Tessa B. Francis
Curriculum Vitae

Tessa B. Francis

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Current Position

Lead Ecosystem Ecologist, Puget Sound Institute, University of Washington Tacoma (2012-present)

Managing Director, Ocean Modeling Forum (2014-present)

Education

B.A. in Political Science with Honors and a Minor in English, University of California, Berkeley (1989-1992)

B.S. in Wildlife Science with Honors and a Minor in Quantitative Science, University of Washington (1999-2002)

Ph.D. in Zoology, University of Washington (2002-2009). Dissertation title: "Effects of shoreline urbanization on aquatic-terrestrial links in lakes." Advisor: Daniel Schindler

Recent Positions

National Research Council Postdoctoral Researcher, Northwest Fisheries Science Center, NOAA, Seattle, WA (2009-2012). Advisor: Phil Levin

Publications

Punt, AE, AD MacCall, TE Essington, TB Francis, F Hurtado-Ferro, KF Johnson, IC Kaplan, LE Koehn, PS Levin and WJ Sydeman. 2016. Exploring the implications of the harvest control rule for Pacific sardine, accounting for predator dynamics: a MICE model. Ecological Modelling 337: 79-95. Doi: 10.1016/j.ecolmodel.2016.06.004.

Levin, PS, TB Francis and NG Taylor. 2016. Thirty-two essential questions for understanding the social-ecological system of forage fish: the case of Pacific herring. *Ecosystem Health and Sustainability* 2(4):e01213. Doi:10.1002/ehs2.1213.

Siple, MC and TB Francis. 2015. Population diversity in Pacific herring of the Puget Sound, USA. *Oecologia* doi: 10.1007/s00442-015-3439-7.

Shelton OE, TB Francis, GD Williams, B Feist, K Stick and PS Levin. 2014. Habitat limitation and spatial variation in Pacific herring egg survival. *Marine Ecology Progress Series* 514: 231-245.

Francis TB, Wolkovich EM, Scheuerell MD, Katz SL, Holmes EE, Hampton SE. 2014. Shifting Regimes and Changing Interactions in the Lake Washington, U.S.A., Plankton Community from 1962–1994. *PLoS ONE* 9(10): e110363. doi:10.1371/journal.pone.0110363.

Carey, M.P, Levin, P.S., Townsend, H.T., Minello, T.J., Sutton, G.R., Francis, T.B., Harvey, C.J, Toft, J.E., Arkema, K.K, Burke, J.L., Kim, C., Guerry, A., Plummer, M., Spiridonov, G. and M. Ruckelshaus. 2013. Characterizing coastal food webs with qualitative links to bridge the gap between the theory and practice of ecosystem based management. *ICES J. of Mar. Sci.* doi:10.1093/icesjms/fst012.

Francis, TB, M.D. Scheuerell, R.D. Brodeur, P.S. Levin, J.J., Ruzicka, N. Tolimieri and W.T. Peterson. 2012. Climate shifts the interaction web of a marine plankton community. *Global Change Biology* 18: 2498–2508. doi: 10.1111/j.1365–2486.2012.02702.x.

Schindler, D.E., J.L. Carter, T.B. Francis, et al. 2012. Mysis in the Okanagan Lake food web: a time–series analysis of interaction strengths in an invaded plankton community. *Aquatic Ecology* 46: 215–227.

Francis, T.B., D.E. Schindler, G.W. Holtgrieve, E.R. Larson, M.D. Scheuerell, B.X. Semmens and E.J. Ward. 2011. Habitat structure determines resource use by zooplankton in temperate lakes. *Ecology Letters* 14(4): 364–372.

Francis, T.B., C.J. Harvey and P.S. Levin. 2011. The perils and promise of futures analysis in marine ecosystem–based management. *Marine Policy* 35:675–681.

Francis, T.B. and Kaplan, I.C. APPENDIX C: Predators and Prey of Sablefish, Pacific Hake, Bocaccio, and Canary Rockfish, in Levin, P. S., F. B. Schwing. (Eds.) 2011. Technical background for an integrated ecosystem assessment of the California Current: Groundfish, salmon, green sturgeon, and ecosystem health. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS–NWFSC–109, 330 p.

Harvey, C. J., KK. Bartz, J. Davies, T.B. Francis, T.P. Good, A.D. Guerry, B. Hanson, K.K. Holsman, J. Miller, M.L. Plummer, J.C.P. Reum, L.D. Rhodes, C.A. Rice, J.F. Samhouri, G.D. Williams, N. Yoder, P.S. Levin and M.H. Ruckelshaus. 2010. A mass–balance model for evaluating food web structure and community–scale indicators in the Central Basin of Puget Sound. NOAA Technical Memorandum NMFS–NWFSC–106.

