



NOAA Omics Strategy Report, FY25 Q4

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

Administrative and Agency Priorities

- **Completion of eDNA collections on the Integrated West Coast Pelagics Survey (IWCPS).** NOAA Fisheries' Northwest Fisheries Science Center and Southwest Fisheries Science Center participated in the months-long, joint survey aboard the NOAA Ship Bell M. Shimada, collecting eDNA samples at surface and depth stations along the entire US West Coast, June through September, 2025. Approximately 2000 samples have been collected to continue the time series for a biomass index for hake, with plans to produce eDNA indices of biomass also for Pacific sardine and anchovy. The time series for eDNA collections on the US West Coast began in 2019, and is a resource to evaluate species abundance and distribution for a number of marine species, including marine mammals and their prey. Collections are also currently being made to also explore how eDNA can inform AI/ML models for acoustic signals from the standard and newly developed active acoustics platforms.

Synergies Across S&T Focus Areas

- **Setting a new standard for environmental DNA (eDNA) data.** NOAA Research Atlantic Oceanographic & Meteorological Laboratory (AOML) researchers, in collaboration with researchers from Australia, Europe, and other countries, released the Findable, Accessible, Interoperable, and Reusable (FAIR) eDNA checklist. The [publication](#) addresses the critical issue of fragmented and inconsistently formatted eDNA data, which currently limits the full potential of eDNA techniques like quantitative PCR (qPCR) and metabarcoding in species detection and biodiversity monitoring. The efforts call for a comprehensive [metadata checklist](#), aligned with FAIR data principles, to standardize eDNA data. This initiative integrates existing data standards such as Darwin Core and MIxS while introducing new eDNA-specific terminology, aiming to enhance data reproducibility, transparency, accessibility, reuse, and overall scientific impact.



Figure 1: Dr. Jamie Adkins joins the NOAA Fisheries MMMGL.

People

- **New hire at NOAA's Southeast Fisheries Science Center (SEFSC).** The NOAA Fisheries SEFSC [Marine](#)

[Mammal Molecular Genomics Lab](#) (MMMGL) welcomed Dr. Jamie Adkins, a Protected Resources Toolbox funded PostDoc (**Figure 1**). Dr. Adkins will be working on creating a genetic panel to identify bottlenose dolphins in the Southeast Region. This panel will allow for confident assignment of unknown bycaught individuals to their species and/or stock of origin, directly supporting NOAA Fisheries' SEFSC priority to develop enhanced 'omics approaches for evaluating patterns in protected species bycatch. This work will improve our understanding of bycatch mortality, informing marine mammal stock assessment reports and Take Reduction Plans.

- NOAA Experiential Research & Training Opportunity (NERTO) graduate student leverages 'omics techniques and citizen science for species detection.** NOAA Research Pacific Environmental Marine Laboratory (PMEL) Ocean Molecular Ecology (OME) group NERTO graduate student, Dwan Jackson, is working to validate an assay for detecting Dungeness crab. On the Washington coast, Dungeness crab is a valuable commercial fishery. During the project, the team coordinated with the Swinomish Indian Tribal Community and Pacific Northwest Crab Research group, to collect eDNA and larval crab samples from light traps (**Figure 2**). Preliminary results show correlations in Dungeness crab larvae and eDNA concentration, a vital step in validating the assay to quantify larval abundances needed for recruitment indices.



Figure 2: Dwan Jackson in Anacortes, WA collecting eDNA samples.

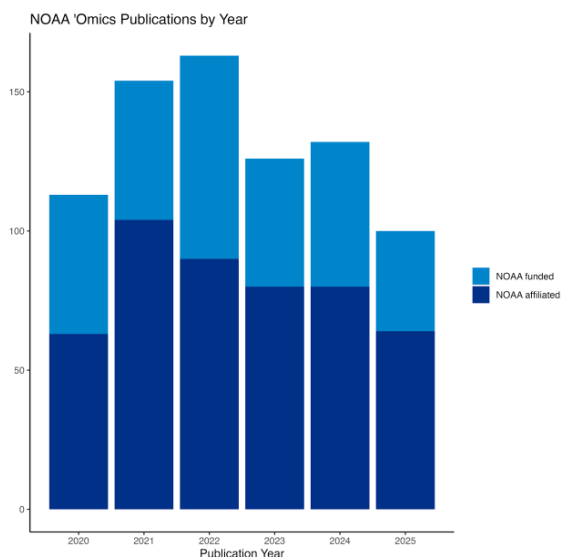


Figure 3: NOAA 'Omics publications by year

Projects

- NOAA 'Omics publications continue to advance mission.** More than 100 publications per year result from NOAA funding and NOAA scientific research and management activities using 'omics tools. Partnerships with nonprofit, Tribal, local, regional and academic organizations are an important part of our science enterprise (**Figure 3**, see NOAA affiliated), while science within our Centers and Labs are integral to management and monitoring activities within our Agency.

