Alexander J. Haro Ph.D.

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Birthdate: 11 August 1959

Birthplace: Royal Oak, Michigan, USA

Education and Degrees:

BS, University of Michigan; Biology, 1981

MS, University of Rhode Island; Zoology, 1984

PhD, University of Maine; Zoology, 1989

Professional Experience:

1991-present	Ecologist and Section Leader, Fish Passage Section, S. O. Conte Anadromous Fish Research Center, Biological Resources Division, U. S. Geological Survey, Turners Falls, Massachusetts
1991-present	Adjunct Associate Professor, Department of Organismal and Evolutionary Biology; Department of Natural Resources Conservation, University of Massachusetts
1989-1990	Postdoctoral Research Associate, Cooperative Institute for Marine Resource Studies, Hatfield Marine Science Center, Oregon State University
1987-1988	Research Assistant, Center for Marine Studies, University of Maine
1986-1987	Teaching Assistant, Department of Zoology, University of Maine
1985-1986	Fisheries Biologist, Aquatec, Inc., South Burlington, Vermont
1984-1985	Research Assistant, Graduate School of Oceanography, University of Rhode Island
1982-1984	Teaching Assistant, Department of Zoology, University of Rhode Island

Research Experience:

- Knowledge of resource issues involving diadromous fish migration, behavior, biology, and ecology.
- Experience in aspects of upstream and downstream fish passage, including hydraulics and behavior of migrants.
- Drafts, competes for and manages grants and awards, conducted research with federal, state, university, and private funding.

- Participates in academic and non-academic research programs involving other researchers, graduate and undergraduate students, biologists, engineers and managers at the private, state and federal levels.
- Experience in field research involving fish ecology, behavior and distribution using video, hydroacoustics, radio and acoustic telemetry, and remotely operated vehicles in streams, large rivers, lakes, estuaries and at sea.
- Laboratory research including design and construction of freshwater and marine experimental systems, video, computer data acquisition and automation used in long-term behavioral studies.
- Knowledge of computer systems and programming; statistical, database, graphics, communication and interface software.
- Strong background in statistics, including experimental design, multivariate, discrimination and nonparametric statistics.

Teaching and Academic Experience:

- Teaches graduate-level seminars in animal migration and movement.
- Teaches advanced level training course in fish passage/behavior.
- Serves as committee member and advisor for graduate and undergraduate students.
- Serves on graduate faculty committees.

Outreach and Other Professional Experience:

- Organizes and manages workshops on fisheries, video and behavioral measurement techniques.
- Cooperates with and provides technical information and expertise to federal agencies (U.S. Fish and Wildlife Service, U. S. Forest Service, National Marine Fisheries Service, Environmental Protection Agency, Army Corps of Engineers, Bureau of Reclamation, Office of Technology Assessment, and others), state agencies, private industry, environmental groups, and the public.

Memberships and Certification:

American Fisheries Society:

- Bioengineering Section (1991-present)
- Southern New England Chapter (1985-present)

EIFAC/ICES Working Group on Eels (WGEEL) - ACFM
Certified Fisheries Biologist, American Fisheries Society (1985-present)

Awards

1996 -Special Achievement Award, American Fisheries Society, Southern New England Chapter (1996; workshop on video technology and applications in fisheries science)

Grants and Outside Funding:

1986-1989 University of Maine Migratory Fish Research Institute Research Assistance Award; studies of eel thermal preference: $2K

1987-1988 University of Maine Association of Graduate Students Grant in Aid of Research; studies of eel thermal preference: $1K

1988 University of Maine Center for Marine Studies Graduate Research Assistantship; studies of eel thermal preference: $7K

1994 Cooperative Contract with Sonalysts, Inc., Milford, CT; evaluation of Atlantic salmon response to infrasound: $4K

1994-1995 Cooperative Contract with Northeast Utilities, Inc., Berlin, Connecticut and Alden Research Laboratories, Holden, Massachusetts; evaluation of uniform acceleration bypass weir: $25K

1994-1995 Cooperative Contract with State of Maryland and U. S. Army Corps of Engineers: Little Falls Dam Hydraulic Modeling Study; U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, State of Maryland, State of Virginia; development of dam notch design for fish passage: $100K

1996-1999 National Biological Survey Quick Response Grant; assessment of upstream passage devices for American eel: $15K

1998-2002 Cooperative Contract with Northeast Utilities, Inc., Berlin, Connecticut; evaluation of fishway complex at Turners Falls, Massachusetts: $100K

1999 Electric Power Research Institute; travel to ICES international workgroup meeting on eels: $1K

2001-2002 U.S. Fish and Wildlife Service research funding for 3-dimensional acoustic telemetry of downstream migrant American eels at hydroelectric projects; $98K

2003 Cooperative Contract with Holyoke Gas and Electric; evaluation of upstream eel passage at Holyoke Dam, Massachusetts: $10K

2003-2004 Electric Power Research Institute; evaluation of downstream passage of eels at Rainbow Dam, Farmington River, Connecticut: $75K

Publications and Manuscripts:

Haro, A. J. and W. H. Krueger. 1988. Upstream migration and relative abundance of elvers and young American eels (*Anguilla rostrata* (LeSueur)) in a Rhode Island stream. Canadian Journal of Zoology 66: 2528-2533.

