

Malte Willmes

¹Researcher, Norwegian Institute for Nature Research,
Trondheim, Norway

+47 46286460

²Assistant Project Scientist WOS, Institute of Marine
Sciences, University of California Santa Cruz, USA

Malte.Willmes@gmail.com

www.maltewillmes.com

github.com/MalteWillmes

Research overview

I am a researcher in ecology, geochemistry, and archaeology, specializing in the use of geochemical tracers to reconstruct wildlife migrations, life histories, and population connectivity. My current work focuses on otoliths and scales to study Atlantic and Pacific salmonids, Delta and Longfin smelt, and sturgeon. By integrating fieldwork, laboratory analyses, and statistical modeling, I aim to advance wildlife management and conservation.

Academic appointments

2022 – ongoing	Researcher at the Norwegian Institute for Nature Research
2022 – ongoing	Assistant Project Scientist WOS, Institute of Marine Sciences, UC Santa Cruz
2021 – 2022	Assistant Project Scientist, Institute of Marine Sciences, UC Santa Cruz
2019 – 2021	Postdoc, Institute of Marine Sciences, UC Santa Cruz
2017 – 2019	Delta Science Postdoc Fellow
2016 – 2019	Postdoc, Moyle Fish Ecology Laboratory and Hobbs lab, UC Davis

Education and Training

2011 – 2016	PhD Earth Sciences The Australian National University, Canberra, Australia
2008 – 2010	MSc. Geoscience Westfälische Wilhelms-Universität Münster, Germany
2005 – 2008	BSc. Geoscience Westfälische Wilhelms-Universität Münster, Germany

Awards and Research Grants (active grants in bold)

2026-2029	Co-PI on “Developing geochemical methods for the non-lethal reconstruction of natal origins and anadromy from <i>Oncorhynchus mykiss</i> fish scales.”, United States Bureau of Reclamation (\$491,803 USD).
2025-2028	Co-PI on “Chinook Salmon juvenile growth through Central Valley rearing grounds”, State Water Contractors (1,273,511 USD).
2025-2026	PI on “Digitalisering av skjellageret – modernisert Skjellbidegrunnlag Miljødirektoratet (800,000 NOK).
2025-2026	Co-PI on “Establishing the origin of the invasive pink salmon, <i>Oncorhynchus gorbuscha</i> , spawning in Icelandic rivers”, Arctic Council, UK (62,000 USD).
2025-2026	Project partner for the “Guadalupe River Salmon project”, South Bay Clean Creeks Coalition (5,000 USD).
2024-2025	PI on “Videreutvikling Genbank - optimalisering med digitalisering av skjell”, Miljødirektoratet (300,000 NOK).
2023-2026	Co-PI on “Using otolith-based approaches to derive demographic parameters for California Central Valley Steelhead”, United States Bureau of Reclamation (581,443 USD).
2023-2026	Co-PI on “Green and White Sturgeon in the San Francisco Estuary: using fin ray geochemistry to reconstruct habitat use and migration throughout the Delta, and to estimate population-level impacts of harmful algal blooms”, Proposition 1 Watershed Restoration Grant & Delta Water Quality and Ecosystem Restoration Grant (889,842 USD).

2022-2025	Co-PI on “Assessing population-level impacts of drought operations on early life stage survival of Winter-run Chinook Salmon using otolith-based temperature reconstructions”, United States Bureau of Reclamation (1,313,740 USD).
2022-2024	Co-PI on “Combining aDNA and stable isotope analysis to reconstruct 6,000 years of salmon life history diversity”, UC Santa Cruz Office of Research Seed Funding for Early Stage Initiatives program (30,000 USD).
2021-2025	Co-PI on “Quantifying Thermal Thresholds for Central Valley Salmonids”, California State Water Resources Control Board (1,740,448 USD).
2021-2025	PI on “The effects of climate change on the life history of spring-run Chinook Salmon through time”, Delta Science Program (698,320 USD).
2021-2023	Co-PI on “Understanding the genetic basis for run timing and upstream passage in the Yuba River, Yuba River Regional Management Team (72,441 USD).
2021-2022	PI on “Genotypic and phenotypic diversity in Yuba River Spring-run Chinook Salmon”, NOAA Office of Habitat Conservation (117,002 USD).
2020-2022	Co-PI on “Putah Creek Chinook Salmon Monitoring”, Solano County Water Agency (308,256 USD).
2021-2022	2021 Cal-Neva AFS Small Grants Program (1500 USD).
2017-2019	PI on “In search of refuge: Investigating the thermal life history of Delta Smelt through in-situ oxygen isotope ratio analysis of otoliths”, Delta Science Postdoctoral Fellowship, Delta Science Program (216 000 USD).
2019	National Academy of Sciences, INQUA Conference 2019 travel grant (700 USD).
2018	UC Davis Postdoc Travel Grant (400 USD).
2018	UC Davis Open Access Fund for publication 2018 (1000 USD).
2018	UC Davis-ICPMS 2018 Exploratory Research Program (2000 USD).
2018	Best Speaker award at the UC Davis Postdoctoral Research Symposium (400 USD).
2017, 2019	Poster award at the UC Davis Postdoctoral Research Symposium (300 USD).
2013	Scholarship for the SPATIAL course, National Science Foundation (3000 USD).
2013	AFAS ACT Science & Technology Fellowship (5000 AUD).
2012	ANU Vice-Chancellor’s HDR travel grant (1000 AUD).
2011	ANU PhD Scholarship for international students (3.5 years).

