Opportunity Title: EPA Fellowship on Developing and Assessing Molecular Methods for Identification and Enumeration of Organisms in Ballast Water
Opportunity Reference Code: EPA-ORD-CEMM-WECD-2022-04

Organization	U.S. Environmental Protection Agency (EPA)
Reference Code	EPA-ORD-CEMM-WECD-2022-04
How to Apply	***Connect with ORISE...on the GO!*** Download the new ORISE GO mobile app in the Apple or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations. Click here for detailed information about recommendations.

All documents must be in English or include an official English translation.

Application Deadline	4/10/2023 3:00:00 PM Eastern Time Zone
Description	***Applications may be reviewed on a rolling-basis and this posting could close before the deadline.** Click **here** for information about the selection process.

EPA Office/Lab and Location: A research training opportunity is available at the U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD), Center for Environmental Measurement & Modeling (CEMM), Watershed & Ecosystem Characterization Division (WECD) located in Research Triangle Park, North Carolina.

Research Project: A research training opportunity at the postdoctoral level is currently available to explore the application of molecular methods for the identification and enumeration of organisms in ships' ballast water. This research opportunity is part of a collaborative research effort between multiple Centers in the EPA's Office of Research and Development, the Marine Bio-invasions Laboratory at the Smithsonian Environmental Research Center (SERC), and multiple other US and international partners engaged in understanding risks associated with ballast water borne species introductions. The research participant will collaborate with a broader group at EPA involved in development and implementation of molecular tools for biomonitoring in multiple contexts ranging from invasive species surveillance to water quality assessment.

Research activities may include: 1) employing metabarcoding approaches to better understand the role that ballast water plays

in shaping biodiversity of port systems (particularly in the Great Lakes); and 2) developing and improving nucleic acids-based tools for more rapid, accurate, and cost-effective assessment of risks of non-native species transfer via ballast water. The research participant will have the opportunity to conduct studies to identify target species of concern in ballast water (including non-native and invasive species, parasites, pathogens, and harmful algal species), to describe overall biodiversity being transferred in ballast water and to identify factors determining the abundance and diversity of organisms being released into recipient environments, and to utilize molecular methods for assessing the effectiveness of ballast water management, including treatment systems. These issues may be explored in both coastal marine and freshwater systems, although there is an opportunity to focus on the Great Lakes within the context of a long-term "sentinel site" Great Lakes monitoring effort established collaboratively with SERC. The research participant may also have the opportunity to conduct studies aimed at developing novel molecular markers for enumeration and viability assessment of organisms in ballast, with the goal of providing new tools for testing compliance with numerical discharge standards. The research participant may conduct research with any components of ballast water diversity, including both microbial and metazoan communities.

Research activities may include:

- Handling and processing of biological samples (possibly including but not limited to ballast water zooplankton, environmental DNA, biofouling samples, and port benthic or zooplankton samples)
- Extraction, purification, and quantification of DNA and/or RNA
- Detection and enumeration of target species using qPCR or ddPCR approaches
- Amplification of metabarcoding loci and preparation of libraries for high throughput sequencing
- Bioinformatic analysis of sequence data
- Statistical analysis of biodiversity data

<u>Learning Objectives</u>: The research participant will be exposed to all phases of the research effort, including project planning, data collection, analysis, interpretation of results, and preparation of final products (e.g. reports, manuscripts, and presentations). This research training opportunity will provide the research participant with the knowledge, skills, and abilities needed to utilize molecular techniques for assessment of risk in biodiversity surveillance settings (e.g. detection of invasive species or other species of concern), and to apply metabarcoding approaches for understanding differences and changes in biodiversity, with potential applications in a variety of ecological and resource management fields. The research

participant will be provided with the opportunity to learn and refine current knowledge in molecular techniques, sequence data analysis and bioinformatics and/or statistical modeling skills, and communication of molecular data with potential implications for management and decision making.

Mentor(s): The mentor for this opportunity is John Darling (darling.john@epa.gov). If you have questions about the nature of the research please contact the mentor(s).

Anticipated Appointment Start Date: January 3, 2023. All start dates are flexible and vary depending on numerous factors. Click **here** for detailed information about start dates.

Appointment Length: The appointment will initially be for one year and may be renewed upon EPA recommendation and subject to availability of funding.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. Click **here** for detailed information about full-time stipends.

EPA Security Clearance: Completion of a successful background investigation by the Office of Personnel Management (OPM) is required for an applicant to be on-boarded at EPA.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and EPA. Participants do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

ORISE offers all ORISE EPA graduate students and Postdocs a free 5 year membership to the National Postdoctoral Association (NPA).

The successful applicant(s) will be required to comply with Environmental, Safety and Health (ES&H) requirements of the hosting facility, including but not limited to, COVID-19 requirements (e.g. facial covering, physical distancing, testing, vaccination).

Questions: Please see the FAQ section of our website. After reading, if you have additional questions about the application process please email ORISE.EPA.ORD@orau.org and include the reference code for this opportunity.

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Qualifications

The qualified candidate should have received a doctoral degree in one of the relevant fields (e.g. Engineering), or be currently pursuing the degree with completion before December 31, 2022. Degree must have been received within five years of the appointment start date.

Preferred skills:

- Demonstrated education and/or experience in environmental engineering, molecular ecology, genetics, statistical ecology, and/or bioinformatics
- Expertise and proficiency with bioinformatics analysis, as well as proficiency with statistical methods for describing and quantifying biological communities, including measurement of common diversity indices, estimation of abundance, and assessment of change in biotic assemblages. Proficiency with related software (e.g. QIIME, mothur, R, Python, etc.)
- Proficiency with molecular laboratory techniques is preferred, including: DNA extraction, clean-up, and quantification techniques, performance of PCR , qPCR, and ddPCR assays (including preparation of standard curves, testing of primer/probe sets and standardization of assays); cloning and preparation of libraries for high throughput sequencing analysis
- Ability to work with microbial as well as metazoan (primarily zoo- and phytoplankton) communities
- Excellent oral, written, and electronic communication skills
- Experience with common computer operation and software usage (e.g., Microsoft Office Professional Suite, including Excel, Word and PowerPoint)

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 60 months or anticipated to be received by 12/31/2022 11:59:00 PM.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (48 👁)
  - **Mathematics and Statistics** (11 👁)