

Matthew James Hansen

mjhansen.sci@gmail.com

Researcher of animal behaviour with particular focus on the mechanisms and functions of group living.

- 1.) **Mechanisms: effects of internal state (e.g. nutrition, metabolic rate) and external stimuli (e.g. temperature, predation) on group movement behaviour.**
- 2.) **Functions: social behaviour in non-kin related groups; self-organisation through selfish strategies; within-group conflicts of interest and decision-making.**

Current Position

Project lead - Deutsche Forschungsgemeinschaft (DFG) funded project (2021-2024):
 “Group hunting behaviour in striped marlin, *Kajikia audax*”

Education

The University of Sydney 2016 PhD, Biology (April 8th 2016)

Dissertation: *Movement Decisions and Foraging Behaviour in Shoals of Fish*

Supervisors: Prof AJW Ward and Prof SJ Simpson

The University of Sydney 2010 BSc (Hon I)

First class honours: *Collective Movement in Australian Plague Locusts*

Supervisors: Prof GA Sword, Dr J Buhl, and Prof SJ Simpson

Research experience

2018-2022

- Post-doctoral researcher at IGB, Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin
- “The Evolution of Collective Cognition: A Comparative Approach” Humboldt Postdoctoral Research Fellowship
- Laboratory studies exploring group decision-making and information transfer in shoals of Trinidadian guppies collected from populations experiencing natural differences in predation pressure.
- Laboratory studies exploring mixed-species shoaling behaviour (*P. picta* and *P. reticulata*).
- Laboratory studies exploring rostrum morphology of several billfish species.
- Field work investigating the attack behaviour of striped marlin on schools of sardine and mackerel in Baja California, Mexico.

2016-2018

- Postdoctoral Research Associate in the Fangue Laboratory, UC Davis
- Behavioural Guidance of Chinook Salmon (*Oncorhynchus tshawytscha*):

Experimental evaluation of the use of a light emitting diode device to reduce entrainment rates of smolts migrating past water diversion infrastructure.

- Laboratory studies exploring the effects of temperature and physiology on group-movement behaviour and predation risk in a range of native and threatened Californian species.

2012-2015

- Laboratory studies in the Animal Behaviour Lab, University of Sydney:

- On how changes in internal nutritional state affect individual movement, spatial positioning, and group dynamics in *Gambusia holbrooki* and *Melanotaenia duboulayi*.
- On the effect of nutrient specific changes in the foraging environment on the social behaviour of *Gambusia holbrooki*.

- Field work at One Tree Island, Great Barrier Reef:

- On the effect of environmental stimuli on the social escape response of *Dascyllus aruanus* to a model predator.
- On the interspecific interactions between *Plagiotremus spp.*, the cleaner wrasse *Lambroides dimidiatus*, and their clients.

Honours Research

2009-2010

- Laboratory studies in the Ecology, Physiology and Behaviour Lab, University of Sydney:

- On the role of cannibalism in the group dynamics of *Chortoicetes terminifera* nymphs.
- On the effect of the fungi, *Metarhizium*, on individual and collective behaviour of *Chortoicetes terminifera* nymphs.
- On the effect of crystal light reflecting tags on individual and social behaviour of *Chortoicetes terminifera* nymphs - test of their validity for use in field tracking.

Related professional experience

Visiting Researcher at Swansea University, Wales, 2013

SHOAL Group

- Assessed the validity of using three-spine sticklebacks, *Gasterosteus aculeatus*, as a new model system for exploring finder-joiner dynamics

Reviewer

Philosophical Transactions B, Journal of Experimental Biology, Animal Behaviour, Behavioural Ecology, Behavioural Ecology & Sociobiology, Behaviour, Ethology, River Research and Applications

Teaching experience

The University of California, Davis, Wildlife Fish and Conservation Biology 2017

Course coordinator and primary lecturer – Introduction to Ecology and Conservation

The University of Sydney, School of Biological Sciences, 2014-2016

Guest lecturer – Animal Behaviour

The University of Sydney, School of Biological Sciences, 2013-2016

Demonstrator – Animal Behaviour

The University of Sydney, School of Biological Sciences, 2011-2012

Demonstrator & Supervisor – Human Biology Summer School & Semester I

The University of Sydney, School of Biological Sciences, 2009-2010

Demonstrator – Living Systems Semester II

Professional associations

Australian Society for the Study of Animal Behaviour; The Fisheries Society of the British Isles; International Society for Behavioural Ecology; Society for Experimental Biology

Professional awards, grants and fellowships

Deutsche Forschungsgemeinschaft (DFG) grant (2021-2024)

Humboldt Postdoctoral Research Fellowship (2016 postponed to 2018)

