIENCE

2022-2024 **Independent Contractor** — **NOAA AFSC / University of Washington**
Built species distribution models for a suite of Eastern Bering Sea groundfish and crab species as part of the Alaska Integrated Climate Modeling (ACLIM) project. Produced species range and spatial overlap projections under multiple earth systems models. Created an R "Shiny" based web app for navigating outputs (mgoodman.shinyapps.io/aclim2_sdms_explorer). Partial research outputs are in review at Fish and Fisheries.

2022 **Independent Contractor** — **Granite Canyon Marine Labs**
Analyzed data from experiments aimed at reducing wetland agricultural runoff. Produced figures and contributed to writing of peer-reviewed manuscript summarizing results.

2017-2018 **Data Analyst & Field Technician** — **California Sea Grant**
Responsible for the analysis, management, and visualization of ecological and social data from Tanzania, Kenya, and Morro Bay, California in the lab of Dr. Jennifer O'Leary. Assisted with writing reports and manuscripts. Full-time.

2016-2018 Summer **Research & Dive Technician** — **Cal Poly SLO**
Worked alongside Dr. Ben Ruttenberg to conduct benthic surveys and fish follows on SCUBA to characterize coral community and document parrotfish feeding behavior in St. Croix, USVI. Responsible for entering and managing photo, video, and GPS data, and for gear and boat maintenance. Seasonal.

2016, 2018 **Aquarist** — **Central Coast Aquarium**
Assisted in managing, training and mentoring volunteers and interns in the husbandry department. Maintained all tanks and systems, collected and acclimated new animals, curated exhibits, and regularly monitored water quality. Part-Time.

TEACHING EXPERIENCE

2022, 2024 **Instructor** — **BIO / OCEANS 143: Quantitative Ecology**
Developed and taught 3 weeks of labs and lectures based on material I designed for the previous years' course (see below), focusing on frequentist parameter estimation and species distribution modeling. Assisted students with labs and assignments and graded student submissions.

2021 **Co-Instructor** — **BIOS 207: Software Engineering for Science**
Co-developed materials for teaching software development concepts (code documentation, version control, modular programming, testing and validation) for "Just Enough Software Engineering for Science" short course. Led discussions, assisted students with programming challenges, and evaluated student assignments.

2021 **Teaching Assistant** **BIOHOPK 143H: Quantitative Ecology**
Designed and taught 3 weeks of labs and lectures on parameter estimation for nonlinear and dynamic models using frequentist and Bayesian principles, as well as species distribution modeling with GAMs (github.com/mcgoodman/quant-eco-2021). Assisted students in learning material taught by other course instructors, held weekly office hours, and assisted students in designing and executing final projects. Awarded Stanford School of Humanities and Science's "Centennial" Teaching Award and Stanford Biology's "Excellence in Teaching" Award.

2019 **Teaching Assistant** **BIO 85: Evolution**
Co-developed lesson plans, teaching materials, homework assignments and tests. Led a section where students reviewed and reinforced material from lecture, held weekly office hours, and graded student assignments. Awarded Stanford Biology departments "Excellence in Teaching" Award.

2017 **Teaching Assistant** **ZOO 336: Invertebrate Zoology**
Prepared lab specimens and activities for class, collected new specimens, demonstrated lab methods and dissections to students, and assisted students with lab and field activities.

OUTREACH, LEADERSHIP, & SERVICE

2022 - 2023 **President** **Hopkins Marine Station Graduate Student Association**
Engaged the graduate student community in multiple community-building initiatives, including organizing inclusivity trainings, social events, and graduate student retreats, representing grad students to Dean and Hopkins faculty and administrative and DEI meetings, and obtaining funds to renovate grad student work & social spaces. Previously served as webmaster for graduate student association (Fall 2019 - Summer 2021).

2020-2022 **Student Liaison** **MARINE**
Served for two academic years as Hopkins Marine Station's liaison for Monterey Area Research Institutions' Network for Education (MARINE), an organization of marine science students and early career researchers from seven academic institutions in the Monterey Bay area. Planned networking, social, and community service events.

2016-2017 **Founder & Vice President** **Cal Poly Marine Science Club**
Founded and co-lead the Cal Poly Marine Science Club. Organized, planned, and lead events and meetings; managed social media and outreach.

2014-2018 **Husbandry & Outreach Volunteer** **Central Coast Aquarium (Non-Profit)**
Assisted with husbandry tasks such as maintenance of tanks, acclimation of fishes, treatment of diseased fishes, curation of exhibits, preparation of diets, and training of new volunteers. Frequently gave talks and tours to the public, taught grade school programs, and participated in outreach and fund raising. **Over 800 hours volunteered.**

FELLOWSHIPS, HONORS, & AWARDS

2022-2024 **Graduate Scholar** 50% Tuition & Salary support **Stanford Data Science**

2022 **Research Grant** $6,500 **Friends of Hopkins Marine Station**

2022 **Research Grant** $1,800 **Myers Oceanographic & Marine Biology Trust**

2021 **Excellence in Teaching Award** **Stanford Department of Biology**

2021 **Centennial Teaching Award** **Stanford School of Humanities & Sciences**

2019-2023 **Graduate Research Fellowship** Tuition & Salary Support **National Science Foundation**

2014-2016 **President's List** **Cal Poly College of Science & Mathematics**

2016 **Summer Research Scholarship** $2,500 **William & Linda Frost Foundation, Cal Poly SLO**

2016 **Undergraduate Research Grant** $500 **CSU COAST**

INVITED PRESENTATIONS

2024 Incorporating local responses to regional change into Bering Sea range projections. Lowell Wakefield Fisheries Symposium. **Talk**