- **A new tool for eDNA analysis of rockfish.** The NOAA Fisheries Alaska Fisheries Science Center (AFSC) in collaboration with Northwest Fisheries Science Center (NWFSC) have developed a [new tool to identify rockfish species from environmental DNA](#) (eDNA).



Figure 4: Rockfish reside in rocky habitats difficult to access by traditional methods.

Rockfish are a group of commercially harvested species that are difficult to survey due to their habitat preferences, rocky areas that are challenging to survey with traditional methods (**Figure 4**). AFSC and NWFSC developed new primers and genetic databases focused on Alaska rockfish that will enable the use of eDNA, a cheaper, faster and less invasive method, for future monitoring and long-term sustainability of these commercially important species.

- **New ‘Omics Computational Tool Increases Rigor for Identifying Fish Hybrids.** NOAA Fisheries Southwest Fisheries Science Center (SWFSC) researchers, in collaboration with colleagues from the United States Department of Agriculture’s (USDA) National Wildlife Research Center, developed a new bioinformatics software tool (*gscramble*) to [better identify hybrids from large population genetic datasets](#). The work provides a more reliable and biologically informed approach to identify individuals that share ancestry from different species or populations. It enhances trust in NOAA stock and population assessments needed to better support agency fisheries and conservation objectives.
- **Southeast ‘omics workshop establishes partnerships and identifies synergies among agency offices.** Researchers at the NOAA Fisheries SEFSC, along with partners from the the NOAA Research Atlantic Oceanographic and Meteorological Laboratory (AOML), and associated cooperative institutes, met in 2024 to identify cross-functional ‘omics capabilities and synergistic activities, and establish partnerships among the southeast region laboratories. The [in-person workshop](#) resulted in collaborations within the SEFSC, streamlined communications, and identified areas for future ‘omics development.



Figure 5: NOAA researchers meet at the first southeast 'omics workshop in Pascagoula, Mississippi.

- **Efforts to understand Japanese sardines in the eastern Pacific continue.** The SWFSC Fisheries Resources Division Genetics Aquaculture and Physiology Group continues to monitor the anomalous [presence of Japanese sardines \(*Sardinops melanosticta*\) in the California Current Large Marine Ecosystem](#) using 'omics tools. Results of analysis from the 2024 Coastal Pelagic Species Survey show that Japanese sardines (**Figure 6**) continue to [persist in the eastern Pacific and were encountered further south than in previous years](#). The research team has also developed a genomic method to identify hybrid individuals. These efforts will further the understanding of the effects of the presence of Japanese sardine in U.S. waters and the impact on native populations. More recently, in partnership with the NOAA

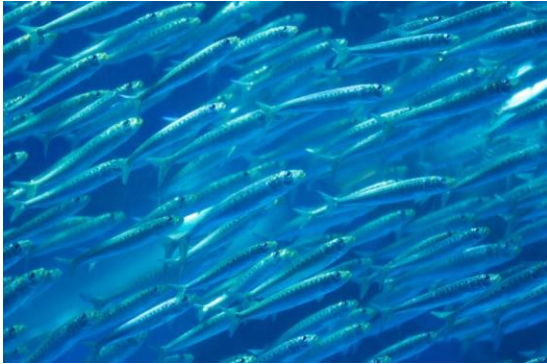


Figure 6: A school of Pacific sardines. Credit: NOAA Fisheries/Dale Sweetman

Fisheries AFSC, the research team found that [sardines appear to be genetically panmictic](#) in this region, with no evidence of spatial genetic structure. This paper provides important data that can be used to evaluate current management strategies for West Coast sardines.

Partnerships

- **Cross-functional partnership leads to advances in bioinformatic analysis of eDNA.** The NOAA Research AOML and [NOAA Ocean Exploration](#) partnered with the Monterey Bay Aquarium Research Institute (MBARI) to [compare eDNA sequencing approaches for assessing eukaryotic biodiversity in the California Current Ecosystem](#). The research team analyzed over 200 paired shotgun metagenomes and marker gene data sets to determine which methods provided more comprehensive, consistent, and accurate community composition data. The findings provide guidance for future eDNA studies and advance bioinformatic analysis methods for increased accuracy of metagenomic analysis of marine ecosystems.
- **Pacific Islands Fisheries Science Center partners with Smithsonian National Museum of Natural History (NMNH) to preserve fish and squid specimens to expand genetic reference data needed for ongoing and future eDNA research.** Voucher-based genetic sequence data are critical for the development of a reliable genetic reference dataset that can be used to inform eDNA metabarcoding analyses. [PIFSC and NMNH collaborated to archive more than 700 fish and squid specimens that will be used to continue the building of a comprehensive DNA reference library for species found in the U.S. Exclusive Economic Zone.](#)