Mentorship

Year	Name	Level	Institution
2023-2025	Frode Pedersen	MS	NTNU, Norway
2021-2024	Pedro Valencia Landa	MS	UC Santa Cruz, USA
2021-2022	Kimberly Evans	BA	UC Davis, USA
2020-2022	Rachel Fichman	MS	UC Davis, USA
2020-2021	Sami Araya	BA	UC Davis, USA
2018-2019	Jamie Sweeny	MS	UC Davis, USA
2018-2019	Kate Mathison	BA, Hons	Griffith University, Australia
2016-2022	Research mentor and supervisor to 8 Junior Specialists at the Otolith Geochemistry and Fish Ecology Laboratory, UC Davis, USA		

Academic Service

Review Editor at Frontiers in Marine Sciences (since 12/2021)

Peer-reviewer for ~53 manuscripts (since 2015) from the Journal of Fish Biology, Marine Ecology Progress Series, Marine and Freshwater Research, Rapid Communications in Mass Spectrometry, Science Advances, Scientific Reports, International Journal of Osteoarchaeology, G-Cubed, Geostandards and Geoanalytical Research, PLOS ONE, American Journal of Physical Anthropology, Frontiers in Ecology, Science of the Total Environment, Canadian Journal of Fisheries and Aquatic Sciences, Global Change Ecology, ICES.

Reviewer for European Research Council Grants (Remote referee), Austrian Academy of Sciences (Written reviewer), Reviewer for internal NOAA manuscript and grant applications.

Memberships

American Fishery Society - Western Division, European Association of Geochemistry, Salmon Restoration Federation, The Wildlife Society, American Quaternary Association, Fisheries Society of the British Isles (FSBI), European SEA-UNICORN COST Action, IsoArch, Research Data Alliance (RDA)

Core skills

Languages	German (native speaker), English (written and spoken fluently), French (beginner), Norwegian (beginner)
Analytical	Experience in working in a clean-lab environment and with hazardous substances Experience in the operation and application of mass spectrometers including Laser ablation ICP-MS, Neptune and Nu Multi-collector ICP-MS, Thermal ionization ICP-MS, Quadrupole ICP-MS, and SIMS.
Technical	R for statistical analysis, HavardX Data Science, GIS software (ESRI ArcGIS, QGIS, GeoNode), Iolite, ImageJ, Web design (HTML, CSS, GoogleEarth API)
Field	Salmon monitoring and carcass surveys in Putah Creek, CA (2018-2019) Boat based fish monitoring surveys in the San Francisco Estuary, CA (2015-2019) Geologic mapping and sample collection for Isoscapes 2012-2015
Qualifications	Wilderness First Aid (WFA) Science communication workshop (2012, 2017, 2018) Graduate of the Leaders for the Future Program, UC Davis (2017-2018)

Selected Presentations

2022	Lecturer at the SPATIAL Short Course, University of Utah, Salt Lake City, Utah, USA. Chair for the session <i>Life History Diversity</i> at the 2022 AFS CalNeva Conference, Folsom California.
2021	Invited speaker at the World Fisheries Congress (virtual) Invited speaker at the Salmonid Restoration Federation meeting (virtual) Invited speaker at the Delta Science Program workshop – Monitoring Steelhead populations in the San Joaquin Basin (virtual)
2020	Guest lecturer at “Stable Isotopes in Archaeology and Biological Anthropology (BIAN8009), ANU, Australia. Public lecture at CreekSpeak, Putah Creek Council, Winters, California.
2019	Invited speaker at the Dating, Isotopes and Human Evolution workshop, Brisbane, Australia. Public lecture at Science Uncorked, Bodega Bay, California.
2018	Organizer of the two-part workshop “Chemical archives beyond otoliths” at the international Otolith Symposium, Taiwan and National American Fishery Society Meeting, Atlantic City.
2018	Invited speaker at the Interagency Ecological Program (IEP) Workshop, Folsom, California
2017	Invited speaker at the Environmental Futures Seminar Series, Griffiths University, Brisbane, Australia.
2013-2015	Guest lecturer in Geochronology and Isotope geochemistry for Archaeological Sciences, Research School of Earth Sciences, ANU, Australia.

