

Kohma Arai, PhD | Fisheries Ecologist

Center for Watershed Sciences
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PRESENT POSITION

I am a Postdoctoral Research Scholar working in the lab of Drs. Rachel Johnson and Carson Jeffres at the Center for Watershed Sciences, interested in studying fish life history diversity and the consequences of those behaviors to the population structure and dynamics. Postdoctoral work involves (1) estimating abundance and population composition of juvenile fall-run Central Valley Chinook salmon by leveraging otolith chemistry, acoustic telemetry, machine learning, and spatial statistics; and (2) studying natal origin and stock mixing of Atlantic bluefin tuna using otolith stable isotope landscapes (“isoscapes”).

EDUCATION, TRAINING, AND EXPERIENCE

Postdoctoral Research Scholar

University of California Davis, USA

Jul 2023–Present

Center for Watershed Sciences

Advisor: Drs. Rachel C. Johnson and Carson Jeffres

PhD, Marine Estuarine Environmental Science

University of Maryland Center for Environmental Science, USA

Sep 2018–Jul 2023

Chesapeake Biological Laboratory

Marine Estuarine Environmental Science Graduate Program

Advisor: Dr. David H. Secor

Dissertation: “*The Role of Connectivity and Spatial Structure on the Population Dynamics of Marine Fishes.*”

Doctoral Course

The University of Tokyo, Japan

Apr 2017–Aug 2018

Graduate School of Frontier Sciences

Department of Natural Environmental Studies

Advisor: Dr. Shingo Kimura

MS, Natural Environmental Studies

The University of Tokyo, Japan

Apr 2015–Mar 2017

Graduate School of Frontier Sciences

Department of Natural Environmental Studies

Advisor: Dr. Shingo Kimura

Thesis: “*Distribution and its Determining Factors of Naturally Recruited Japanese Eels in Rivers.*”

BS, Aquaculture Life Science

Hokkaido University, Japan

School of Fisheries Sciences

Department of Aquaculture Life Science

Advisor: Dr. Shinji Adachi

Thesis: “*Seasonal Variation of Growth and Reproductive-related Factors of Japanese Eels in Hamana Lake.*”

Apr 2011–Mar 2015

HONORS AND AWARDS

- **Japan Student Service Organization Study Abroad Graduate Fellowship (2018-2020) for three-year full tuition (\$23,000 yearly) and partial stipend (\$1,000 monthly) support for doctorate research.**
- **Reid Evans Menzer Memorial Graduate Award (\$4,672.06)** for a graduate student with superior academic merit and achievement (2022).
- **Dean’s Award for Master’s Thesis** for ranking 2nd place among the entire department at The University of Tokyo (2017).
- **3rd place Oral Presentation Award** at the 36th Annual Meeting of the Tidewater Chapter of the American Fisheries Society (2023).
- **Best Graduate Student Poster Presentation Award** at the 26th biennial conference of the Coastal and Estuarine Research Federation (CERF) Virtual Conference (2021).
- **3rd place Poster Presentation Award** at the 33rd Annual Meeting of the Tidewater Chapter of the American Fisheries Society (2019).
- **Best Poster Presentation Award** at 2017 Eel Symposium hosted by East Asia Eel Society.
- **1st place Award** in 2015 University of Tokyo Ocean Alliance Presentation.
- **Travel Award (\$2,000)** for the PICES Small Pelagic Fish Symposium (2022).
- **Travel Award (\$1,000)** for the 4th ICES/PICES Early Career Scientist Conference (2022).
- **Travel Award (\$500)** from University of Maryland Center for Environmental Science Graduate Education Committee (2019, 2020, 2021).

TECHNICAL SKILLS

- Fish hard part preparation for microstructural examination
- Stable isotope and otolith microchemistry analysis
- Data management and synthesis using R programming software and LaTeX
- Expert knowledge in supervised/unsupervised machine learning, geostatistics, time series analysis, simulation, parametric, non-parametric statistics
- Foundational knowledge in fishery assessment and models
- Basic histology
- Gene sequencing from GenBank and PCR
- Microsoft Office (Excel, Word, PPT)

- Fish sampling with beach seine and electrofisher

TEACHING EXPERIENCE

- **Teaching Assistant** in “Introduction to R programming” (2022) with Dr. Vyacheslav Lyubchich, University of Maryland Center for Environmental Science. Helped structure course material and planned/created student assignments.