NERC Standard/ New Investigator - named *postdoctoral research assistant (PDRA)* (2016)

School of Biological Sciences Postgraduate Award Finalist, University of Sydney (2015)

Postgraduate Research Support Scheme, Faculty of Science, University of Sydney (2013/15)

Australian Postgraduate Award, Australian Research Council (2012-2015)

Haswell Prize for proficiency in Senior Zoology (2009)

Academic conferences

- SEB, Florence, 2018
- Behaviour, Cairns, 2015
- ECBB, Prague, 2014

Departmental presentations

- SCIoI, Science of Intelligence, Summer Meeting, 2022
- IGB, Leibniz-Institute, Berlin, 2014, 2019, 2020, 2021, 2022
- Department of Environmental Science and Policy, UC Davis, California, 2018
- School of Biological Sciences, Sydney University, 2016
- Department of Biosciences, Swansea University, 2013

Complete list of publications

Publications with peer review process:

- 1.) **Hansen, M. J.**, Kurvers, R. H. J. M., Licht, M., Häge, J., Pacher, K., Dhellemmes, F., Trillmich, F., Krause, J. (2022) Sea lions interfere with striped marlin hunting behaviour in multi-species predator aggregations. *Philosophical Transactions of the Royal Society B: Biological Sciences*, under review
- 2.) **Hansen, M. J.**, Domenici, P., Krause, J. (2022) Mechanisms of Group-Hunting in Vertebrates. *Biological Reviews*, under review
- 3.) **Hansen, M. J.**, Krause, S., Dhellemmes, F., Kurvers, R.H.J.M., Domenici, P. & Krause, J. (2022) Group-hunting striped marlin divide resources according to effort, *Communications Biology*, under review
- 4.) Häge, J., **Hansen, M. J.**, Pacher, K., Dhellemmes, F., Domenici, P., Steffensen, J.F., Breuker, M., Krause, S., Hildebrandt, T., Fritsch, G., Bach, P., Sabarros, P.S., Zaslansky, P., Mahlow, K., Müller, J., Krause, J. (2022) Lacunae: A new structure on the rostrum of sailfish *Istiophorus platypterus*. *Journal of Fish Biology*, 10.1111/jfb.15018
- 5.) **Hansen, M. J.**, Burns, A.L., Monk, C.T., Schutz, C., Lizier, J. T., Ramnarine, I., Ward, A.J.W, Krause, J. (2021). The effect of predation risk on group behaviour and information flow during repeated collective decisions. *Animal Behaviour*, 10.1016/j.anbehav.2021.01.005
- 6.) Dhellemmes, F., **Hansen, M. J.**, Bouet, S. D., Videler, J. J., Domenici, P., Steffensen J. F., Hildebrandt T., Fritsch, G., Bach, P., Sabarros P. S., Kruger A., Kurvers, R. H. J. M., Krause J. (2020). Oil gland and oil pores in billfishes: in search of a function. *Journal of Experimental Biology*, 10.1242/jeb.2249
- 7.) **Hansen, M. J.**, Krause, S., Breuker, M., Kurvers, R. H. J. M., Dhellemmes, F., Viblanc, P.E., Muller, J., Mahlow, C., Boswell, K., Marras, S., Domenici, P., Wilson, A. D. M., Herbert-Read, J. E., Steffensen, J. F., Fritsch, G., Hildebrandt, T. B., Zaslansky, P., Bach, P., Sabarros, P. S., Krause, J. (2020) Linking hunting weaponry to attack strategies in sailfish and striped marlin. *Proceedings of the Royal Society B: Biological Sciences*, 10.1098/rspb.2019.2228
- 8.) **Hansen, M. J.**, Ligocki, I. Y., Zillig, K. E., Steel, A. E., Todgham, A. E., Fangue, N. A. (2020) Risk-taking and locomotion in foraging threespine sticklebacks (*Gasterosteus aculeatus*): the effect of nutritional stress is dependent on social context. *Behavioural Ecology and Sociobiology*, 10.1007/s00265-019-2795-4
- 9.) Davis, B. E., **Hansen, M. J.**, Cocherell, D. E., Nguyen, T., Sommer, T., Baxter, R., Fangue, N. A., Todgham, A. E. (2019) Consequences of warming on swimming activity, group structure, and predation of endangered Delta Smelt unless warming is simulated in a natural cycle. *Freshwater Biology*, 10.1111/fwb.13403
- 10.) **Hansen, M. J.**, Steel, A. E., Cocherell, D. E., Patrick, P. H., Sills, M., Cooke, S. J., Fangue, N. A. (2019). Experimental evaluation of the effect of a light emitting diode device on Chinook salmon smolt entrainment in a simulated river. *Hydrobiologia*, 10.1007/s10750-019-04022-1
- 11.) Steel, A. E., **Hansen, M. J.**, Cocherell, D. E., Fangue, N. A. (2019) Behavioural responses of juvenile white sturgeon (*Acipenser transmontanus*) to manipulations of nutritional state and predation risk. *Environmental Biology of Fishes*, 10.1007/s10641-019-00873-8
- 12.) Singer, G. P., **Hansen, M. J.**, Ho, K. V., Lee, K. W., Cocherell, D. E., Klimley, A. P., Rypel, A. L., Fangue, N. A. (2019) Behavioural response of juvenile Chinook Salmon *Onchorhynchus tshawytscha*