Selected Reports

5. ICES. 2026. Workshop on emerging methods and technologies for the automated analysis of calcified structures (WKETAC). ICES Scientific Reports. 8:7. 32 pp.
4. Lewis, LS, **Malte Willmes**, Christian Denney, Christina Parker, Micah Bisson, Arthur Barros, James Hobbs. 2019. Interdisciplinary Studies on Longfin Smelt in the San Francisco Bay Estuary. Report to the California Department of Water Resources, Contract No. 4600011196, 130 pp.
3. James A. Hobbs, Christian Denney, Levi Lewis, **Malte Willmes**, Wilson Xieu, Andrew Schultz, Oliver Burgess. 2019. Chapter 4 - Exploring life history diversity of Delta Smelt during a period of extreme environmental variability. In A.A. Schultz, editor. Directed Outflow Project Technical Report 1. U. S. Bureau of Reclamation, Bay-Delta Office, Mid-Pacific Region, Sacramento, CA. Technical Report, August 2019, 402 pp.
2. James A. Hobbs, Christian Denney, Levi Lewis, **Malte Willmes**, Wilson Xieu, Andrew Schultz, Oliver Burgess. 2019. Chapter 5 - Environmental and ontogenetic drivers of growth in a critically-endangered species. In A.A. Schultz, editor. Directed Outflow Project Technical Report 1. U. S. Bureau of Reclamation, Bay-Delta Office, Mid-Pacific Region, Sacramento, CA. Technical Report, August 2019, 402 pp.
1. Lewis, LS, **Malte Willmes**, Christian Denney, Christina Parker, Micah Bisson, Arthur Barros, James Hobbs. 2018. Interdisciplinary Studies on Longfin Smelt in the San Francisco Bay Estuary. Report to the California Department of Water Resources, Contract No. 4600011196, 44 pp.

Publications

60. Herrera-Thomas P, Cordoleani F, Whitman G, Killackey K, Jeffres C, Johnson RC, Eerkens JW, Rosenthal J, Eubanks J, Willmes M (2026). Listening to the Past to Help California's Salmon in the Future. *Frontiers for Young Minds* 14:1619598. <https://doi.org/10.3389/frym.2026.1619598>
59. Brennan KG, Sturrock AM, Willmes M, Arai K, Phillis CC, Weber PK, Johnson RC (2026). A dendritic strontium river isoscape for fisheries applications in the Sacramento River basin, California, USA. *North American Journal of Fisheries Management*: vqag027. <https://doi.org/10.1093/najfmt/vqag027>
58. Simmons, O.M., Paulsen, T., Berntsen, H.H., Diserud, O., Fiske, P., Østborg, G., Willmes, M., and Thorstad, E.B. (2026). Early marine growth and spawning body size vary by year and region in invasive pink salmon (*Oncorhynchus gorbuscha*). *Aquatic Sciences* 88(3):77. [doi:10.1007/s00027-026-01309-z](https://doi.org/10.1007/s00027-026-01309-z).
57. Sturrock, A.M., Sellheim, K., Merz, J., Sweeney, J., Bell-Tilcock, M., Whitman, G., Arai, K., Willmes, M., Jeffres, C., Johnson, R.C. (2026). A Modern Ghost Story: Increased Selective Mortality of Salmon Under Climate Extremes. *Global Change Biology*. 32, e70854. <https://doi.org/10.1111/gcb.70854>
56. Stantis C., Willmes M., Le Corre M., James H.F., Kafino C., Verostick K.A., Paris E.H., Bank J., Bowen G.J., Salesse K., Bataille C.P. (2026). Global compilation of bioavailable strontium isotope data. *Scientific Data*. <https://doi.org/10.1038/s41597-026-06643-3>
55. Arai K., Willmes M., Johnson R.C., Sturrock A.M. (2026). Advancing provenance assignment using machine learning and time series analysis of chemical chronologies in archival tissues. *Ecological Informatics*. <https://doi.org/10.1016/j.ecoinf.2026.103604>
54. Willmes, M., Varmann Aamodt, A., Solli Andreassen, B., Tuddenham Haug, L.V., Steinkjer, E., Østborg, G.M., Løkeberg, G., Fiske, P., Brandt, G.R., Mikalsen, T., Siversten, A., Moustache, M., Ydsti, J.L., Florø-Larsen, B. (2025). Identifying escaped farmed salmon from fish scales using deep learning. *Biology Methods and Protocols*. <https://doi.org/10.1093/biomethods/bpaf078>
53. Arai K., Willmes M., Whitman G.E., Zillig K.W., Cooper C.J., Matsuda N., Bell E.A., McKeegan K.D., Lewis L.S., Jeffres C.A., Johnson R.C. (2025) Inter-method differences (SIMS vs. IRMS) in oxygen isotope fractionation: insights from Chinook salmon otoliths. *Geochimica et Cosmochimica Acta*:

52. Barakat, S., Williams K., Willmes M., Desclaux E., & Britton, K. (2025). Multi-Isotope Analysis of Mammalian Fauna from the Middle Pleistocene (MIS6) Lazaret Cave: Palaeoecological, Palaeoenvironmental and Archaeological Implications. *Journal of Archaeological Science: Reports* 68: 105456. <https://doi.org/10.1016/j.jasrep.2025.105456>
51. Evans, K. R., Whitman, G., Willmes, M., Holmes, E., Cordoleani, F., Jeffres, C. A., & Johnson, R. C. (2025). Reconstructing Salmon growth trajectories through biochronologies across a highly variable growthscape. *Canadian Journal of Fisheries and Aquatic Sciences*, cjfas-2024-0139. <https://doi.org/10.1139/cjfas-2024-0139>
50. Willmes, M., Cordoleani, F., Sturrock, A. M., Chen, E. K., Satterthwaite, W. H., Johnson, R. C., Eerkens, J. W., Whitman, G., Jeffres, C., Palkovacs, E. P., Ruiz Jr, J. J., Hobbs, J. A., Lewis, L. S., & Rosenthal, J. (2025). Archaeological evidence across four millennia indicates recent erosion of Chinook salmon age structure in California. *Marine Ecology Progress Series*. <https://doi.org/10.3354/meps14972>
49. Ghere, C. L., Willmes, M., Hardy, R. S., Ross, T. J., Dunnigan, J. L., Wilson, S. M., Carleton, S. A., & Quist, M. C. (2025). Population Structure and Movement Dynamics of Redband Trout in the Kootenai River Basin. *River Research and Applications*, rra.70027. <https://doi.org/10.1002/rra.70027>
48. Hitt, L. G., Willmes, M., Whitman, G., Miner, M. C., Jeffres, C., Johnson, R. C., Cocherell, D. E., Fangue, N. A., & Rypel, A. L. (2025). Early evidence for establishment of a Chinook salmon population in a restored watershed. *Ecosphere*, 16(3), e70207. <https://doi.org/10.1002/ecs2.70207>
47. James, H. F., Willmes, M., Fabre, M., Courtaud, P., Rey, K., Balasse, M., Grün, R., & Snoeck, C. (2025). Environmental sampling to capture bioavailable strontium isotope distributions on Corsica. *Applied Geochemistry*, 190, 106511. <https://doi.org/10.1016/j.apgeochem.2025.106511>
46. Lewis, L. S., Denney, C. T., Cavole, L. M., Lama, A. W., Chung, C. Y., Zhao, F., Hobbs, J. A., Willmes, M., Hung, T.-C., Glessner, J. J., Teh, S., & Hammock, B. G. (2025). Otolith-based comparisons of wild versus hatchery-origin delta smelt. *Endangered Species Research*, 57, 467–480. <https://doi.org/10.3354/esr01422>
45. Lewis, L., Willmes, M., Denney, C., Cavole, L., Xieu, W., Fichman, R., Hung, T., Ellison, L., Stevenson, T., Schultz, A., Hammock, B., Teh, S., & Hobbs, J. (2025). Validating estuarine movements from otoliths for an imperiled fish. *Aquatic Biology*. <https://doi.org/10.3354/ab00773>
44. Cordoleani, F., Phillis, C. C., Sturrock, A. M., Willmes, M., Whitman, G., Holmes, E., Weber, P. K., Jeffres, C., & Johnson, R. C. (2024). Restoring freshwater habitat mosaics to promote resilience of vulnerable salmon populations. *Ecosphere*, 15(3), e4803. <https://doi.org/10.1002/ecs2.4803>
43. Ghere, C. L., Quist, M. C., Hardy, R. S., Willmes, M., Lewis, L. S., Wilson, S. M., & Smith, T. W. (2024). An evaluation of fin ray microchemistry to describe movement of White Sturgeon in the Kootenai River basin: Insights and limitations. *Frontiers in Freshwater Science*, 2, 1475115. <https://doi.org/10.3389/ffwsc.2024.1475115>
42. Hugentobler, S. A., Sturrock, A. M., Willmes, M., Thompson, T. Q., Johnson, R. C., Cordoleani, F., Stauffer-Olsen, N. J., Whitman, G., & Meek, M. H. (2024). Remnant salmon life history diversity rediscovered in a highly compressed habitat. *Evolutionary Applications*, 17(7), e13741. <https://doi.org/10.1111/eva.13741>
41. Whitman, G., Messner, J., Johnson, R. C., Willmes, M., Kennedy, B. P., & Jeffres, C. (2024). Forensic geochemistry identifies the illegal introduction of Walleye into Lake Cascade, Idaho. *North American Journal of Fisheries Management*, nafm.10985. <https://doi.org/10.1002/nafm.10985>
40. Willmes, M., Sturrock, A. M., Cordoleani, F., Hugentobler, S., Meek, M. H., Whitman, G., Evans, K., Palkovacs, E. P., Stauffer-Olsen, N. J., & Johnson, R. C. (2024). Integrating otolith and genetic tools to reveal intraspecific biodiversity in a highly impacted salmon population. *Journal of Fish Biology*, jfb.15847. <https://doi.org/10.1111/jfb.15847>