Levin, P.S., T.B. Francis, et al. 2010. Understanding future and desired system states, Chapter 1A in Puget Sound Science Update, Puget Sound Partnership, 144 p.

Francis, T.B. and D.E. Schindler. 2009. Shoreline urbanization reduces terrestrial insect subsidies to fishes in North American lakes. *Oikos* 118(12): 1872–1882.

Mills, A., T.B. Francis, V. Shandas, K. Whittaker, and J.K. Graybill. 2008. Using best available science to protect critical areas in Washington state: challenges and barriers to planners. *Urban Ecosystems* 11(4).

Francis, T.B., D.E. Schindler, J.M. Fox, E. Seminet–Reneau. 2007. Effects of urbanization on the dynamics of organic sediments in temperate lakes. *Ecosystems* 10: 1057–1068.

Francis, T.B. and D.E. Schindler. 2006. Degradation of littoral habitats by residential

development: woody debris in lakes of the Pacific Northwest and Midwest, United States. *Ambio* 35: 274-280

Francis, T.B., D.E. Schindler and J.W. Moore. 2006. Aquatic insects play a minor role in dispersing salmon-derived nutrients into riparian forests in southwestern Alaska. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 2543-2552.

Francis, T.B. "Eurasian watermilfoil" in Boersma, P. D., S. E. Reichard, and A. N. Van Buren (eds.). *Invasive Species in the Pacific Northwest*. Seattle and London: University of Washington Press, 2006.

Francis, T.B., K.A. Whittaker, V. Shandas, A. Mills and J.K. Graybill. 2005. Incorporating science into the environmental policy process: A case study from Washington State. *Ecology and Society* 10(1): 35.

Schindler, D.E., M.D. Scheuerell, J.W. Moore, S.M. Gende, T.B. Francis and W.J.Palen. 2003. Pacific salmon and the ecology of coastal ecosystems. *Frontiers in Ecology and the Environment* 1(1): 31-37.

In Prep

Francis, T.B., AO Shelton, PS Levin, GD Williams. The role of egg predation by seabirds in Puget Sound herring population dynamics.

Francis, T.B. and H. Moran. Environmental drivers of spawn timing shifts in Puget Sound herring. *CJFAS*

Francis, T.B. Evaluating trade-offs among ecosystem recovery targets: a qualitative food-web analysis. *Estuaries and Coasts.*

Francis, T.B. and P.S. Levin. Key prey and predators of California Current fish groundfish: a qualitative food web analysis. *MEPS.*

Francis, T.B., W.T. Peterson, E. Wolkovich and P.S. Levin. Zooplankton community stability is a leading indicator of regime shift in the Northern California Current. *Limnology & Oceanography*

Grants and Fellowships

Pacific Herring Working Group, Ocean Modeling Forum (Co-PI) Pew Charitable Trusts. **2016.**	$ 69,386
Ocean Modeling Forum (Co-PI). David and Lucile Packard Foundation. **2015-2017.**	$250,000
Synthesis of Puget Sound Recovery Projects (PI). Marine / Nearshore Lead Organization, Washington Department of Fish and Wildlife. **2015-2016.**	$239,085
Pacific herring summit, Ocean Modeling Forum (Co-PI) Pew Charitable Trusts. **2015.**	$ 46,282
Habitat limitation of Puget Sound forage fish (PI) Puget Sound Institute / EPA. **2012-2013.**	$120,000
National Research Council Postdoctoral Research Fellow/CAMEO	$177,000

2009-2012.

U.S. Environmental Protection Agency – STAR Graduate Fellow $111,000
2006-2009.

U.S. National Science Foundation – Graduate Research Fellow $90,000
2004-2006.

U.S. National Science Foundation – IGERT Fellow. **2002-2004.** $48,000

Teaching and Mentoring (* = won teaching award)

Instructor: Urban Ecology (Enviro 220) Univ. Washington

Teaching Assistant: Limnology (FSH 473) Univ. Washington (2 years)*
Teaching Assistant: Limnology Lab (FSH 475), Univ. Washington (2 years)*

PhD Committee Member: Megsie Siple, Univ. Washington SAFS

Supervisor: Aimee Kinney, Research Scientist, Puget Sound Institute
Supervisor: Bryan Huebner, GIS Technician, Puget Sound Institute
Supervisor: Chiara Robertson, Research Assistant, Puget Sound Institute
Supervisor: Hiram Moran & Bryan Huebner, Undergraduate Interns, Puget Sound Institute

Guest lecturer: Water Seminar (ESRM 429, Undergraduate), Univ. Washington
Guest Lecturer: Limnology (FISH 473, Undergraduate), Univ. Washington

