
Statement of Qualifications

Lenny Grimaldo, Ph.D.

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Work Experience

ICF International

2013-Present

Senior Scientist/Project Director

Provide leadership in ecosystem research related to restoration, ecology of native fishes, estuarine ecology, food webs, water quality, and water diversion in the San Francisco Bay Estuary and adjacent riverine and coastal ecosystems. Design and conduct field monitoring and research to better understand biological responses to ecosystem impacts and changes. Represent the firm and its clients before state and federal resource agencies.

Key achievements

- Serving as a lead scientist for Reclamation's collaborative Outflow Study that will determine how outflow affects abundance and distribution of Delta Smelt and their prey in the upper San Francisco Estuary.
- Serving as a lead scientist for a CDFW Prop 1 Coordinated Longfin Smelt investigation with MWD, USGS, and SFSU in the Upper San Francisco Estuary. The purpose of these studies are to better understand how Longfin Smelt use tidal marsh and shallow habitat and how they vertically migrate in relation to turbidity.
- Serving as Lead Scientist for Collaborative Adaptive Management Team (CAMT) entrainment investigations for delta smelt. In this role, I oversee a team of seven independent scientists, serve as the liaison with policy makers, conduct statistical analyses on delta smelt entrainment, and lead communication with progress of studies to state and federal agencies, public water agency stakeholders, and NGO's. and Department of Water Resources (DWR).
- Worked closely with state and federal agencies to develop a method for revising the USFWS Incidental Take Limit.
- Serving as a contributing scientist on IEP Longfin Smelt and FLOAT MAST teams.
- Served as Conference Chair for the 2014 Bay-Delta Science Conference (> 1,200 attendees)
- Leading efforts to develop tagging technologies for Delta Smelt and Longfin Smelt.

United States Bureau of Reclamation**2008-2013***Fish Biologist*

Served as the program manager for the Fall X2 Adaptive Management Plan of the 2008 USFWS Biological Opinion on the coordinated impacts of the SWP and CVP water projects to delta smelt. Provided leadership within Reclamation and with outside entities (public water agencies, environmental organizations, state and federal agencies) on how to resolve complex and controversial water operation management actions for ESA species, including delta smelt, longfin smelt, and steelhead. Served on Interagency Ecological Program (IEP) management and coordinator teams, providing technical and management guidance on research and monitoring activities in the Sacramento-San Joaquin Delta. Published peer-review manuscripts on research related to restoration, early life history of fishes, and water diversions. Served as an independent advisor and reviewer of a number of restoration projects, including Dutch Slough, Prospect Island, Yolo Bypass, Liberty Island, and Sherman Island.

Key achievements

- Developed an adaptive management plan for the USFWS 2008 Fall X2 RPA using a consensus driven process with stakeholders and agency scientists.
- Published a peer-review manuscripts and technical reports on delta smelt migration patterns, fish communities in restored habitats, larval fish feeding and day/night behaviors, and impacts of harmful algal blooms to aquatic ecosystems.
- Completed an effects analysis for the 2008 USFWS Biological Opinion on the coordinated operations of the SWP and CVP for delta smelt.
- Served as the program chair for the 2012 Bay-Delta Conference (1,200 attendees) and the IEP Annual Workshop (2012 and 2013, 400 attendees).
- Provided expert testimony on behalf of Interior on Delta Smelt during USFWS 2009 Biological Opinion litigation, as an expert on native fish at State Water Resources Control Board hearings of flow, and before the State Assembly on Natural Resources hearing for Delta Smelt Biological Opinion rules.
- As the IEP Science Advisory Group (SAG) liaison, coordinated independent peer reviews of the Delta Juvenile Fish Monitoring Program and coupled hydrodynamic-biological modeling applications for the San Francisco Estuary.

California Department of Water Resources (DWR)**1996-2008***Environmental Scientist*

Provided leadership on water management issues, including entrainment of ESA species at the state and federal water projects, water quality, and barrier operations. Developed methods for sampling fish and aquatic invertebrate communities in shallow water habitats in the San Francisco Estuary and developed novel analyses and approaches for evaluating restoration outcomes to native fish communities. Managed and mentored dozens of early career scientists. Collaborated on fish and invertebrate research

studies throughout the California, including steelhead/salmon investigations on the Feather River, floodplain research in the Yolo Bypass and San Joaquin River, Lake Davis rotenone project, and quagga mussel invasions into California's aqueduct and reservoir network. Reviewed regulatory compliance documents, including Biological Assessments and Opinions on Water Project impacts to delta smelt and Feather River FERC relicensing impacts to steelhead.