39. Källo, K., Birnie-Gauvin, K., Baktoft, H., Bekkevold, D., Leshner, C., Grønkjær, P., Barfod, G. H., Johnson, R., Whitman, G., Willmes, M., Glessner, J., & Aarestrup, K. (2024). Otolith microchemistry combined with genetics reveal patterns of straying and population connectivity in anadromous brown trout (*Salmo trutta*). *Ecology of Freshwater Fish*, eff.12760. <https://doi.org/10.1111/eff.12760>
38. Barakat, S., Le Corre, M., Willmes, M., Cohen, J., Vuillien, M., Desclaux, E., & Britton, K. (2023). Laser ablation strontium isotopes and spatial assignment show seasonal mobility in red deer (*Cervus elaphus*) at Lazaret Cave, France (MIS 6). *Frontiers in Ecology and Evolution*, 11, 988837. <https://doi.org/10.3389/fevo.2023.988837>
37. Reis-Santos, P., Gillanders, B. M., Sturrock, A. M., Izzo, C., Oxman, D. S., Lueders-Dumont, J. A., Hüsey, K., Tanner, S. E., Rogers, T., Doubleday, Z. A., Andrews, A. H., Trueman, C., Brophy, D., Thiem, J. D., Baumgartner, L. J., Willmes, M., Chung, M.-T., Johnson, R. C., Heimbrand, Y., ... Walther, B. D. (2023). Reading the biomineralized book of life: Expanding otolith biogeochemical research and applications for fisheries and ecosystem-based management. *Reviews in Fish Biology and Fisheries*, 0123456789. <https://doi.org/10.1007/s11160-022-09720-z>
36. Vaisvil, A., Willmes, M., Enriquez, E. J., Klein, Z. B., & Caldwell, C. A. (2023). A needle in a haystack: Strontium isotopes ($^{87}\text{Sr}/^{86}\text{Sr}$) in otoliths identify origin of Largemouth Bass from a large Southwest reservoir. *Canadian Journal of Fisheries and Aquatic Sciences*, cjfas-2023-0148. <https://doi.org/10.1139/cjfas-2023-0148>
35. Barros, A., Hobbs, J. A., Willmes, M., Parker, C. M., Bisson, M., Fangue, N. A., Rypel, A. L., & Lewis, L. S. (2022). Spatial Heterogeneity in Prey Availability, Feeding Success, and Dietary Selectivity for the Threatened Longfin Smelt. *Estuaries and Coasts*. <https://doi.org/10.1007/s12237-021-01024-y>
34. Campbell, M. A., Joslin, S. E. K., Goodbla, A. M., Willmes, M., Hobbs, J. A., Lewis, L. S., & Finger, A. J. (2022). Polygenic Discrimination of Migratory Phenotypes in an Estuarine Forage Fish. *G3 Genes|Genomes|Genetics*. <https://doi.org/10.1093/g3journal/jkac133>
