M.S. Student Assistantship

Combining river flow optimization and forecast-informed reservoir operations

Position: Graduate research assistantship in species modeling and water management
First review: Initial review of applications will start November 10 and the position will remain open until filled
Location: Cal Poly Humboldt, Department of Fisheries Biology, Arcata, California

Project description

Dams provide flood protection, water supply, hydropower, and water storage but change the magnitude, timing and variability of river flows that shape aquatic habitats. The recently published Real Time Management (RTM) framework offers a way to synchronize reservoir releases with precipitation-driven patterns in nearby rivers while respecting system-specific requirements such as flood limits, water allocations, baseflows, and infrastructure constraints.

Forecast-Informed Reservoir Operations (FIRO) uses weather and streamflow forecasts to give reservoir operators more flexibility in deciding when to retain or release water, while accounting for flood-risk requirements. This project will bring RTM and FIRO together in an optimization framework that considers river flow patterns and reservoir storage at the same time. The goal is to identify operating strategies that support ecological flow objectives and water storage needs while satisfying operational and public-safety constraints.

The M.S. student will help develop and evaluate this combined approach using one or more example watersheds in the NOAA Fisheries West Coast Region. The work will synthesize precipitation, streamflow, reservoir storage, flood-control limits, and other operating constraints; add time-varying, forecast-informed storage limits to the RTM optimization routine; and use simulation to demonstrate a proof of concept. Watershed selection and the final modeling scope will be refined with the project team.

The student will contribute to model development, data analysis, interpretation of results, and preparation of a master's thesis and peer-reviewed publication. In particular, the student will be responsible for using species habitat and population models to evaluate the potential impacts for multiple aquatic species of RTM, FIRO, and RTM + FIRO flow regimes compared to standard water management practices. The project also connects researchers and practitioners working in FIRO, river ecology, and river restoration, offering opportunities to present results and participate in collaborative discussions about future applications.

Qualifications

- B.S. in hydrology, water resources, civil or environmental engineering, natural resources, fisheries, ecology, mathematics, statistics, or a related field.
- Qualified for admission to the M.S. program in Natural Resources at Cal Poly Humboldt.

Preferred qualifications

- Experience with quantitative analysis, hydrologic or hydraulic modeling, optimization, or programming.
- Experience with R, Python, or similar analytical tools, or demonstrated ability to learn them.
- Interest in river ecology, environmental flows, reservoir operations, or water resources management.
- Strong writing and communication skills and the ability to work in a collaborative, interdisciplinary team.

Graduate program and appointment

The selected student will enroll in the Natural Resources graduate program at Cal Poly Humboldt and pursue an M.S. degree through the Department of Fisheries Biology. The research combines hydrologic data analysis, optimization, and river ecosystem management. The student will be housed in the lab of, and advised by, PI Nicholas Som (https://som-ecostat.com) and also receive advising from Seth Naman of NOAA's West Coast Region.

Expected start date: January 2027

Salary and duration: $30,000 annual salary for 2.5 years

Tuition support: In-state tuition costs covered for 2.5 years

Principal investigator and advisor: Dr. Nicholas A. Som, Department of Fisheries Biology, Cal Poly Humboldt; Unit Leader, California Cooperative Fish and Wildlife Research Unit.

Student Support

An annual stipend of $30,000 will be provided for 2.5 years, which should be a sufficient timeline for completing the MS degree coursework and thesis requirements, as well as submitting a manuscript to a journal to publish the results of the project. In-state tuition expenses will also be covered for a period of 2.5 years.

About Cal Poly Humboldt

Cal Poly Humboldt is located in Arcata, in Northern California near Humboldt Bay, the Pacific coast, and redwood forests. The university's Department of Fisheries Biology offers students access to diverse freshwater, estuarine, and marine ecosystems for research and learning.

Cal Poly Humboldt is a Hispanic-Serving Institution committed to an equitable and inclusive community. The university is an equal opportunity employer. All qualified applicants will receive consideration without regard to legally protected status.

Application instructions

Email a cover letter describing your interest and relevant experience, a resume or CV, transcripts (unofficial copies are acceptable), and contact information for three references to Nicholas A. Som at nicholas.som@humboldt.edu. If selected, the applicant will complete the formal graduate program application.

Point of contact

Nicholas A. Som, Ph.D.
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Selected background reading

- Som, N. A., & Naman, S. W. (2026). A method to implement natural flow regimes for regulated rivers. Water Resources Research, 62(5), e2025WR041095. https://doi.org/10.1029/2025WR041095
- Timberlake, T. W., Ramirez-Avila, J. J., Grigg, N. S., & Curtis, D. C. (2025). Forecast-informed prerelease reservoir operations for flood risk management. Journal of Water Resources Planning and Management, 151(9), 03125002. https://doi.org/10.1061/JWRMD5.WRENG-6683
- Grantham, T. E., et al. (2022). Modeling functional flows in California's rivers. Frontiers in Environmental Science, 10, 787473. https://doi.org/10.3389/fenvs.2022.787473