Haro, A. J. 1991. Thermal preferenda and behavior of Atlantic eels (genus *Anguilla*) in relation to their spawning migration. Environmental Biology of Fishes 31: 171-184.

Haro, A. J. and W. H. Krueger. 1991. Pigmentation, otolith rings and upstream migration of juvenile American eels (*Anguilla rostrata*) in a coastal Rhode Island stream. Canadian Journal of Zoology 69: 812-814.

Bakshtansky, E. L., V. D. Nesterov, and A. Haro. 1993. Some aspects of juvenile anadromous salmonid behavior and behavioral studies, and their application to development of fish passage systems. Pages 205-209 in: K. Bates (ed.). Proceedings of the Fish Passage Policy

and Technology Symposium, American Fisheries Society, Bethesda, Maryland.

Castro-Santos, T., A. Haro, and S. Walk. 1996. A passive integrated transponder (PIT) tag system for monitoring large orifices in fishways. Fisheries Research 28: 253-261.

Odeh, M. and A. Haro. 1996. Design of simple Denil and deepened Alaska steeppass fishways. 2nd International Symposium on Habitat Hydraulics, Quebec City, Canada, INRS-EAU&IAHR (Publishers), Volume B. pp. 953-965.

Haro, A. and B. Kynard. 1997. Video evaluation of passage efficiency of American shad and sea lamprey in a modified Ice Harbor fishway. North American Journal of Fisheries Management 17: 981-987.

Haro, A., M. Odeh, J. Noreika, and T. Castro-Santos. 1998. Effect of water acceleration on downstream migratory behavior and passage of Atlantic salmon smolts and juvenile American shad at surface bypasses. Transactions of the American Fisheries Society 127: 118-127.

Haro, A., M. Odeh, T. Castro-Santos, and J. Noreika. 1999. Effect of slope and headpond on passage of American shad and blueback herring through simple Denil and deepened Alaska steeppass fishways. North American Journal of Fisheries Management 19: 51-58.

Haro, A., T. Castro-Santos, and J. Boubée. 2000. Behavior and passage of silver-phase American eels at a small hydroelectric facility. Dana 12: 33-42.

Haro, A., W. Richkus, K. Whalen, A. Hoar, D. Busch, S. Lary, T. Brush, and D. Dixon. 2000. Population decline of the American eel: Implications for science and management. Fisheries 25(9): 7-16.

Odeh, M. and A. Haro. 2000. Developments in fish passage engineering and biology. Pages 1-11 in: M. Odeh, ed. Advances in Fish Passage Technology – Engineering Design and Biological Evaluation. American Fisheries Society, Bethesda, Maryland.

Roussel, J-M., A. Haro, and R. A. Cunjak. 2000. Field-test of a new method for tracking small fishes in shallow rivers using passive integrative transponder (PIT) technology. Canadian Journal of Fisheries and Aquatic Sciences 57(7): 1326-1329.

Zydlewski, G. B., A. Haro, K. G. Whalen, and S. D. McCormick. 2001. Performance of stationary and portable passive transponder detection systems for monitoring of fish movements. Journal of Fish Biology 58(5): 1471-1475.

Boubée, J. A., C. P. Mitchell, B. L. Chisnall, A. Haro, and E. J. Bowman. 2001. Factors regulating the downstream migration of mature eels (*Anguilla* spp) at Aniwhenua Dam, Bay of Plenty, New Zealand. New Zealand Journal of Marine and Freshwater Research.35: 121-134.

Haro, A. T. Castro-Santos, K. Whalen, G. Wipplehauser and L. McLaughlin. 2003. Simulated effects of hydroelectric project regulation on mortality of American eels. Pages 357- 365 in: D. Dixon, editor. Biology, Management, and Protection of Catadromous Eels. American Fisheries Society Symposium 33. Bethesda, Maryland.

Haro, A. 2003. Downstream migration of silver-phase anguillid eels. Pages 215-222 in: Aida, K., K. Tsukamoto, and K. Yamauchi, eds. Eel Biology. Springer, Tokyo.