33. James, H. F., Adams, S., Willmes, M., Mathison, K., Ulrichsen, A., Wood, R., Valera, A. C., Frieman, C. J., & Grün, R. (2022). A large-scale environmental strontium isotope baseline map of Portugal for archaeological and paleoecological provenance studies. *Journal of Archaeological Science*, 142(April), 105595. <https://doi.org/10.1016/j.jas.2022.105595>
32. James, H. F., Griffith, J. I., Long, K., Cheung, C., & Willmes, M. (2022). The Secrets in our Teeth. *Frontiers for Young Minds*, 10. <https://doi.org/10.3389/frym.2022.749555>
31. Lewis, L. S., Huang, J. L., Willmes, M., Fichman, R. A., Hung, T.-C., Ellison, L. T., Stevenson, T. A., Teh, S. J., Hammock, B. G., Schultz, A. A., Grimsich, J. L., Huyskens, M. H., Yin, Q.-Z., Cavole, L. M., Botto, N. W., & Hobbs, J. A. (2022). Visual, spectral, and microchemical quantification of crystalline anomalies in otoliths of wild and cultured delta smelt. *Scientific Reports*, 12(1), 20751. <https://doi.org/10.1038/s41598-022-22813-w>
30. Saygın, S., Polat, N., Willmes, M., Lewis, L. S., Hobbs, J. A., Atıcı, A. A., & Elp, M. (2022). Strontium isotopes in otoliths reveal a diversity of natal origins for Tarek (*Alburnus tarichi*) in Lake Van, Turkey. *Fisheries Research*, 255(May), 106441. <https://doi.org/10.1016/j.fishres.2022.106441>
29. Sellheim, K., Willmes, M., Lewis, L. S., Sweeney, J., Merz, J., & Hobbs, J. A. (2022). Diversity in Habitat Use by White Sturgeon Revealed Using Fin Ray Geochemistry. *Frontiers in Marine Science*, 9(March), 1–18. <https://doi.org/10.3389/fmars.2022.859038>
28. Bell-Tilcock, M., Jeffres, C. A., Rypel, A. L., Willmes, M., Armstrong, R. A., Holden, P., Moyle, P. B., Fangue, N. A., Katz, J. V. E., Sommer, T. R., Conrad, J. L., & Johnson, R. C. (2021). Biogeochemical processes create distinct isotopic fingerprints to track floodplain rearing of juvenile salmon. *Plos One*, 16(10), e0257444. <https://doi.org/10.1371/journal.pone.0257444>
27. Fichman, R. A., Khen, A., Willmes, M., Kuntz, J., Scott, A. R., Hobbs, J. A., & Lewis, L. S. (2021). The Clever Strategies That Fishes Use to Survive in San Francisco's Dynamic Estuary. *Frontiers for Young Minds*, 9. <https://doi.org/10.3389/frym.2021.608881>