Key achievements

- Developed a statistical approach for understanding relationships between entrainment of ESA species and environmental factors that was adopted by state and federal agencies and stakeholders during preliminary injunction hearings on USFWS Biological Opinion litigation.
- Published several peer-review manuscripts and technical reports on fish communities in restored habitats (BREACH studies), larval fish communities, fish predation, water quality, submerged aquatic vegetation patterns, and methods for morphometric discrimination of delta smelt and wakasagi.
- Invited speaker to an Adaptive Management Session at the Estuarine Research Federation Conference in Tampa Bay, FL. (2001).

CALFED Science Program (on loan from DWR)

2000-2001

Assistant Delta Science Coordinator

Helped the CALFED lead scientist (Sam Luoma) develop a region-wide restoration strategy for the San Francisco Estuary. Coordinated independent peer-review panels on hydrodynamic issues and restoration.

Key achievements

- Coordinated, led, and helped produce independent peer-review reports on the Channel Cross Gates/Georgiana Slough project and Environmental Water Account study.
- Authored several sections of the CALFED Bay-Delta Program Ecosystem Restoration Program Programmatic EIS/EIR.

California Department of Fish and Game

1994-1996

Fish and Wildlife Scientific Aide

Conducted an independent study on the comparison and validity of using fin rays and otoliths to age splittail. Collected and identified larval fish, juvenile fish, and shrimp samples from various monitoring and research studies in the San Francisco Estuary. Field leader on multi-agency real-time monitoring study.

Key achievements

- Conducted fish identification classes for multi-agency Real-time Monitoring study staff.
- Developed several fish keys for discriminating early juvenile cyprinids and tridentiger gobies.
- In conjunction with U.C. Davis, presented research on splittail aging methods at the Annual Undergraduate Research Conference.

Education

Ph.D., Ecology, University of California at Davis, Emphasis on management and restoration of freshwater fishes in the San Francisco Estuary, 2009.

M.S., Marine Biology, San Francisco State University, Emphasis on food webs and fish communities in restored habitats of the San Francisco Estuary, 2004

B.S., Wildlife and Fisheries Biology, University of California Davis, 1996. Fisheries biology emphasis, 1996.

Peer-review publications

Grimaldo, L.F., J.Burns, J.Hassrick, A.Kalmbach, R.Miller, D.Maniscalco. Pelagic fish response to outflow in the upper San Francisco Estuary. In prep for Marine Ecology Progress Series

Grimaldo, L.F. and C. Phillis. In prep. Applying Boosted Regression Trees to Examine Longfin Smelt Habitat in the Upper San Francisco Estuary. In prep for Ecological Applications

Grimaldo, L.F., W.E. Smith, and M.Nobriga. After the storm: Examining factors that affect Delta Smelt Salvage at the SWP and CVP. In prep for San Francisco Estuary and Watershed Science.

Grimaldo, L.F., F.Feyrer, J.Burns, and D.Maniscalco. 2017. Sampling Uncharted Waters: Distribution and Rearing Habitat of Larval Longfin Smelt (*Spirinchus thaleichthys*) in the Upper San Francisco Estuary. DOI 10.1007/s12237-017-0255-9

Wilder, R., J. Hassrick, L.F. Grimaldo, M. Greenwood, S. Acuna, J. Burns, D.Maniscalco, P.Crain. TC Hung. Feasibility of PIT and Acoustic Tagging for Endangered Adult Delta Smelt. North American Journal of Fisheries Management. 36:1167-1177, DOI: 10.1080/02755947.2016.1198287

Feyrer, F.V., J. Hobbs, S.Acuna, B.Marhadja, L.Grimaldo, M.Baerwald, R.C. Johnson, S.Teh. 2015. Metapopulation structure of a semi-anadromous migratory fish (Sacramento splittail *Pogonichthys macrolepidotus*) shaped by climate-induced dynamic habitat fragmentation. Canadian Journal of Fish and Aquatic Sciences. 10.1139/cjfas-2014-0433

Grimaldo, L.F., R.E. Miller, C.D. Peregrin, and Z. Hymason. 2012. Fish Assemblages in Reference and Restored Tidal Freshwater Marshes of the San Francisco Estuary. San Francisco Estuary and Watershed Science 10: 1-21.

Sommer, T., M. Nobriga, F. Feyrer, F. Mejia, L. Grimaldo. 2011. The Spawning Migration of Delta Smelt in the Upper San Francisco Estuary. *San Francisco Estuary and Watershed Science* 9: 1-16.

Grimaldo, L.F., A.R. Stewart, and W. Kimmerer. 2009. Dietary segregation of pelagic and littoral fish assemblages in a highly modified tidal freshwater estuary. *Marine and Coastal Fisheries* 1:200–217.

Grimaldo, L.F., T. Sommer, N. Van Ark, E. Holland, G. Jones, B. Herbold, P. Smith, and P. Moyle. 2009. Factors affecting fish entrainment into massive water diversions in a freshwater tidal estuary: Can fish losses be managed?" *North American Journal of Fisheries Management* 29:1253–1270.

