Supplementary Materials for: Marine Invertebrate Anthropogenic Noise Research – Trends in Methods and Future Directions

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1. Research Strategy Key

Research strategies

1. Main area of biology?
    - Ecology, Fisheries … 2
    - Behaviour, Physiology, Larval development … 3
    - Biochemistry, Genetics, Morphology/Trauma … 4

2. Multiple focal species?
    - Yes … 6
    - No … 3

3. Take samples for biochemical/genetic analysis?
    - Yes … 6
    - No … 5

4. Additional behavioral analysis?
    - Yes … 6
    - No … 5

5. Study innovative?
    - Yes … 6
    - No … Revise study

6. Include of dose dependency measurements?
    - Yes … Best outcome, 7
    - No … Acceptable outcome, 7

7. How many species?

Single … 9
Multiple … 8

8. Assess the same/equivalent response parameters?
Yes … 9
No … Choose a single species, 9

Exposure assessment

9. Study to be conducted in the laboratory?
Laboratory … 10
Field … 13

10. Use large exposure tanks?
Yes … 13
No … 11

11. Field component to be included?
Yes … 13
No … 12

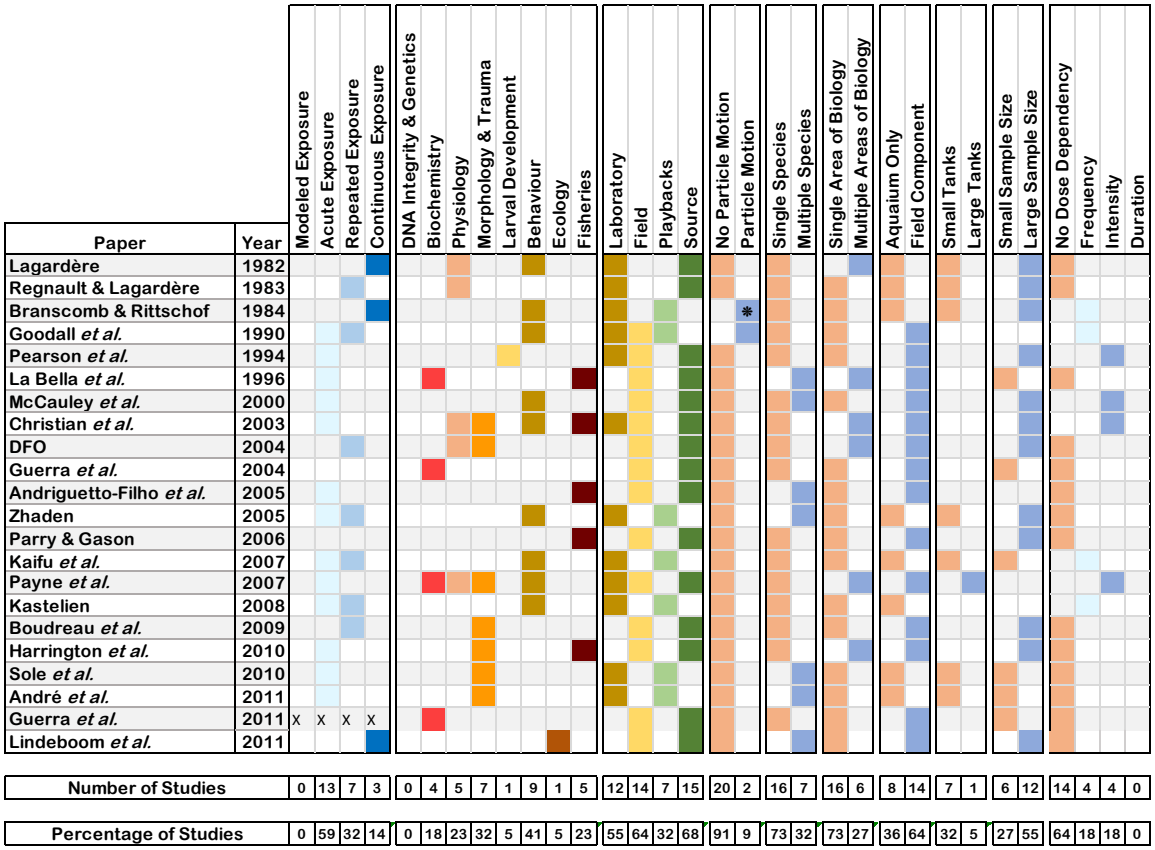
12. Tank size limited by systems, species, techniques, or research question?
Yes … Acceptable shortcoming - Conduct study
No … Unacceptable shortcoming - Revise or abandon study

