

Corey C. Phillis

Metropolitan Water District of Southern California
Bay Delta Initiatives
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Education

2008–2014

Ph.D. Biological Sciences, Simon Fraser University, Burnaby, Canada
Ecology & Evolutionary Biology, University of California, Santa Cruz
(transferred to Simon Fraser University in May 2011)

Thesis title: The evolution, ecology, and restoration of anadromy in rainbow trout/steelhead (*Oncorhynchus mykiss*).

Committee: Jonathan Moore (Supervisor), John Reynolds, Anne Salomon

1998–2003

B.Sc. Marine Biology, University of California, Santa Cruz

Employment

2015–present

Resource Specialist, Metropolitan Water District of Southern California

2014–2015

Fishery Biologist III, Northwest Fisheries Science Center

Developed models to identify habitat factors limiting survival and capacity for different life history types of Chinook and coho salmon. Used models to improve escapement goal estimates and evaluate whether restoration scenarios met recovery plan goals

2011–2014

Graduate R.A., Simon Fraser University

2008–2011

Graduate R.A., University of California, Santa Cruz

2003–2010

Participant Guest, Lawrence Livermore National Laboratories

Analyzed elemental composition of otoliths (fish earbones) on specialized

instruments, including electron probe microanalysis (EPMA), secondary ion mass spectrometry (SIMS), and NanoSIMS.

2006–2010

Staff Research Associate II, University of California, Berkeley

Developed elemental and isotopic mixing models for Sacramento River and San Francisco Bay Delta waters. Analyzed otolith samples using Laser Ablation Multi-Collector Inductively Coupled Mass Spectrometry (LA-ICP-MS). Applied models to otoliths to determine habitats used by juvenile salmon and striped bass.

2003–2006

Laboratory Assistant III, University of California, Berkeley

Collected, prepared, and analyzed water and otolith samples.

2001–2002

Laboratory Assistant II, National Marine Fisheries Service, Santa Cruz

Performed redd surveys, seined lagoons to estimate juvenile abundance

1998–2002

Field and Laboratory Assistant, various labs, University of California, Santa Cruz

Publications in Refereed Journals

In Review

Phillis C.C. & J.W. Moore. “Dam evolution: an individual-based model of the evolution of anadromy in a steelhead/rainbow trout population.” In review

Phillis C.C., D.E. Pearse, S.A. Hayes, A.B. Cooper, J.W. Moore. “Density-mediated effects of rapid evolution on stream ecosystems.” In review

Published

Johnson R.C., J.C. Garza, R.B. MacFarlane, C.B. Grimes, **C.C. Phillis**, P.L. Koch, P.K. Weber, M.H. Carr. Accepted. “Isotopes and genes reveal freshwater origins and composition of salmon aggregations in the coastal ocean.” *Marine Ecology Progress Series*.

Phillis C.C., J.W. Moore, M. Buoro, S.A. Hayes, J.C. Garza, D.E. Pearse. 2016. “Shifting thresholds: rapid evolution of migratory life histories in steelhead/rainbow trout, *Oncorhynchus mykiss*.” *Journal of Heredity* 10.1093/jhered/esv085.

Moore J.W., M.P. Beakes, H.K. Nesbitt, J.D. Yeakel, D.A. Patterson, L.A. Thompson, **C.C. Phillis**, D.C. Braun, C. Favaro, D. Scott, C. Carr-Harris, W. Atlas. 2015. “Emergent stability in a large free-flowing watershed.” *Ecology* 96:340–347. <http://dx.doi.org/10.1890/14-0326.1>.

Moore, J.W., T.D. Lambert, W.N. Heady, S.E. Honig, A-M.K. Osterback, **C.C. Phillis**, A.L. Quiros, N.A. Retford, D.B. Herbst. 2014. “Anthropogenic land-use signals propagate through stream food webs in a California, USA, watershed.” *Limnologia* 46: 124–130. doi:10.1016/j.limno.2014.01.005.

Favaro, B., D.C. Braun, **Earth2Ocean Research Derby**. 2013. “The ‘Research Derby’: a pressure cooker for creative and collaborative science.” *Ideas in Ecology and Evolution* 6 (1). <http://doi:10.4033/iee.2013.6.9.n>.