Boubée, J., B. Chisnall, E. Watene, E. Williams, D. Roper and A. Haro. 2003. Enhancement and management of eel fisheries affected by hydroelectric dams in New Zealand. Pages 191-205 in: D. Dixon, editor. Biology, Management, and Protection of Catadromous Eels. American Fisheries Society Symposium 33. Bethesda, Maryland.

Watene, E. M., J. A. Boubée and A. Haro. 2003. Downstream movement of mature eels in a hydroelectric reservoir in New Zealand. Pages 295-305 in: D. Dixon, editor. Biology, Management, and Protection of Catadromous Eels. American Fisheries Society Symposium 33. Bethesda, Maryland.

Castro-Santos, T. and A. Haro. *In Press*. An overview of survival analysis and its application to fish passage research. Canadian Journal of Fisheries and Aquatic Sciences.

Castro-Santos, T. and A. Haro *In Press*. Quantifying the combined effects of attempt rate and swimming capacity on passage through velocity barriers. Can. J. Fish. Aquat. Sci.

Castro-Santos, T. and A. Haro. *In Prep*. Quantifying delay in anadromous fish migrations: a new application of event-tine analysis. Can J. Fish. Aquat. Sci.

Zydlewski, G. B., A. Haro, and S. D. McCormick. *In Prep.* Role of temperature in downstream migratory behavior of Atlantic salmon (*Salmo salar*) smolts. 30pp; to be submitted to Animal Behavior.

Reports, Bulletins, and Other Products

Downey, P. C. and A. J. Haro. 1985. Fish impingement on intake screens at Vermont Yankee, 1974-1984. Vermont Yankee/Connecticut River System Analytical Bulletin 14 (Aquatec, Inc., South Burlington, Vermont).

Fabrizio, M. C., S. B. Saila and A. J. Haro. 1985. Growth invariant discrimination and classification of striped bass (*Morone saxatilis*) stocks in New York, Connecticut and Rhode Island coastal waters by morphometric and electrophoretic methods. National Marine Fisheries Service Contract Report No. NA84EAC00046 (Woods Hole, Massachusetts).

Kynard, B., M. Odeh and A. Haro. 1996. *Review of*: Clay, C. H. 1995. Design of Fishways and Other Fish Facilities, 2nd edition. Transactions of the American Fisheries Society 125: 631

Haro, A. and P. Angermeier. 1996 . Assessment of upstream passage devices for American eels. Final Report: NBS Quick Response Project.

Haro, A., and T. Castro-Santos. 1996. Summary of downstream migrant eel telemetry pilot studies, Connecticut River, 1995. Conte Anadromous Fish Research Center Technical Report No. 96-01.

Haro, A. 1997. Distribution and upstream movement of American eels in the Shenandoah River. Report to USFWS, Ecological Services (Region 5 and Chesapeake Bay Field Office) and FERC.

Haro, A., and T. Castro-Santos. 1997. Downstream migrant eel telemetry studies, Cabot Station, Connecticut River, 1996. Conte Anadromous Fish Research Center Technical Report No. 97-01.

Haro, A., D. Degan, J. Horne, B. Kulik, and J. Boubée. 1999. An investigation of the feasibility of employing hydroacoustic monitoring as a means to detect the presence and movement of large, adult eels (Genus *Anguilla*). S. O. Conte Anadromous Fish Research Center Internal Report No. 99-01

Haro, A., T. Castro-Santos, and C. Koch. 1999. Passage of American shad at Turners Falls fishways: PIT tag evaluation 1999. S. O. Conte Anadromous Fish Research Center Internal Report No. 99-02. Turners Falls, Massachusetts. 9 pp.

Pugh, D. and A. Haro. 2000. Adult Atlantic salmon passage at the Turners Falls fish passage complex, Turners Falls, Massachusetts, 1999. S. O. Conte Anadromous Fish Research Center Internal Report No. 00-01. Turners Falls, Massachusetts. 12 pp.

Haro, A., T. Castro-Santos, and T. Sullivan. 2001. Passage of American shad at Turners Falls fishways: PIT tag evaluation 2000. S. O. Conte Anadromous Fish Research Center Internal Report No. 2001-01. Turners Falls, Massachusetts. 18 pp.

Sullivan, T., A. Haro, and T. Castro-Santos. 2002. Passage of American shad at Turners Falls fishways: PIT tag evaluation 2001. S. O. Conte Anadromous Fish Research Center Internal Report No. 2001-01. Turners Falls, Massachusetts.

Haro, A. 2002. Passage of American shad through natural and experimental high velocity flow environments. Report to American Rivers, Washington DC. 17 pp.

Odeh, M., J. F. Noreika, A. Haro, A. Maynard, T. Castro-Santos and G. Cada. 2002. Evaluation of the effects of turbulence on the behavior of migratory fish. Report to U.S. Department of Energy, Bonneville Power Administration. Project No. 2000-057-00. 46 pp.