13. Sample size large enough to allow robust conclusions?
Yes … Conduct study
No … 14

14. Sample size limited by systems, species, techniques, or research question?
Yes … Acceptable shortcoming - Conduct study
No … Unacceptable shortcoming - Revise or abandon study

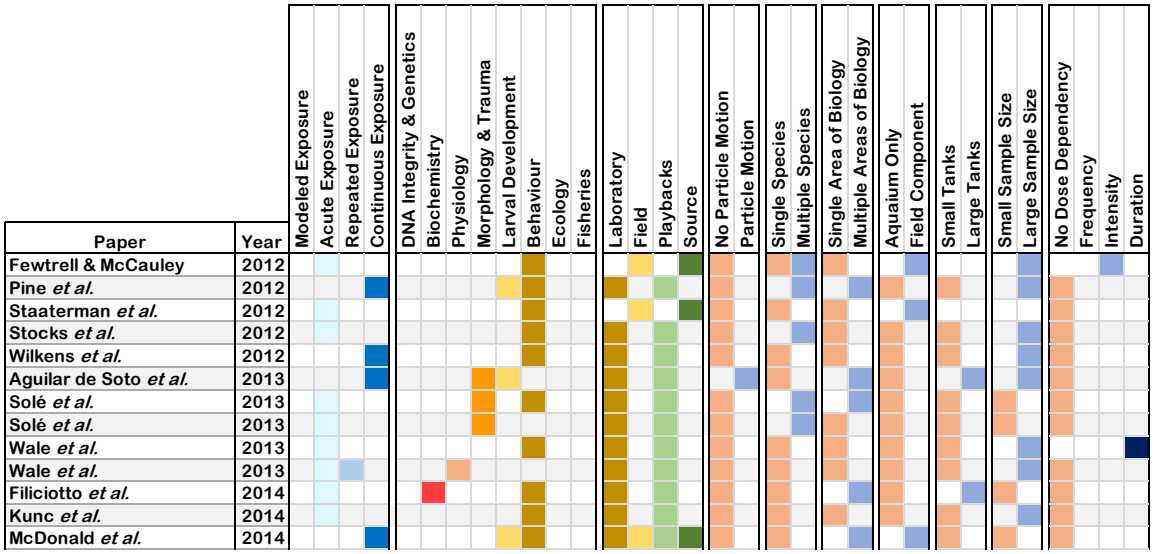
2. Study Analysis Tables

2.1. Studies 1982 – 2011



Paper	Year	Modeled Exposure	Acute Exposure	Repeated Exposure	Continuous Exposure	DNA Integrity & Genetics	Biochemistry	Physiology	Morphology & Trauma	Larval Development	Behaviour	Ecology	Fisheries	Laboratory	Field	Playbacks	Source	No Particle Motion	Particle Motion	Single Species	Multiple Species	Single Area of Biology	Multiple Areas of Biology	Aquaium Only	Field Component	Small Tanks	Large Tanks	Small Sample Size	Large Sample Size	No Dose Dependency	Frequency	Intensity	Duration
Lagardère	1982																																
Regnault & Lagardère	1983																																
Branscomb & Rittschof	1984																		*														
Goodall *et al.*	1990																																
Pearson *et al.*	1994																																
La Bella *et al.*	1996																																
McCauley *et al.*	2000																																
Christian *et al.*	2003																																
DFO	2004																																
Guerra *et al.*	2004																																
Andriguetto-Filho *et al.*	2005																																
Zhaden	2005																																
Parry & Gason	2006																																
Kaifu *et al.*	2007																																
Payne *et al.*	2007																																
Kastelien	2008																																
Boudreau *et al.*	2009																																
Harrington *et al.*	2010																																
Sole *et al.*	2010																																
André *et al.*	2011																																
Guerra *et al.*	2011	X	X	X	X																												
Lindeboom *et al.*	2011																																
Number of Studies		0	13	7	3	0	4	5	7	1	9	1	5	12	14	7	15	20	2	16	7	16	6	8	14	7	1	6	12	14	4	4	0
Percentage of Studies		0	59	32	14	0	18	23	32	5	41	5	23	55	64	32	68	91	9	73	32	73	27	36	64	32	5	27	55	64	18	18	0

