



Student Scholarship Internship Opportunity (SSIO) Online System

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SSIO 2022 Internship Opportunity Position

Internship Information

Project title: EPP CSC student: Spatial modeling of diets, predation, and the pelagic food web of the California Current

NOAA mission goal: Healthy Oceans

Hypothesis or objectives: In the California Current, modeling of marine food web dynamics has lacked a comprehensive species diet database of the type available for other US regions. Previous California Current diet syntheses primarily relied on literature reports rather than information at the level of individual predator stomachs or scats (see Szobosolai et al. 2015, Wippel et al. 2017). Recently however, as part of the Atlantis ecosystem modeling, our team at NWFSC has been exploring a new diet database, with thousands of predator diets, including fish, sharks, and pinnipeds. Uses of this include identifying predators most dependent on forage fish, understanding how diets shift over space and time, and quantifying which predators exert the strongest top-down mortality on forage stocks.

Key questions this summer for our small team will be

1) Can Atlantis ecosystem model projections recreate spatio-temporal diets from the database?

2) What perspective is gained by this new full representation of the diets, versus older more aggregated diet syntheses (e.g. indices of prey importance reported in Koehn et al. 2016)? In particular, we will focus on diet dependencies of pelagic predators, including variation over time (1990-present) and over regimes of sardine and anchovy abundance.

3) How pivotal are forage species such as anchovy and sardine, if we accurately account for diet and energetic contributions of the full range of prey items in the region, as well as diet switching over time and space (e.g. Brodeur et al. 2014)? One way to depict this is via revisiting Figure 5 in Koehn et al. (2016), which portrays forage species in terms of the SURF index of Plaganyi and Essington (2014) and proportion of consumer biomass. How does this vary over years?

The internship will focus on the diet analyses (questions # 2 and #3 above), though the intern will gain some experience running Atlantis ecosystem model projections as well. We also aim to supplement the Atlantis modeling experience with Ecopath food web modeling, focusing on pelagic predators such as larger highly migratory fish and sharks. This will involve collaboration with NOAA Southwest Fisheries Science Center and UC Santa Cruz researchers, to support Ecopath (static modeling), Ecosim (dynamic modeling), and EcoOcean (spatial modeling of Coll et al. 2020).

Academic status: Graduate

Estimated start - end date: May 2022 - August 2022

Duration: 3 months

Area(s) of discipline: Ecology

Internship location: Seattle, WA

Duties and responsibilities: The intern will lead analyses in the R programming language and other programming and database languages to:

- 1) Estimate diet dependencies of pelagic predators, including variation over time (1990-present) and over regimes of sardine and anchovy abundance.
- 2) Identify the importance of forage species such as anchovy and sardine, over time and space.
- 3) Collaborate on food web modeling using the Atlantis ecosystem modeling software and the Ecopath food web modeling package.

Special skills/training required: We seek motivated graduate students in oceanography, marine science, or environmental science with an interest in marine ecological research and computer modeling. Previous experience with computer programming languages such as R, Python, Matlab, or C++ is preferred.

Graduate Students in the NERTO program are welcome to apply for this internship.

Expected outcomes: The Scholar's analyses will be used by our team to inform the Atlantis and Ecopath end-to-end ecosystem models in the California Current. This work is part the "Future Seas" project focusing on pelagic fish and climate change, and will also support the "Groundfish, Climate Change and Communities in the California Current" project based at NOAA NWFSC.

The internship is a chance to learn technical skills and support priority research within larger projects. Motivated interns may have the opportunity to develop research papers but this is not the primary goal of the internship.

Guidance and supervision: Our research team is based at NOAA's Northwest Fisheries Science Center, in Seattle, Washington. We primarily develop multispecies, spatially-explicit ecosystem simulation models to improve management of marine systems. We are part of a broader Integrative Marine Ecology Team, within an Ecosystem Science Program. Our project also includes participants from NOAA SWFSC and UC Santa Cruz.

Isaac Kaplan (NOAA NWFSC) and Pierre-Yves Hervann (NWFSC/UCSC) look forward to providing the student Scholar with technical guidance, growth opportunities in ocean and ecosystem modeling, and assistance with documenting and presenting the scientific results. We hope to guide student Scholars toward careers related to the research.

Application package: Resume
Cover letter

Posted or modified date/time: Monday, December 27, 2021 - 5:10:00 PM

Internship Travel Information

Purpose (student's role): ---

Mode of transportation: ---

Date(s): ---

Destination: ---

Estimated cost: ---

Source of funding: ---

Mentors Contact Information

Name: Isaac, Kaplan

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Co-Mentor name: Pierre-Yves Hervann And Nerea Lezama Ochoa

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Agency or organization: University of California Santa Cruz/
NOAA Fisheries Affiliates



Admin Approval Information

Comments: Accepted for a minimum 3-month EPP/MSI NERTO internship and will require: a workplan developed by CSC and NOAA mentor also reflecting the substantial engagement with NOAA mentor; and, NOAA-aligned professional development. Queries are sent to: oed.epp10@noaa.gov.

Initials: AT

Approval date/time: 12/28/2021 9:34:17 AM

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