26. Griffin, J. M., Montañez, I. P., Glessner, J. J. G., Chen, J., & Willmes, M. (2021). Geologic variability of conodont strontium isotopic composition quantified by laser ablation multiple collection inductively coupled plasma mass spectrometry. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 568, 110308. <https://doi.org/10.1016/j.palaeo.2021.110308>
25. Lewis, L., Denney, C., Willmes, M., Xieu, W., Fichman, R., Zhao, F., Hammock, B., Schultz, A., Fangue, N., & Hobbs, J. (2021). Otolith-based approaches indicate strong effects of environmental variation on growth of a Critically Endangered estuarine fish. *Marine Ecology Progress Series*, 676, 37–56. <https://doi.org/10.3354/meps13848>
24. Willmes, M., Jacinto, E. E., Lewis, L. S., Fichman, R. A., Bess, Z., Singer, G., Steel, A., Moyle, P., Rypel, A. L., Fangue, N., Glessner, J. J. G., Hobbs, J. A., & Chapman, E. D. (2021). Geochemical Tools Identify the Origins of Chinook Salmon Returning to a Restored Creek. *Fisheries*, 46(1), 22–32. <https://doi.org/10.1002/fsh.10516>
23. Xieu, W., Lewis, L. S., Zhao, F., Fichman, R. A., Willmes, M., Hung, T., Ellison, L., Stevenson, T., Tigan, G., Schultz, A. A., & Hobbs, J. A. (2021). Experimental validation of otolith-based age and growth reconstructions across multiple life stages of a critically endangered estuarine fish. *PeerJ*, 9, e12280. <https://doi.org/10.7717/peerj.12280>
22. Britton, K., Le Corre, M., Willmes, M., Moffat, I., Grün, R., Mannino, M. A., Woodward, S., & Jaouen, K. (2020). Sampling Plants and Malacofauna in 87Sr/86Sr Bioavailability Studies: Implications for Isoscape Mapping and Reconstructing of Past Mobility Patterns. *Frontiers in Ecology and Evolution*, 8(December), 1–16. <https://doi.org/10.3389/fevo.2020.579473>
21. Moffat, I., Rudd, R., Willmes, M., Mortimer, G., Kinsley, L., McMorrow, L., Armstrong, R., Aubert, M., & Grün, R. (2020). Bioavailable Soil and Rock Strontium Isotope Data from Israel. *Earth System Science Data Discussions*, July, 1–16. <https://doi.org/10.5194/essd-2020-162>
20. Sweeney, J. K., Willmes, M., Sellheim, K., Lewis, L. S., Hobbs, J. A., Fangue, N. A., & Merz, J. E. (2020). Ontogenetic patterns in the calcification and element incorporation in fin rays of age-0 White Sturgeon. *Environmental Biology of Fishes*. <https://doi.org/10.1007/s10641-020-01031-1>
19. Adams, S., Grün, R., McGahan, D., Zhao, J.-X., Feng, Y., Nguyen, A., Willmes, M., Quaresimin, M., Lobsey, B., Collard, M., & Westaway, M. C. (2019). A strontium isoscape of north-east Australia for human provenance and repatriation. *Geoarchaeology*. <https://doi.org/10.1002/gea.21728>
18. Hobbs, J. A., Lewis, L. S., Willmes, M., Denney, C., & Bush, E. (2019). Complex life histories discovered in a critically endangered fish. *Scientific Reports*, 9(1), 16772. <https://doi.org/10.1038/s41598-019-52273-8>
17. James, H. F., Willmes, M., Boel, C. A., Courtaud, P., Chancerel, A., Ciesielski, E., Desideri, J., Bridy, A., Wood, R., Moffat, I., Fallon, S., McMorrow, L., Armstrong, R. A., Williams, I. S., Kinsley, L., Aubert, M., Eggins, S., Frieman, C. J., & Grün, R. (2019). Who's been using my burial mound? Radiocarbon dating and isotopic tracing of human diet and mobility at the collective burial site, Le Tumulus des Sables, southwest France. *Journal of Archaeological Science: Reports*, 24(March), 955–966. <https://doi.org/10.1016/j.jasrep.2019.03.012>
16. Lewis, L. S., Willmes, M., Barros, A., Crain, P. K., & Hobbs, J. A. (2019). Newly discovered spawning and recruitment of threatened Longfin Smelt in restored and under-explored tidal wetlands. *Ecology*, ecy.2868. <https://doi.org/10.1002/ecy.2868>
15. Moncel, M.-H., Fernandes, P., Willmes, M., James, H., & Grün, R. (2019). Rocks, teeth, and tools: New insights into early Neanderthal mobility strategies in South-Eastern France from lithic reconstructions and strontium isotope analysis. *PLOS ONE*, 14(4), e0214925. <https://doi.org/10.1371/journal.pone.0214925>
14. Willmes, M., Lewis, L. S., Davis, B. E., Loiselle, L., James, H. F., Denny, C., Baxter, R., Conrad, J. L., Fangue, N. A., Hung, T., Armstrong, R. A., Williams, I. S., Holden, P., & Hobbs, J. A. (2019). Calibrating temperature reconstructions from fish otolith oxygen isotope analysis for California's