Kimmerer, W., S. Avent, S. Bollens, F. Feyrer, L. Grimaldo, P. Moyle, M. Nobriga, and T. Visintainer. 2005. Variability in length-weight relationships used to estimate biomass of estuarine fishes from survey data. *Transactions of the American Fisheries Society* 134:481-495.

Grimaldo, L.F., R.E. Miller, C.M. Peregrin, and Z.P. Hymanson. 2004. Spatial and temporal distribution of ichthyoplankton in three habitat types of the Sacramento-San Joaquin Delta. Pages 81-96 in F. Feyrer, L.R. Brown, R.L. Brown, and J.J. Orsi, editors. *Early Life History of Fishes in the San Francisco Estuary and Watershed*. American Fisheries Society, Symposium 39, Bethesda, Maryland.

Toft, J.D., C.A. Simenstad, J.A. Cordell, and L.F. Grimaldo. 2003. The effects of introduced water hyacinth on habitat structure, invertebrate assemblages, and fish diets. *Estuaries* 26:746-758.

Technical reports

Baxter, R., L.F. Grimaldo, and others. An updated conceptual model for delta smelt: Our evolving understanding of an estuarine fish by Management Analysis and Synthesis Team. 2015.

Brown, L.R., G. Castillo, L. Conrad, S. Culberson, G. Erickson, F. Feyrer, S. Fong, K. Gehrts, L. Grimaldo, and others. 2014. Synthesis of Studies in the Fall Low Salinity Zone of the San Francisco Estuary, September-December 2011. Interagency Ecological Program.

Baxter, R., Breuer R., Brown L, Conrad L, Feyrer F., Fong S, Gehrts K., Grimaldo L., and others. 2011. Pelagic Organism Decline Work Plan and Synthesis of results. Interagency Ecological Program.

Wang, J.C.S., L. Lynch, B. Bridges, and L. Grimaldo. 2005. Using morphometric characteristics to identify the Early Stages two sympatric Osmerids (Delta smelt and *Wakasagi-Hypomemus transpacificus* and *H. nipponensis*) in the Sacramento-San Joaquin Delta, California. U.S. Department of the Interior, Bureau of Reclamation, Volume 30.

Grimaldo, L.F., R.E. Miller, C. Peregrin. 2000. Examining the Relative Predation Risks of Juvenile Chinook Salmon in Shallow Water Habitats of the Central Delta: The Effect of Submerged Aquatic Vegetation on Predation Risk. *IEP Newsletter* 13(1):55–59.

Simenstad C, Toft J, Higgins H, Cordell J, Orr M, Williams P, Grimaldo L, Hymanson Z. 1999. Preliminary results from the Sacramento-San Joaquin Delta breached-levee wetland study (BREACH). *IEP Newsletter* 12(4):15–21.

Grimaldo, L.F. and Z. Hymanson. 1999. What is the impact of the introduced Brazilian Waterweed *Egeria densa* to the Delta Ecosystem? IEP Newsletter 12(1): 43-45.

Grimaldo, L.F., B. Harrell, R. Miller, Z. Hymanson. 1998. Determining the Importance of Shallow-Water Habitat in the Delta to Resident and Migratory Fishes: A New Challenge for the IEP. IEP Newsletter 11(3) 4:27.

Grimaldo, L.F., D. Sweetnam, and B. Ross. 1998. Preliminary Results on the Age and Growth of Delta Smelt (*Hypomesus transpacificus*) from Different Areas of the Estuary using Otolith Microstructure Analysis. IEP Newsletter 11(1): 25-28.

Baxter R., W. Harrell, and L. Grimaldo. 1996. Splittail Spawning Investigations. IEP Newsletter (9) 4:27.

Awards

San Francisco State University, Romberg Tiburon Center, 2013, Outstanding Alumnus Award

United States Bureau of Reclamation, 2011, Star Award for outstanding performance on review of the 2-Gates Demonstration Project

United States Bureau of Reclamation, 2010, Star Award for outstanding work for providing expert testimony and technical support on the Preliminary Injunction case for the biological opinion for the Central Valley Project and State Water Project

Cal-Neva American Fisheries Society, 2009, Award for Distinguished Professional Achievement for participating on the Delta Smelt Workgroup

Cal-Neva American Fisheries Society, 2008, Award for Distinguished Professional Achievement for participation on the 2007 Annual Conference Committee.

California Department of Water Resources, 2008, Outstanding Superior Accomplishment Directors Award for technical assistance related to the delta smelt workgroup and food web research

California Department of Water Resources, 2008, Outstanding Service Award for technical assistance on Pelagic Organism Decline (POD) research efforts

California Department of Water Resources, 2004, Outstanding Service Award 2004 for larval fish research publication in book symposia

CALFED Science Program, 2001, Best Student Speaker Award

California Department of Water Resources, 1995, Outstanding Service Award for assistance on the Interagency Ecological Program Real-time Monitoring Survey