Phillis, C.C.*, S.M. O’Regan*, S.J. Green*, J.E.B. Bruce*, S.C. Anderson, J.N. Linton, Earth2Ocean Research Derby, B. Favaro. “Multiple pathways to conservation success.” *Conservation Letters* 6(2): 98-106. <http://doi.org/10.1111/j.1755-263X.2012.00294.x>.

(*Authors contributed equally, listed in reverse alphabetical order)

Phillis, C.C., D.J. Ostrach, B.L. Ingram, P.K. Weber. 2011. “Evaluating otolith Sr/Ca as a tool for reconstructing estuarine habitat use.” *Canadian Journal of Fisheries and Aquatic Sciences* 68 (2): 360–73. doi:10.1139/F10-152.

In Preparation

Phillis, C.C., J.W. Moore, M.P. Beakes, C. Favaro, H.K. Nesbitt, E.P. Palkovacs, G.R. Pess. “Restoration of anadromy”.

Phillis, C.C., E.J. Ward, P.K. Weber, *et. al.* “Non-natal juvenile rearing habitats are important contributors to adult production in an endangered Chinook salmon population: Insights from novel quantitative methods for assessing habitat use from otolith chemistry”.

Teaching Experience

Fall 2013

Co-Instructor with Sean Anderson, Alex Chubaty, and Franz Simon. Simon Fraser University

BISC 888-1: Data Wrangling and Visualization in R. A graduate-level course of 20 students. Co-developed the curriculum, lectures, exercises, and assignments, presented `ggplot2` lecture.

Course is available at: <https://github.com/seananderson/datawranglR>

Fall 2013

Teaching Assistant, Simon Fraser University
TA for BISC 309: Conservation Biology (Nick Dulvy).

Fall 2013

Guest Lecture, Simon Fraser University
Conservation Biology. “Scales of Diversity”

Fall 2007, Fall 2008, & Fall 2010

Guest Lecture, Earth & Planetary Sciences Department, University of California, Berkeley
Sophomore Seminar Series (Lynn Ingram). “California Salmon & Water”

Fall 2010

Teaching Assistant, University of California, Santa Cruz
TA for BIOE 109: Evolution (Grant Pogson).

Fall 2009

Guest Lecture, University of California, Santa Cruz
EART 209: Isotope Ecology (Paul Koch). “Sr isotopes: Systematics and ecological applications”

Fall 2009

Teaching Assistant, University of California, Santa Cruz
TA for BIOE 150: Ecological Field Methods (Don Croll).

Presentations

2015

American Fisheries Society, Portland, WA
“Incorporating life-history diversity into estimates of Skagit River Chinook salmon production”

American Fisheries Society, California-Nevada Chapter, Santa Cruz, CA
“Eco-Evolutionary dynamics and the indirect effects of density on aquatic ecosystems”

American Fisheries Society, California-Nevada Chapter, Santa Cruz, CA
“Using Bayesian state-space models to quantify movement through isoscapes: life-history diversity in migrations of imperiled salmon”

NWFSC Watershed Program Open House, Seattle, WA
“Incorporating life-history diversity into estimates of Skagit River Chinook salmon production”

