

# Malte Willmes

Geochemist in Wildlife Ecology

Institute of Marine Sciences, University of  
California Santa Cruz and NOAA fisheries

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## Academic appointments

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- Nov. 01, 2019-  
Ongoing      **Postdoctoral Researcher at the Institute of Marine Sciences, University of California Santa Cruz and NOAA Fisheries Collaborative Program**  
Research at the interface of geochemistry, fish ecology, and archaeology with a focus on salmonids in California
- Apr. 01, 2017 –  
Mar. 31, 2019      **Delta Science Fellow, Department of Wildlife, Fish, and Conservation Biology, University of California Davis**  
PI of the interdisciplinary research project “In search of refuge- Investigating the thermal life history of Delta Smelt through in situ oxygen isotope ratio analysis of otoliths”
- July 01, 2016 –  
Oct. 31, 2019      **Postdoctoral Researcher at the Hobbs Fish Ecology Laboratory, University of California Davis**  
Research at the interface of geochemistry and fish ecology with a focus on native endangered fish in California

## Education

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- Apr. 01, 2011 –  
Mar. 27, 2015  
(Awarded 2016)      **PhD in Earth Sciences (Geochemistry and Archaeology)**  
Research School of Earth Sciences, The Australian National University,  
Canberra, Australia
- Oct. 01, 2008 –  
Dec. 10, 2010      **Master of Science in Geoscience**  
Institut für Planetologie, Westfälische Wilhelms-Universität Münster, Germany
- Sept. 02, 2005 –  
Sept. 13, 2008      **Bachelor of Science in Geoscience**  
Institut für Planetologie, Westfälische Wilhelms-Universität Münster, Germany

## Work experience

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- May. 01, 2016–  
current      **Consulting work for Cramer Fish Sciences, West Sacramento Office**  
Collaborative research project on the reconstruction of white sturgeon life histories from geochemical analysis of fin rays
- May. 01, 2015 –  
June. 30, 2016      **Research Specialist at the Moyle Fish Ecology Laboratory, University of California Davis**  
Isotopic analysis of fish otolith and water samples, data analyses and synthesis, report writing
- May. 01, 2011 –  
Mar. 27, 2015      **Lab manager for the Archaeology-Geochemistry lab at the Research School of Earth sciences, ANU, Australia**  
Supervision of the daily operation of the lab, design and implementation of new procedures, chemical inventory and logistics, handling of hazardous substances, import of quarantine materials (plants, soils, water), data management

Feb. 29, 2012 – Mar. 27, 2015	<b>Technical Officer (part time) at the Research School of Earth sciences, ANU, Australia</b> Distribution and organization of office and lab equipment, chemical inventory management
Apr. 01, 2009 – Feb. 28, 2011	<b>Research assistant at the Institut für Planetologie, Münster, Germany</b> Image analysis of surface morphologies of Earth, Mars and the Moon, using GIS software, data management
Oct. 01, 2008 – Mar. 31, 2009	<b>Student assistant at the Institut für Planetologie, Münster, Germany</b> Image analysis of surface morphologies of Mars, data management
Aug. 01, 2007 – Feb. 28, 2011	<b>Student assistant at the Institut für Geologie, Münster, Germany</b> Web design and database management
Sept. 2009	<b>Internship at DLR (German Aerospace Center), Berlin, Germany</b>
Aug. 2008	<b>Internship at IFM-Geomar, Kiel, Germany</b>

### Field experience and short courses

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2015-ongoing	<b>Fish monitoring and sampling in the San Francisco Estuary</b> Part of the field crew for monthly fish monitoring and sampling studies of UC Davis in the San Francisco Estuary using several different nets (Otter trawl, 20mm, SLS) and water quality monitoring gear, Beach seining in South San Francisco Bay, Salmon carcass surveys in Putah Creek
2013	<b>SPATIAL Stable Isotopes in Large-Scale Ecology (2 weeks)</b> Inter-university training for continental scale ecology, University of Utah, USA
2011-2013	<b>Geologic fieldwork in France (18 weeks)</b> Sample collection (plant, soil, rock) and fieldwork at multiple archaeological sites in France
2010	<b>Geologic fieldwork at the Ries crater in Germany (8 weeks)</b> Geologic mapping of structural and morphologic features and shallow soil coring and drilling
2010	<b>Field training at Meteor Crater, Arizona (2 weeks)</b> Geologic mapping of the impact crater, organized by the Lunar and Planetary Institute
2008-2011	<b>Geologic field trips to New Zealand, South Africa, Greece, Scandinavia, as part of BSc and MSc courses (2-3 weeks each)</b> Geologic mapping and sample collection

### Core skills

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<b>Languages</b>	German (native speaker), English (written and spoken fluently), French (beginner)
<b>Analytical skills</b>	<ul style="list-style-type: none"> <li>- Experience in working in a clean-lab environment and with hazardous substances</li> <li>- Experience in the operation and application of mass spectrometers (Laser ablation ICP-MS, Neptune and Nu Multi-collector ICP-MS, Thermal ionization ICP-MS, Quadrupole ICP-MS)</li> </ul>

- Technical skills**
- R for statistical analysis ('Tidyverse', 'Shiny', 'Mass', 'zoo', 'leaflet')
  - GIS software (ESRI ArcGIS, ERDAS Imagine, GMT Mapping tool, GeoNode, OpenGeo Suite)
  - Iolite, POXI, ImageJ
  - Web design (HTML, CSS, GoogleEarth API)
- Qualifications**
- Driver license (since 2002), experience in operating 4WD vehicles,
  - Wilderness First Aid (WFA) qualification (2015, 2018)
  - Science communication workshop (2012, 2017, 2018)