CONTRIBUTED PRESENTATIONS

2024 Ecological impacts of climate-driven species range shifts: Inference from multiple methods in the Bering Sea. Stanford Sustainability Data Science. **Talk**

2024 Climate Impacts on Predator-Prey Interactions: implications for Bering Sea fisheries. Stanford Resilient Pacific. **Talk**

2024 Forecasting predator-prey overlap for climate-ready fisheries management in the Bering Sea. World Fisheries Congress. **Talk**

2023 Forecasting predator-prey overlap for climate-ready fisheries management in the Bering Sea. Western Society of Naturalists. **Talk**

2023 Shifting fish distributions impact predator-prey interactions in the Eastern Bering sea. Alaska Marine Science Symposium. **Talk**

2023 Global shark fin demand, small-scale fisheries, and reef sharks: A case study in the Northern Line Islands. Stanford Data Science Conference. **Talk**

2022 Shifting fish distributions impact predation intensity in a sub-Arctic ecosystem. Ocean Sciences Meeting. **Talk**

2021 International market demand drives a small-scale Central Pacific reef shark fishery towards collapse. Western Society of Naturalists. **Talk**

2020 Ecological consequences of climate induced changes in spatial overlap between Eastern Bering Sea walleye pollock and their predators. Western Society of Naturalists. **Talk**

2017 The Relationship Between Geographic Range Extent and Adult Traits in Coastal Temperate Fishes. Western Society of Naturalists. **Talk**

2017 The Relationship Between Geographic Range Extent and Adult Traits in Coastal Temperate Fishes. Cal Poly Annual Student Research Symposium. **Talk**

2017 Long–Term Monitoring of Sea Urchin Settlement Along the California Coast. Cal Poly Annual Student Research Symposium. **Poster**

2017 The Relationship Between Geographic Range Extent and Adult Traits in Coastal Temperate Fishes. Central Coast Wildlife Society Annual Wildlife Symposium. **Talk**

2016 The Relationship Between Geographic Range Extent and Adult Traits in Coastal Temperate Fishes. Western Society of Naturalists. **Poster**

FIELD RESEARCH

2023 **NOAA Alaska Fisheries Science Center** **Bering Sea Bottom Trawl Survey**
Volunteered on a three week survey leg sorting, sexing, and lengthing specimens as part of the annual Eastern Bering Sea bottom trawl survey which collects data needed for stock assessments and other management models. Lead stomach collection for food habits analysis.

2019-2023 **Stanford Hopkins Marine Station** **Various Projects**
Palumbi lab: Assisted on field projects in Palau (collecting corals and running heat stress experiments, transplanting corals for common garden experiments) and the California central coast (collecting samples via boat on SCUBA, processing samples). **Other:** Various dives to conduct kelp forest ecological surveys and deploy instrumentation for graduate student projects.

2014-2018 **Cal Poly San Luis Obispo** **Ruttenberg & O'Leary Labs**
Ruttenberg lab: Collection of coral reef ecological survey data via SCUBA (see Work Experience section), and surveys of Pismo Clam populations on California coastal beaches from Port San Luis to San Diego. **O'Leary lab:** Monthly collection of cobbles via SCUBA for monitoring recruitment of abalone, surveys of eelgrass and associated fish communities via beach seines and monitoring of permanent plots.

SCUBA Experience & Certifications

AAUS Scientific Diver, 60 ft **2015 - Present**
PADI Divemaster Now Inactive **2017 - Present**
DAN Diving First Aid for Professional Divers **2015 - Present**
400+ Total Dives **200+** Scientific Dives

MENTORSHIP

2019, 2022 **REEFS Undergraduate Internship** **Stanford University**
2022: Mentored two undergraduate students in building out a control system for conducting multiple stressor experiments in aquaria, developing protocols as part of a pilot study, and analyzing data. Students prepared and presented poster to researchers and other students at Hopkins. **2019:** Mentored an undergraduate student in applying machine learning and statistical approaches to model harmful algal bloom incidence in California.

2016-2018 **Undergraduate research mentor** **Cal Poly SLO**
Established and led a biweekly sea urchin recruitment monitoring program at Port San Luis as part of the larger Santa Barbara Coastal LTER project. Trained several undergraduates in deploying collection media and sorting and identifying specimens.

TECHNICAL SKILLS

Scientific Computing

R, R Markdown, & RStudio, Stan, GIS (QGIS, R sf & stars packages), git & github

Statistical Methodology

Bayesian and frequentist linear, nonlinear, and dynamical models; hierarchical, time-series, and spatial models; R statistics packages (rstan, brms, mgcv, glmmTMB, nlme, lme4, VAST, etc.)

Software Development

R Shiny web apps

ACLIM2 SDMs explorer: mgoodman.shinyapps.io/aclim2_sdms_explorer
Probability distributions lab: mgoodman.shinyapps.io/distributions-lab

Reproducible Scientific Code Repositories

Faiad et al. 2023: github.com/wood-lab/Faiad_et_al_2023_PLoS_One
Goodman et al. 2022: github.com/mcgoodman/Goodman-et-al_2022_Ecography
Andrzejaczek et al. 2022: github.com/mcgoodman/shark-vertical-overlap
O'Leary et al. 2020: github.com/mcgoodman/OLeary-et-al_2020_ESCO

R Packages

geomViolinDiscrete: github.com/mcgoodman/geomViolinDiscrete

SCHOLARLY REVIEWS

2024 Progress in Oceanography, NOAA Internal Review (2)

2023 Fisheries Research, Marine Ecology Progress Series, PLoS One

2022 Progress in Oceanography, Animal Biotelemetry, NOAA Internal Review

2021 ICES Journal of Marine Science