- critically endangered Delta Smelt. *Rapid Communications in Mass Spectrometry*, 33(14), 1207–1220. <https://doi.org/10.1002/rcm.8464>
13. Bataille, C. P., von Holstein, I. C. C., Laffoon, J. E., Willmes, M., Liu, X.-M., & Davies, G. R. (2018). A bioavailable strontium isoscape for Western Europe: A machine learning approach. *PLOS ONE*, 13(5), e0197386. <https://doi.org/10.1371/journal.pone.0197386>
 12. Willmes, M., Bataille, C. P., James, H. F., Moffat, I., McMorrow, L., Kinsley, L., Armstrong, R. A., Eggins, S., & Grün, R. (2018). Mapping of bioavailable strontium isotope ratios in France for archaeological provenance studies. *Applied Geochemistry*, 90, 75–86. <https://doi.org/10.1016/j.apgeochem.2017.12.025>
 11. Willmes, M., Hobbs, J. A., Sturrock, A. M., Bess, Z., Lewis, L. S., Glessner, J. J. G., Johnson, R. C., Kurth, R., & Kindopp, J. (2018). Fishery collapse, recovery, and the cryptic decline of wild salmon on a major California river. *Canadian Journal of Fisheries and Aquatic Sciences*, 75(11), 1836–1848. <https://doi.org/10.1139/cjfas-2017-0273>
 10. Willmes, M., Ransom, K. M., Lewis, L. S., Denney, C. T., Glessner, J. J. G., & Hobbs, J. A. (2018). IsoFishR: An application for reproducible data reduction and analysis of strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) obtained via laser-ablation MC-ICP-MS. *PLOS ONE*, 13(9), e0204519. <https://doi.org/10.1371/journal.pone.0204519>
 09. Goude, G., Willmes, M., Wood, R., Courtaud, P., Leandri, F., Cesari, J., & Grün, R. (2017). New Insights into Mesolithic Human Diet in the Mediterranean from Stable Isotope Analysis: The Sites of Campu Stefanu and Torre d'Aquila, Corsica. *International Journal of Osteoarchaeology*, 27(4), 707–714. <https://doi.org/10.1002/oa.2578>
 08. Sellheim, K., Willmes, M., Hobbs, J. A., Glessner, J. J. G., Jackson, Z. J., & Merz, J. E. (2017). Validating Fin Ray Microchemistry as a Tool to Reconstruct the Migratory History of White Sturgeon. *Transactions of the American Fisheries Society*, 146(5), 844–857. <https://doi.org/10.1080/00028487.2017.1320305>
 07. Willmes, M., Glessner, J. J. G., Carleton, S. A., Gerrity, P. C., & Hobbs, J. A. (2016). $^{87}\text{Sr}/^{86}\text{Sr}$ isotope ratio analysis by laser ablation MC-ICP-MS in scales, spines, and fin rays as a nonlethal alternative to otoliths for reconstructing fish life history. *Canadian Journal of Fisheries and Aquatic Sciences*, 73(12), 1852–1860. <https://doi.org/10.1139/cjfas-2016-0103>
 06. Willmes, M., Grün, R., Douka, K., Michel, V., Armstrong, R. A., Benson, A., Crégut-Bonnouère, E., Desclaux, E., Fang, F., Kinsley, L., Saos, T., & Defleur, A. R. (2016). A comprehensive chronology of the Neanderthal site Moula-Guercy, Ardèche, France. *Journal of Archaeological Science: Reports*, 9, 309–319. <https://doi.org/10.1016/j.jasrep.2016.08.003>
 05. Willmes, M., Kinsley, L., Moncel, M.-H., Armstrong, R. A., Aubert, M., Eggins, S., & Grün, R. (2016). Improvement of laser ablation in situ micro-analysis to identify diagenetic alteration and measure strontium isotope ratios in fossil human teeth. *Journal of Archaeological Science*, 70, 102–116. <https://doi.org/10.1016/j.jas.2016.04.017>
 04. Sturm, S., Kenkmann, T., Willmes, M., Pösges, G., & Hiesinger, H. (2015). The distribution of megablocks in the Ries crater, Germany: Remote sensing, field investigation, and statistical analyses. *Meteoritics & Planetary Science*, 50(1), 141–171. <https://doi.org/10.1111/maps.12408>
 03. Willmes, M., McMorrow, L., Kinsley, L., Armstrong, R. A., Aubert, M., Eggins, S., Falguères, C., Maureille, B., Moffat, I., & Grün, R. (2014). The IRHUM (Isotopic Reconstruction of Human Migration) database – bioavailable strontium isotope ratios for geochemical fingerprinting in France. *Earth System Science Data*, 6(1), 117–122. <https://doi.org/10.5194/essd-6-117-2014>
 02. Benson, A., Kinsley, L., Willmes, M., Defleur, A. R., Kokkonen, H., Mussi, M., & Grün, R. (2013). Laser ablation depth profiling of U-series and Sr isotopes in human fossils. *Journal of Archaeological Science*, 40(40), 2991–3000. <https://doi.org/10.1016/j.jas.2013.02.028>
 01. Willmes, M., Reiss, D., Hiesinger, H., & Zanetti, M. (2012). Surface age of the ice–dust mantle deposit

in Malea Planum, Mars. *Planetary and Space Science*, 60(1), 199–206.
<https://doi.org/10.1016/j.pss.2011.08.006>