LIST OF PUBLICATIONS

1. **Arai K**, Castonguay M, Lyubchich V, Secor DH (2023) “Integrating machine learning with otolith isoscapes: Reconstructing connectivity of a marine fish over four decades.” *PLoS ONE* 18: e0285702. <https://doi.org/10.1371/journal.pone.0285702>
2. **Arai K** and Lyubchich V (2022) "Book review: Modern Data Science with R (2nd ed.)." *Technometrics* 64:3, 429. <https://doi.org/10.1080/00401706.2022.2087421>
3. Jesse JA, Agnew MV, **Arai K**, Armstrong CT, Hood SM, Kachmar ML, Long JT, McCarty AJ, Ross MO, Rubalcava KD, Shaner J, Tanaka S, Wood L, Schott EJ, Wilberg MJ (2021) "Effects of infectious diseases on population dynamics of marine organisms in Chesapeake Bay," *Estuaries and Coasts* 44: 2334-2349. <https://doi.org/10.1007/s12237-021-00915-4>
4. **Arai K**, Castonguay M, Secor DH (2021) "Multi-decadal trends in contingent mixing of Atlantic mackerel (*Scomber scombrus*) in the Northwest Atlantic from otolith stable isotopes." *Scientific Reports* 11: 6667. <https://doi.org/10.1038/s41598-021-86116-2>
5. **Arai K**, Graves JE, Secor DH (2020) "Sub-annual cohort representation among young-of-the-year recruits of the western stock of Atlantic bluefin tuna." *Fisheries Research* 225. <https://doi.org/10.1016/j.fishres.2019.105476>
6. **Arai K**, Itakura H, Yoneta A, Kaifu K, Shirai K, Kimura S (2019) “Anthropogenic impacts on the distribution of wild and cultured Japanese eels in the Tone River watershed, Japan, from otolith oxygen and carbon stable isotopic composition.” *Environmental Biology of Fishes* 102:1405–1420. <https://doi.org/10.1007/s10641-019-00915-1>
7. Yoneta A, Itakura H, **Arai K**, Kaifu K, Yoshinaga T, Miyake Y, Shirai K, Kimura S (2019) “Distribution of naturally recruited wild Japanese eels in Japan revealed by otolith stable isotopic ratios and document investigation.” *Nippon Suisan Gakkaishi* 85:150–161. (in Japanese with English abstract) <https://doi.org/10.2331/suisan.18-00038>
8. Itakura H, **Arai K**, Kaifu K, Shirai K, Yoneta A, Miyake Y, Secor DH, Kimura S (2018) “Distribution of wild and stocked Japanese eels in the lower reaches of the Tone River watershed revealed by otolith stable isotope ratios.” *Journal of Fish Biology* 93:805–813. <https://doi.org/10.1111/jfb.13782>
9. Miyake Y, Takeshige A, Itakura H, Itoh H, Onda H, Yamaguchi A, Yoneta A, **Arai K**, Hane YV, Kimura S (2018) “Predation on glass eels of Japanese eel *Anguilla japonica* in the Tone River Estuary, Japan.” *Fisheries Science* 84:1009–1014. <https://doi.org/10.1007/s12562-018-1238-x>
10. Miyake Y, Itakura H, Takeshige A, Onda H, Yamaguchi A, Yoneta A, **Arai K**, Hane YV, Kimura S (2018) “Multiple habitat-use of Japanese sea bass *Lateolabrax japonicus* in the estuary region of the Tone River system, implied by stable isotope analysis.” *Ichthyological Research* 66:172–176.

<https://doi.org/10.1007/s10228-018-0655-2>

11. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Shirotori F, Kaifu K, Kimura S (2017) “Discovering the dominance of the non-native European eel in the upper reaches of the Tone River system, Japan.” *Fisheries Science*, 83:735–742. <https://doi.org/10.1007/s12562-017-1107-z>