### **Teaching and mentorship**

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- Co-mentor to 3 MSc students in Department of Wildlife, Fish, and Conservation Biology, University of California Davis and at the Australian National University
- Mentor to 8 Junior Specialists and several undergraduate interns at the Fish Ecology Lab, UC Davis
- Guest lecturer in Geochronology and Isotope geochemistry for Archaeological Sciences, ANU, 2013, 2014

### **Grants and Awards**

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- Delta Science Fellowship 2017-2019 (216 000 USD)
- INQUA Conference 2019 travel grant, National Academy of Sciences (700 USD)
- UC Davis-ICPMS 2018 Exploratory Research Program award (2000 USD)
- Best Speaker award at the 2018 UC Davis Postdoctoral Research Symposium (400 USD)
- UC Davis Open Access Fund for publication 2018 (1000 USD)
- Poster award at the 2017 and 2019 UC Davis Postdoctoral Research Symposium (300 USD)
- AFAS ACT Science & Technology Fellowships for 2013 (5000 AUD) for fieldwork in France
- Scholarship to attend the SPATIAL short course (3000 USD), US National Science Foundation, 2013
- Vice-Chancellor's HDR travel grant (1000 AUD), for attending the EGU conference 2012, Vienna
- ANU PhD Scholarship (international), March 2011 (3 years)
- Best poster award 2011 Australian Space Science Conference (200 AUD)

### **Professional affiliations and community service**

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- Memberships**
- American Fishery Society, Western Division
  - European Association of Geochemistry
  - Salmon Restoration Federation
  - The Wildlife Society
  - American Quaternary Association

- Service**
- Reviewer for the Journal of Fish Biology, Marine Ecology Progress Series, Marine and Freshwater Research, Rapid Communications in Mass Spectrometry, Science Advances, International Journal of Osteoarchaeology, G-Cubed, Geostandards and Geoanalytical Research
  - Reviewer for the UC Postdoctoral society grants 2018
  - Contributor to several annual research reports for California state and USA federal grants and synthesis efforts for the San Francisco Bay-Delta
  - Session chair and organizer at the 2017 American Fishery Society meeting
  - Member of the search and interview committee for Junior Specialist (BSc level) positions at the Department of Wildlife, Fish, and Conservation Biology, UC Davis in 2017, 2018, 2019.

### **Extracurricular and outreach actives**

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- Graduate of the Leaders for the Future Program, 2017/2018 UC Davis
- Occupational health and safety representative 2013-2015, ANU
- Part of the Organizing committee for the RSES Student conference 2013 and 21st Annual RACI Environmental and Analytical Division R&D Topics Conference at ANU, 2013
- EGU conference assistant in Vienna (2009, 2010, 2012, 2013)
- Part of the Organizing committee for the Bundesfachschafts Tagung (national student conference in Münster, 2010)
- Member of the Student council for Geosciences (2007 - 2010)
- Trip leader on various hiking and kayaking trips, Australian University Mountaineering Club (ANUMC)

### **Selected presentations**

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| <b>2017</b> | - Invited talk in the Environmental Futures Seminar Series, 2017, Griffiths University, Brisbane, Australia   |
| <b>2018</b> | - Invited talk at the Interagency Ecological Program (IEP) Workshop, Folsom, California   |
| <b>2018</b> | - Organizer of the workshop “Chemical archives beyond otoliths” at the international Otolith Symposium, Taiwan 2018 and 2018 National American Fishery Society Meeting, Atlantic City |
| <b>2019</b> | - Invited speaker at the Workshop on Dating, Isotopes and Human Evolution (DIHE), 25th - 27th September 2019, Brisbane, Australia   |

### **Reports**

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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.

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 – Final Draft. August 2019, 402 pp.

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 – Final Draft. August 2019, 402 pp.

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 (peer reviewed)**

19. Hobbs, J.A., Lewis, L.S., **Willmes, M.**, Denney, C., and Bush, E. 2019. Complex life histories discovered in a critically endangered fish. *Scientific Reports* 9(1): 16772.
18. 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.
17. **Willmes M.**, Lewis, L.S., Davis, B.E., Loiselle, L., James, H.F., Denny, C., Baxter, R., Conrad, J. L., Fangué, N.A., Hung, T-C, 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, 1207-1220.
16. Adams, S., Grün, R., McGahan, D., Zhao, J-X., Feng, Y., Nguyen, A., **Willmes, M.**, Quresimin, M., Lobsey, B., Collard, M., Westaway, M.C., 2019. A strontium isoscape of north-east Australia for human provenance and repatriation. *Geoarchaeology*, 34, 231- 251.
15. 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, 955-966.
14. Moncel, M-H., Fernandes, P., **Willmes, M.**, James H.F., 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.
13. **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.
12. Bataille, C.P., von Holstein, I.C.C., Laffoon, J.E., **Willmes, M.**, Liu, X., Davies, G.R., 2018. A bioavailable strontium isoscape for Western Europe: A machine learning approach. *PLOS ONE*, 13, 5.
11. **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.
10. **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.
09. 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 *Acipenser transmontanus*. *Transactions of the American Fisheries Society*, 146, 5, 844-857.
08. 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.
07. **Willmes, M.**, Grün, R., Douka, K., Michel, V., Armstrong, R.A., Benson, A., Crégut-Bonnoure, 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, 309-316.
  06. **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 non-lethal alternative to otoliths for reconstructing fish life history. *Canadian Journal of Fisheries and Aquatic Sciences*, 73, 12, 1852-1860.
  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.
  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, 141–171.
  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, 117–122.
  02. Benson, A., Kinsley, L., **Willmes, M.**, Defleur, A., 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, 2991–3000.
  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, 199–206.