Graduate Student Advisory Committees
Margaret Siple, UW School of Aquatic and Fishery Sciences (Ph.D degree; Advisor: Tim Essington)

Awards

ICES/PICES Early Career Conference Invitee (2012)

Eco-DAS Awardee (2009)

Marsha Landolt and Robert Busch Award in Aquatic and Fishery Sciences (2006)

University of Washington Ingrith Deyrup-Olsen Outstanding Teaching Award (2005)

Washington Lake Protection Association Research Scholarship (2004)

University of Washington Robert T. Paine Field Ecology Award (2004)

Budweiser/National Fish & Wildlife Foundation Conservation Scholarship
- $10,000 (2001)

Synergistic Activities

Northwest Straits Commission Science Advisory Board

Editor, Encyclopedia of Puget Sound

Member, Cherry Point Herring Technical Committee

Participant, Puget Sound Eelgrass Recovery Target Working Group

Puget Sound Ecosystem Monitoring Program, Forage Fish and Food Webs working group member.

Salish Sea Ecosystem Conference (2014, 2016) Steering Committee member

Salish Sea Ecosystem Conference (2014) Forage Fish and Food Web Session. (Organizer)

Puget Sound Institute Study Panel: Ecosystem-based Management of Puget Sound Forage Fish. Friday Harbor, San Juan Island, WA. August 2013. (Organizer)

Puget Sound Institute/Puget Sound Partnership State of the Science Panel: "Ocean Health Index Downscaling to Puget Sound," Tacoma, WA. March 2013. (Organizer)

Scholarly and Professional Activities

Peer Review:

Science
Canadian J of Fisheries and Aquatic Sciences
Global Change Biology
Ecological Applications
Ecology
Ecology Letters
Conservation Letters
MEPS
PLoS ONE
New York Sea Grant
Limnology and Oceanography
Ecology of Freshwater Fish
Ecosystems
Hydrobiologia
J of Applied Ecology
Oikos
Ecology & Evolution
Ecological Research
ESA LTER Program

Society Memberships and Service

Secretary, Aquatic Section of the Ecological Society of America, 2011-2013
American Society of Limnology and Oceanography, 2002--present
Ecological Society of America, 2002--present
Washington Lake Protection Association, 2003--present
North American Benthological Society, 2005--present

Presentations *(* = invited)*

*A multi-model approach to incorporating traditional knowledge and human dimensions into Pacific herring management: The Ocean Modeling Forum. ICES Annual Science Conference. Riga, Latvia. September 2016.

*Integrating traditional and local ecological knowledge into the quantitative assessment of forage fish populations and ecosystems. International Marine Conservation Congress. Newfoundland, Canada. July 2016.

*Turning models into action: The Ocean Modeling Forum. International Marine Conservation Congress. Newfoundland, Canada. July 2016.

The role of egg predation in Pacific herring population dynamics in the Salish Sea. Salish Sea Ecosystem Conference. Vancouver, British Columbia, Canada. April 2016.

*Seagrass, climate, birds and seals: Understanding limits on Puget Sound herring recovery. Monster Seminar Jam, NOAA Northwest Fisheries Science Center, Seattle, WA. April 2016.

Improving the use of models in marine ecosystem-based management: The Ocean Modeling Forum. Coastal and Estuarine Research Federation Annual Conference. Portland, OR. November 2015.

*A multi-model approach to assessing the ecosystem impacts of Pacific sardine fisheries. ICES Annual Science Conference. Copenhagen, Denmark. September 2015.

The role of egg predation in Pacific herring population dynamics in Puget Sound, Washington. American Fisheries Society Annual Meeting. Portland, OR. August 2015.

*Does the road to recovery of Pacific herring go through eelgrass? Vashon Ed Talks. Vashon, WA. May 2015.

*Does shoreline development impact herring in Puget Sound? University of Washington Water Seminar. Seattle, WA. April 2015.

*What limits Pacific herring recovery in Puget Sound? University of Washington Tacoma Environmental Seminar. Tacoma, WA. April 2015.

*Synthesis and communication of Lead Organization Grant Program Results. Puget Sound Partnership Science Panel. Seattle, WA. February 2015.

The role of egg predation in population dynamics of Pacific herring, Puget Sound, USA. ICCB. Montpellier, France. August 2015.

*Pacific herring "recovery": identifying causes of decline of an indicator species. Marine Resources Commission Annual Meeting. Port Townsend, WA. December 2014.

*The ecology of forage fish in Puget Sound. Cherry Point Aquatic Reserve Citizen Stewardship meeting. Bellingham, WA. October 2014.