CONFERENCE PRESENTATIONS

1. **Arai K.** Castonguay M, Lyubchich V, Secor DH. “Integrating machine learning with otolith isoscapes: reconstructing connectivity of a marine fish over four decades.” 7th International Otolith Symposium, Vina del Mar (Chile), October 2023
2. **Arai K.** Sturrock A, Willmes M, Whitman G, Provost M, Jeffres C, Johnson R. “Using otolith strontium isotopes to assess portfolio effects in California Chinook salmon.” 7th International Otolith Symposium, Vina del Mar (Chile), October 2023 (Poster presentation)
3. **Arai K.** Best JE, Craig CA, Secor DH. “To stay or go: partial migration in Hudson River striped bass.” 36th Annual Meeting of the Tidewater Chapter of the American Fisheries Society, Solomons, MD (USA) March 2023 (3rd place Oral Presentation)
4. **Arai K.** Castonguay M, Lyubchich V, Secor DH. “Machine learning and otolith isoscapes to evaluate decadal trends in contingent mixing of Atlantic mackerel.” *Small Pelagic Fish Symposium* Lisbon, Portugal, November 2022
5. **Arai K.** Best JE, Craig CA, Secor DH. “Hudson river striped bass recruitment to “extra” nurseries.”, 152nd Annual American Fisheries Society (AFS) Meeting, Spokane, WA (USA) (hybrid meeting), August 2022
6. **Arai K.** Castonguay M, Secor DH. “Application of otolith isoscapes to evaluate decadal trends in contingent mixing of a key transboundary fishery.” 4th ICES PICES Early Career Scientist Conference St. John’s, Canada, July 2022
7. **Arai K.** Best JE, Craig CA, Secor DH. “Drivers and recruitment processes to “extra” nurseries for the Hudson River striped bass.”, 151st Annual American Fisheries Society (AFS) Meeting, Baltimore, MD (USA) (hybrid meeting), November 2021 (Poster presentation)
8. **Arai K.** Best JE, Craig CA, Secor DH. “Drivers and recruitment processes to “extra” nurseries for the Hudson River striped bass.” 26th biennial conference of the Coastal and Estuarine Research Federation (CERF), Virtual Conference, November 2021 (Best Graduate Student Poster Presentation)
9. **Arai K.** Castonguay M, Secor DH. “Otolith stable isotopes reveal multi-decadal trends in contingent mixing of a key transboundary fishery.” 35th Annual Meeting of the Tidewater Chapter of the American Fisheries Society, Virtual Conference, April 2021
10. **Arai K.** Castonguay M, Secor DH. “Decadal trends in stock mixing of Northwest Atlantic mackerel from otolith oxygen and carbon stable isotopes.” 34th Annual Meeting of the Tidewater Chapter of the American Fisheries Society, Virtual Conference, May 2020
11. **Arai K.** Graves JE, Secor DH. “Sub-annual cohort representation in young-of-the-year juvenile recruits of the western Atlantic bluefin tuna population.” 33rd Annual Meeting of the Tidewater Chapter of the American Fisheries Society, Maryland, USA, February 2019 (3rd place Poster Presentation)
12. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Shirotori F, Kaifu K and Kimura S. “A study on the natural

distribution of the Japanese eel in rivers.” *Eel symposium hosted by the East Asia Eel Society*, Tokyo, Japan, July 2017 (*Best Poster Presentation*)

13. **Arai K.** Itakura H, Yoneta A, Kaifu K and Kimura S. “A study on the natural distribution of the Japanese eel in the Tone River system, Japan.” *The 1st UK International Eel Science Symposium*, London, UK, June 2017
14. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Kaifu K and Kimura S. “A study on the geographic distribution range of anguillid eels.” *Annual Meeting of the Japanese Society of Fisheries Oceanography*, Tokyo, Japan, November 2016
15. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Kaifu K and Kimura S. “Natural distribution of the Japanese eel in rivers.” *International Symposium: “Eel Planet”*, Kanagawa, Japan, November 2016 (Poster presentation)
16. **Arai K.** Itakura H, Yoneta A, Kaifu K and Kimura S. “A study on the natural distribution of the Japanese eel in the Tone River system.” *Annual Meeting of the Japanese Society of Fisheries Science*, Nara, Japan, September 2016
17. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Kaifu K and Kimura S. “The distribution of exotic anguillid eels in the Tone River system.” *Annual Meeting of the Japanese Society of Fisheries Science*, Nara, Japan, September 2016
18. **Arai K.** Itakura H, Yoneta A, Yoshinaga T, Kaifu K and Kimura S. “The distribution of anguillid eels in the Tone River system.” *Annual Meeting of the Ichthyological Society of Japan*, Gifu, Japan, September 2016

EDITORIAL SERVICE

- **Journal reviewer:** *Fisheries Research, Frontiers in Marine Science, Journal of Animal Ecology, Journal of Fish Biology (2), Marine and Freshwater Research, Plos One, Scientific Reports*