to surgical implantation of micro-acoustic transmitters. Submitted to *Transactions of the American Fisheries Society*, 10.1002/tafs.10147

- 13.) Davis, B. E., Komoroske, L. M., **Hansen, M. J.**, Poletto, J. B., Miller N. A., Perry E., Ehlman, S., Wheeler, S., Sih, A., Todgham, A. E., Fanguie, N. A. (2018). Juvenile rockfish show resilience to CO₂-acidification and hypoxia across multiple biological scales. *Conservation Physiology*, 10.1093/conphys/coy038
- 14.) **Hansen, M. J.**, Cocherell, D. E., Cooke, S. J., Patrick, P. H., Sills, M. Fanguie, N. A. (2018). Behavioural guidance of Chinook salmon smolts: the variable effects of LED spectral wavelength and strobing frequency. *Conservation Physiology*, 10.1093/conphys/coy032
- 15.) **Hansen, M. J.**, O'Leary, P. M. Ward, A. J. W. (2017). Interactions between fang blennies, cleaner wrasse and their clients: evidence for behavioural niche partitioning. *Journal of Fish Biology*, 10.1111/jfb.13165
- 16.) **Hansen, M. J.**, Schaerf, T. M. Simpson, S. J., Ward, A. J. W. (2016) Group foraging decisions of *Gambusia holbrooki* in nutritionally differentiated environments. *Functional Ecology*, 10.1111/1365-2435.12646
- 17.) **Hansen, M. J.**, Schaerf, T. M., Krause, J., Ward, A. J. W. (2016). Crimson-spotted rainbowfish, *Melanotaenia duboulayi*, change their position within shoals according to nutritional requirement. *PLoS ONE*, 10.1371/journal.pone.0148334
- 18.) **Hansen, M. J.**, Ward, A. J. W., Fürtbauer, I., King, A. J. (2016). Environmental quality determines finder-joiner dynamics in socially foraging three-spined sticklebacks, *Gasterosteus aculeatus*. *Behavioural Ecology and Sociobiology*, 10.1007/s00265-016-2111-5
- 19.) **Hansen, M. J.**, Morrell, L. J., Ward, A. J. W. (2015). The effect of temporally variable environmental stimuli and group size on emergence behaviour. *Behavioural Ecology*, arv237
- 20.) **Hansen, M. J.**, Schaerf T. M., Ward, A. J. W. (2015). The influence of nutritional state on individual and group movement behaviour in shoals of crimson-spotted rainbow fish, *Melanotaenia duboulayi*. *Behavioural Ecology and Sociobiology*, 10.1007/s00265-015-1983-0
- 21.) **Hansen, M. J.**, Schaerf T. M., Ward, A. J. W. (2015). The effect of hunger on the exploratory behaviour of shoals of mosquitofish, *Gambusia holbrooki*. *Behaviour*, 10.1163/1568539X-00003298
- 22.) **Hansen, M. J.**, Buhl, J., Bazazi, S., Simpson, S. J., & Sword, G. A. (2011). Cannibalism in the lifeboat—collective movement in Australian plague locusts. *Behavioural Ecology and Sociobiology*, 10.1007/s00265-011-1179-1

as of August 2022

References

Ward, A. J. W., PhD
 Professor of Animal Behaviour
 School of Life and Environmental Sciences
 The University of Sydney
 A12 Macleay Building
 2006, Sydney, NSW, Australia
ashley.ward@sydney.edu.au

Fanguie, N. A., PhD
 Professor in the Wildlife, Fisheries and
 Conservation Biology department
 Department Chair
 University of California, Davis
 1088 Academic Surge Building
 95616, Davis, CA, USA
nafanguie@ucdavis.edu

Krause, J., PhD
Professor Humboldt University
Head of Department (Dept. 2) Biology and
Ecology of Fishes, Leibniz Institute of
Freshwater and Inland Fisheries (IGB)
Müggelseedamm 310, 12587 Berlin, Germany
j.krause@igb-berlin.de