After the indicator: The road to recovery for Puget Sound herring. International Marine Conservation Congress. Glasgow, Scotland. August 2014.

Can we have our herring and eat our salmon, too? A qualitative approach to modeling trade-offs in Puget Sound. Joint Aquatic Sciences Meeting, Portland, OR, August 2014.

*Can we have our herring and eat our salmon, too? A qualitative approach to modeling trade-offs in Puget Sound. Salish Sea Ecosystem Conference, April 2014, Seattle, WA 2014.

*Forage fish and the Puget Sound Food Web. A "Science Café" presentation, Tacoma, WA. May 2014.

*Forage fish in Puget Sound: Status, Importance and Recovery. A presentation to the Washington State House Environment Committee, Olympia, WA. March 2014.

Population diversity in Puget Sound herring: Is there a "portfolio effect"? Annual Ecological Society of America meeting, Minneapolis, MN, August 2013.

Qualitative food-web modeling to support ecosystem-based fisheries management: A case study of California Current groundfish. Annual Ecological Society of America meeting, Portland, Oregon, August 2012.

Big problems, little data: Qualitative modeling of the forage fish food web in Puget Sound, USA. 2012. ICES/PICES FACT Forage Fish Conference, Nantes, France.

*Forage fish of Puget Sound. 2012. University of Washington Water Seminar, Seattle,

WA.

Qualitative food-web modeling to support ecosystem-based fisheries management: A case study of California Current groundfish. 2012. Ecological Society of America, Portland, OR.

Qualitative modeling of groundfish food-webs. Western Society of Naturalists meeting, Vancouver, WA. November 2011.

Analysis of OR coast zooplankton interactions and stability using multivariate autoregressive (MAR) models with a moving window. American Society of Limnology and Oceanography Aquatic Sciences meeting, Santa Fe, NM. February 2011.

Analysis of Oregon coast zooplankton interactions using multivariate autoregressive (MAR) models. American Society of Limnology and Oceanography Ocean Sciences meeting, Portland, OR. February 2010.

Shoreline urbanization reduces terrestrial insect subsidies to fishes in North American lakes. Ecological Society of America, Albuquerque, NM. August 2009.

*Modeling community interactions in the California Current. NOAA Northwest Fisheries Science Center. Newport, OR. July 2009.

*Effects of shoreline urbanization on aquatic-terrestrial coupling in lakes. 2009. National Lakes Management Conference. Chicago, IL.

*Lakes on the edge: Consequences of shoreline urbanization in the Pacific Northwest. University of Washington Water Center's 18th Annual Review of Research. Seattle, WA. April 2008.

Terrestrial insect subsidies to fish populations weakened with lakeshore development in the Pacific Northwest. American Society of Limnology and Oceanography, Santa Fe, NM. February 2007.

Terrestrial insect subsidies to fish populations weakened with lakeshore development in the Pacific Northwest. North American Benthological Society. Anchorage, AK. August 2006.

*Alteration of benthic habitats in the Pacific Northwest: Effects of lakeshore development and consequences for invertebrate production. Washington Lake Protection Associate. Spokane, WA. September 2005.

Alteration of benthic habitats in the Pacific Northwest: Effects of lakeshore development and consequences for invertebrate production. American Society of Limnology and Oceanography, Salt Lake City, UT. February 2005.

Emerging aquatic insects transport salmon nutrients to riparian forests. Alaska Salmon Program Research Symposium. Seattle, WA. December 2004.

Consequences of lakeshore development for littoral habitats in the Pacific Northwest: The role of large wood in lakes. Ecological Society of America, Portland, OR. August 2004.

*Distribution and function of coarse woody debris in Pacific Northwest lakes. Littoral Habitat Workshop, Trout Lake Research Station, Wisconsin. September 2003.

Consequences of lakeshore development for littoral habitats in the Pacific Northwest. Ecological Society of America, Savannah, GA. August 2003.

The role of coarse woody debris in lakeshore dynamics. Urban Ecology Conference, Berlin, Germany. July 2003.

*Consequences of lakeshore development for littoral habitats in the Pacific Northwest. Washington Lake Protection Association annual meeting. September 2003.

*Consequences of lakeshore development for littoral habitats in the Pacific Northwest. American Society of Limnology and Oceanography, Salt Lake City, UT. February 2003.
Flying insects disperse salmon nutrients into streamside forests. Mary Gates Undergraduate Research Symposium. May 2002.

Non-scientific Professional Activities
Producer and Staff Member, Annex Theater, Seattle, WA (1996-1999)
Founder and Board Member, Westside Original Works, Los Angeles, CA (1992-1994)
Assistant to the Producers, *Robin Hood: Men in Tights*, Hollywood, CA (1992-1994)