



NOAA 'Omics Strategy Report, FY24 Q4

provided to the NOAA Science Council by the NOAA Omics Working Group

People

- **NOAA 'Omics Workforce Enhancement.** NOAA achieved a major milestone in implementing the [NOAA 'Omics Strategic Plan](#) by onboarding over ten staff across NOAA Research Laboratories, NMFS Science Centers, and NOAA Cooperative Institutes during fiscal year 2024. Team members are advancing 'omics research and data delivery across an array of priority applications. Recent additions include:

- To aid NOAA Fisheries 'omics efforts, Meghan Parsley (NWFSC), Joanna Griffiths (NWFSC), and Reid Brennan (SEFSC) were recently onboarded through support of the Inflation Reduction Act (IRA).



Figure 1: NOAA 'Omics welcomes Meghan Parsley, Joanna Griffiths, Reid Brenna

- The AOML Coral Program

recently hired two postdocs supporting 'omics projects. Dr. Ashley Rossin joins the team



Figure 2: From left to right, Ashley Rossin & Brad Weiler.

from Louisiana State University, where she developed quantitative analyses in coral disease and reproductive histology. At NOAA, she will apply these skills to develop disease diagnostic tools and to evaluate the fecundity and resilience of corals from urbanized habitats in the Port of Miami. Dr. Brad Weiler hails from the University of Miami's Rosenstiel School, where he applied multi-'omics pipelines to the study of

coral diseases and their etiologic agents. With the Coral Program, he will work on a set of >500 samples collected from eight distinct coral diseases to identify potential pathogens and coral immune responses.

- The Cooperative Institute for Great Lakes Research continued its training of the next generation of 'omics researchers through weekly workshops and one-on-one mentoring of 4 postdocs, 6 PhD students, 5 MS students, 5 undergraduate students, 1 high school student, and 3 staff.

Projects

- **Genomic Study Confirms Appropriateness of Current Management Boundaries for Sablefish.**

A new study [finds](#) that there is no detectable genetic structure in the northern range of sablefish. The impact on Alaskan fisheries in confirming a single population for this valuable commercial species was highlighted in a [local Juneau news outlet](#). This [study](#), led by scientists at the Alaska Fisheries Science Center in collaboration with the Northwest Fisheries Science Center, is one of the first to use low-coverage whole genome resequencing to assess population structure and management boundaries in marine fish.



Figure 3: Release of a juvenile sablefish after tagging. Photo credit: NOAA Fisheries/Kari

- **Genetic Tools Show Promise for Detecting Harmful Algal Blooms in Alaska.** Scientists at the Alaska Fisheries Science Center explored multiple tools for detecting HABs and [found](#) that [eDNA represents a potential improvement](#) over currently available methods in terms of precision and speed.
- **Integrative Study Leverages ‘Omics to Suggest Suspended Sediments on Threatened Coral Larvae.** [A recent study](#) found significantly lower survival and settlement of coral larvae, and ultimately reduced reproductive success, when exposed to suspended sediments from recently dredged areas. This [work](#), led by scientists at the Cooperative Institute for Marine and Atmospheric Sciences, NOAA’s Atlantic Oceanographic and Meteorological Laboratory, and the National Marine Fisheries Service Habitat Conservation Division, found that sediments collected near the Port of Miami also contained different microbial communities than reef sediments, and higher relative abundances of the bacteria *Desulfobacterales*, which has been associated with coral disease.
- **Whole Genome Sequencing of Alaskan Oyster Pathogens.** National Centers for Coastal Ocean Science (NCCOS) scientists at the Cooperative Oxford Laboratory finished whole genome sequencing of *Vibrio* isolated from Alaskan oysters in 2018 and 2022 and are depositing the data to NCBI and FDA's GenomeTrakr database, demonstrating NOAA’s commitment to FAIR data principles. Genetic analysis of *Vibrio* is important for understanding pathogenicity and geographic distribution of virulent strains.

Partnerships

- **‘Omics Partnership Refines Epigenetic Approach for Fish Age.** NOAA’s Northeast Fisheries Science Center (NEFSC) is partnering with the Gloucester Marine Genomics Institute (GMGI) to refine an epigenetic approach to age fish using haddock as a model species. This work represents an important milestone toward providing fish age via molecular methods to serve fisheries stock assessments. A preliminary test of a training dataset with wild-caught haddock explained about 80% of the variation in DNA methylation rates using only 18 loci. Continued work will test whether this high predictive value can be replicated and explore the

functionality of these loci to determine if this epigenetic aging model can be applied to other fishes.

- **'Omics Technical Team Workshop.** The first in-person meeting of the Southeast Fisheries Science Center (SEFSC) 'Omics Tech Team was held at the Pascagoula, MS lab July 30-31, 2024. Over 20 scientists from SEFSC, along with partners from AOML, the National Seafood Inspection Laboratory (NSIL), and Texas A&M Corpus Christi, were brought together to learn more about ongoing and planned 'omics projects at the Center and to identify potential collaborations moving forward. A report regarding the current and future status of 'omics research in the southeast will be drafted and presented to the SEFSC Directorate.



Figure 4: Nicole Vollmer of NMFS presenting on ways 'omics tools can be used in population-level research at the SEFSC 'Omics Technical Team workshop.

- **First Steps to Creating HAB Forecasting for the Kodiak Archipelago.** NCCOS scientists at the Beaufort Laboratory have been conducting [field work including eDNA sample collection](#) as part of the first steps in creating a harmful algal bloom forecast for the Kodiak Archipelago in Alaska. Species-specific qPCR will be used to assess abundance and distribution patterns of the toxic dinoflagellate *Alexandrium catenella*. This project draws on foundational partnerships with several Tribal organizations within the Kodiak region.
- **Support Received to Develop 25-Year Time Series of Zooplankton.** The Pacific Environmental Marine Laboratory is actively coordinating with CalCOFI to use quantitative eDNA approaches to generate a 25-year time series of zooplankton assemblages in the southern California Current. By analyzing this time series alongside high-resolution ecosystem modeling, the aim is to identify key indicator species that respond to eutrophication and ocean warming and develop a coastal pelagic ecosystem health index. This resource will improve understanding of environmental and human-induced drivers of coastal productivity and support decision-making regarding nutrient management, sustainable fisheries, and protected species in the region.

Administrative Priorities

- **NOAA 'Omics Catalyzes Research Transitions.** Transitions were completed for four out of five modules of a fully signed umbrella transition plan that is focused on autonomous 'omics. These modules feature synergy between 'omics and uncrewed systems (UxS) and feature cross-lab, cross-line, and private-public partnerships.