- 2014 Joint Aquatic Science Meeting, Portland, OR
Invited presentation, Integrative Session: Eco-evolutionary dynamics in aquatic ecosystems
“Eco-Evolutionary dynamics and the indirect effects of density on aquatic ecosystems”
- 2013 Inter-Departmental Ecology of Aquatic Systems Symposium, Simon Fraser University
“The evolutionary salmon rescue”
Ecological Society of America, Minneapolis, MN
“Rapid evolution of migratory life histories: From steelhead to trout in 25 generations”
Canadian Society of Ecology & Evolution, Kelowna, BC, Canada
“Rapid evolution of migratory life histories: From steelhead to trout in 25 generations”
- 2012 Inter-Departmental Ecology of Aquatic Systems Symposium, Simon Fraser University
“Dammed Anadromy? Ecological and evolutionary considerations for restoring anadromy” ***Awarded Best Talk***
Ecological Society of America, Portland, OR
“Dam evolution: Rapid evolution of fish migration in response to novel river barriers”
Center for Coastal Studies Open House, Simon Fraser University
“Dam evolution!: Can salmon evolve in response to novel river barriers” (*Poster*)
- 2011 American Fisheries Society, Seattle, WA
“Ecological consequences of rapid life-history evolution in rainbow trout”
Ecological Society of America, Austin, TX
“Ecological consequences of rapid life-history evolution in rainbow trout”
Ecology & Evolutionary Biology Department Symposium, University of California, Santa Cruz
“Ecological consequences of rapid life-history evolution in *Oncorhynchus mykiss*”
- 2010 Biennial Bay-Delta Science Conference, Sacramento, CA
“Life history diversity within spring-run Chinook salmon populations”
- 2009 International Otolith Symposium, Monterey, CA
“Life history diversity within imperiled Chinook salmon populations determined by otolith $^{87}\text{Sr}/^{86}\text{Sr}$ and $\delta^{18}\text{O}$ microchemistry”

- Ecological Society of America, Albuquerque, NM
 “Life history diversity within imperiled Chinook salmon populations”
- Fisheries and Marine Ecosystems, Surrey, BC, Canada
 “Life history diversity within imperiled Chinook salmon populations”
- 2008 American Geophysical Union, San Francisco, CA
 “San Francisco Bay Estuary habitat use determined by otolith stable isotopes” (*Poster*)
- CALFED Biennial Science Conference, Sacramento, CA
 “Freshwater and estuary rearing of successfully spawned adult Chinook salmon, determined by Sr isotopes”
- ISOSCAPES: Isotopes Mapping Workshop, Santa Barbara, CA
 “The role of juvenile rearing habitats for winter and spring run Chinook salmon, determined by otolith Sr isotopes” (*Poster*)
- 2007 Organizer/Moderator Otolith Microchemistry Symposium, 137th Annual AFS Meeting, San Francisco, CA, September, 2007
- American Fisheries Society, San Francisco, CA
 “Chinook salmon rearing in the San Francisco Bay-Delta system: Identification of geochemical markers to determine Delta use”
- 2006 CALFED Biennial Science Conference, Sacramento, CA
 “A novel method to develop an otolith microchemistry model to determine Striped Bass Habitat Use in the San Francisco Estuary”
- 2005 American Geophysical Union, San Francisco, CA
 “Striped Bass habitat use in the San Francisco Estuary determined by otolith microchemistry techniques” (*Poster*)
- 2004 CALFED Biennial Science Conference, Sacramento, CA
 “Sacramento River striped bass migration history determined by otolith Sr/Ca ratio” (*Poster*)
- Fourth SETAC World Congress, Portland, OR
 “Sacramento River striped bass migration history determined by otolith Sr/Ca ratio” (*Poster*)

Refereed Journals

Ecological Applications, Journal of Fish Biology, Limnology & Oceanography, Functional Ecology, Transaction of the American Fisheries Society

Selected Courses

- 2012 Fisheries Assessment Methods. Andy Cooper. Simon Fraser University
- 2009 Isotope Ecology. Paul Koch. University of California, Santa Cruz
- 2009 Population Biology and Disease Ecology. Marm Kilpatrick. University of California, Santa Cruz
- 2006 Presenting Data and Information. Edward Tufte, San Francisco, CA
- 2002 Field Ecology of French Polynesia. Pete Raimondi & Giacomo Bernardi. University of California, Santa Cruz (*field quarter in Moorea, French Polynesia*)
- 2002 Fisheries Population Dynamics. Marc Mangel. University of California, Santa Cruz
- 2001 Quantitative Ecology for Conservation Biology. Dan Doak. University of California, Santa Cruz

Toolkit

My workflow involves R for data manipulation, statistical analyses, and data presentation, Markdown for composition, RMarkdown for integrating analysis and composition, knitr for pulling it all together, pandoc for exporting to various file types (.tex, .pdf, .docx, etc.), and Git/GitHub for keeping track of it all. I have a working knowledge of JAGS, LaTeX, C++/Rcpp.