2.2. Studies 2012 – 2021



Paper	Year	Modeled Exposure	Acute Exposure	Repeated Exposure	Continuous Exposure	DNA Integrity & Genetics	Biochemistry	Physiology	Morphology & Trauma	Larval Development	Behaviour	Ecology	Fisheries	Laboratory	Field	Playbacks	Source	No Particle Motion	Particle Motion	Single Species	Multiple Species	Single Area of Biology	Multiple Areas of Biology	Aquaium Only	Field Component	Small Tanks	Large Tanks	Small Sample Size	Large Sample Size	No Dose Dependency	Frequency	Intensity	Duration
Fewtrell & McCauley	2012																																
Pine *et al.*	2012																																
Staaterman *et al.*	2012																																
Stocks *et al.*	2012																																
Wilkens *et al.*	2012																																
Aguilar de Soto *et al.*	2013																																
Solé *et al.*	2013																																
Solé *et al.*	2013																																
Wale *et al.*	2013																																
Wale *et al.*	2013																																
Filiciotto *et al.*	2014																																
Kunc *et al.*	2014																																
McDonald *et al.*	2014																																

Nedelec *et al.*	2014
Samson *et al.*	2014
Stanley *et al.*	2014
Woodcock *et al.*	2014
Celi *et al.*	2015
De Vincenzi *et al.*	2015
Roberts *et al.*	2015
Day *et al.*	2016
Filicotto *et al.*	2016
Jolivet *et al.*	2016
Langhamer *et al.*	2016
Miller *et al.*	2016
Mooney *et al.*	2016
Nousek-McGregor & Mei	2016
Peng *et al.*	2016
Roberts *et al.*	2016
Roberts *et al.*	2016
Solan *et al.*	2016
Sole et al.	2016
Spiga *et al.*	2016
Spiga	2016
Stanley *et al.*	2016
Stefano *et al.*	2016
Vazzana *et al.*	2016
Zhou *et al.*	2016
Charifi *et al.*	2017
Day *et al.*	2017
Fitzgibbon *et al.*	2017
Lin *et al.*	2017
McCauley et al.	2017
Solé *et al.*	2017
Walsh *et al.*	2017
Filiciotto *et al.*	2018
Heyward *et al.*	2018
Hubert *et al.*	2018
Lecchini *et al.*	2018
Lossent *et al.*	2018
Morris *et al.*	2018
Przeslawski *et al.*	2018
Solé *et al.*	2018
Zhou *et al.*	2018
Day *et al.*	2019
Fields *et al.*	2019
Roberts and Laidre	2019
Shi et al.	2019
Tidau & Briffa	2019
Tidau & Briffa	2019
Wale *et al.*	2019
Day *et al.*	2020
Doyle *et al.*	2020
Jones *et al.*	2020
Morris *et al.*	2020
Pieretti *et al.*	2020
Ruiz-Ruiz *et al.*	2020
Slater *et al.*	2020
Vazzana *et al.*	2020
Vazzana *et al.*	2020
Hall *et al.*	2021
Hubert *et al.*	2021
Jones *et al.*	2021

	C1				C2								C3				C4		C5		C6		C7		C8		C9		C10			
Number of Studies	2	52	16	14	7	17	10	13	7	50	2	4	48	25	53	22	49	20	55	18	43	28	46	26	30	19	17	57	57	10	11	1
Percentage of Studies	3	71	22	19	10	23	14	18	10	68	3	5	66	34	73	30	67	27	75	25	59	38	63	36	41	26	23	78	78	14	15	1
Total Number of Studies	2	65	23	17	7	21	15	20	8	59	3	9	60	39	60	37	69	22	71	25	59	34	54	40	37	20	23	69	71	14	15	1
Total Percentage of Studies	2	68	24	18	7	22	16	21	8	62	3	9	63	41	63	39	73	23	75	26	62	36	57	42	39	21	24	73	75	15	16	1

3. Studies Assessed

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