

Rafał Zwolak

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AREAS OF SPECIALIZATION AND INTEREST

Plant-animal interactions, seed predation and dispersal, parasite-host interactions, forest ecology, behavioral ecology.

ACADEMIC HISTORY

- 2018-present **Associate Professor**, Department of Systematic Zoology, Institute of Environmental Biology, Adam Mickiewicz University, Poznań, Poland
- 2017-2018 **Fulbright Visting Scholar**, University of California in Davis
- 2009-2018 **Assistant Professor** (*adiunkt*), Department of Systematic Zoology, Institute of Environmental Biology, Adam Mickiewicz University, Poznań, Poland
- 2008 **Ph.D.**, Organismal Biology and Ecology, Division of Biological Sciences, University of Montana, Missoula, MT, USA
- 2003 **M.S.**, Institute of Environmental Biology, Adam Mickiewicz University, Poznań, Poland
- 2001 **B.A.**, Institute of Environmental Biology, Adam Mickiewicz University, Poznań, Poland

GRANT SUPPORT

Principal Investigator

- 2019-2023 Narodowe Centrum Nauki, „Harmonia”: *Individuals make a difference: theoretical and empirical consequences of behavioral types in seed-dispersing animals* – 901 397 zł
- 2015-2018 Narodowe Centrum Nauki, „Opus”: *Do personalities matter? How individual differences in foraging behavior affect seed dispersal by rodents* – 313 234 zł
- 2012-2015 Narodowe Centrum Nauki, „Harmonia”: *Interspecific interactions in changing environments: how do community context and abiotic conditions shape the outcome of plant-granivore interactions?* – 463 471 zł

- 2009-2013 Ministerstwo Nauki i Szkolnictwa Wyższego: *The influence of rodents on the demography of early developmental stages of trees: how does the consumption of seeds and seedlings change the dynamics of forest regeneration?* – 216 090 zł
- 2010-2011 Ministerstwo Nauki i Szkolnictwa Wyższego, „Juventus Plus”: *Can rodent endoparasites affect forest regeneration?* – 95 600 zł
- 2009-2011 Fundacja na rzecz Nauki Polskiej, „Homing”: *Granivores: helping or hurting plant recruitment?* – 92 000 zł

Mentor

- 2022-2025 Narodowe Centrum Nauki, „Preludium” (P.I. **Martyna Wirowska**): *How do seed limitation and negative density dependence shape the recruitment of native and invasive tree species?* – 209 907 zł
- 2016-2017 Narodowe Centrum Nauki, Preludium (P.I. **Aleksandra Wróbel**): *Janzen-Connell effect in native and invasive tree species: do immigrants have advantage over locals?* – 99 402 zł
- 2017-2019 Narodowe Centrum Nauki, Preludium (P.I. **Milena Zduniak**): *Does a negative feedback mechanism occur in an interaction between animal personality and its parasite load?* – 125 751 zł
- 2016-2018 Narodowe Centrum Nauki, Preludium (P.I. **Michał Bogdziewicz**): *Apparent predation in rodent seed dispersal: how does the introduction of an alien plant influence the native plant - seed disperser interaction* – 129 168 zł
- 2015-2016 Narodowe Centrum Nauki, Etiuda (P.I. **Michał Bogdziewicz**): *Influence of chronic nitrogen deposition of plant-granivore interactions* – 92 758 zł

Co-Investigator

- 2021-2023 Narodowe Centrum Nauki, „Sonata” (P.I. **Aleksandra Wróbel**): *How does animal-mediated seed dispersal affect range shifts of European beech in the Swiss Alps?* – 1 688 541 zł
- 2021-2023 Narodowe Centrum Nauki, „Sonatina” (P.I. **Aleksandra Wróbel**): *The role of secondary dispersal in montane tree recruitment along an elevation gradient: considering the climate change scenario* – 963 941 zł
- 2007-2008 USDA McIntire-Stennis Grant (P.I. **Elizabeth Crone**): *Twice the mice: Indirect effects of fire on forest dynamics?* - \$18 000
- 2006 USDA Research Joint Venture Agreement (P.I. **Dean Pearson**): *Biotic versus abiotic factors influencing Douglas-fir encroachment and ladder fuel accumulations in seral ponderosa pine forests* - \$6 800

PEER-REVIEWED PUBLICATIONS

1. ZWOLAK R., D. Clement, A. Sih, and S. J. Schreiber. 2024. Granivore abundance shapes mutualism quality in plant-scatterhoarder interactions. **New Phytologist**, 241: 1840-1850.
2. ZWOLAK R., P. Celebias, M. Zduniak, M. Bogdziewicz, and A. Wróbel. 2024. Scatterhoarder abundance and advantages of seed burial drive dynamics of a tree–rodent interaction. **Journal of Ecology**.
3. Celebias P., A. Wróbel, M. Zduniak, M. Steele, M. Bogdziewicz, and R. Zwolak. 2024. Behaviour, body mass and sex: How intraspecific variation influences seed dispersal by a scatter-hoarding rodent. **Functional Ecology**, 38: 1420-1430.
4. Bogdziewicz, M., (...), R. ZWOLAK, M. Żywiec, and A. J. Hackett-Pain (31 autorów). 2024. Ecolutionary ecology of masting: mechanisms, models, and climate change. **Trends in Ecology and Evolution**.
5. Zduniak M., S. Serafini, A. Wróbel, and R. ZWOLAK. 2023. Host’s body mass, not sex, affects ectoparasite loads in yellow-necked mouse *Apodemus flavicollis*. **Parasitology Research**, 122: 2599-2607.
6. Baláž I., M. Bogdziewicz, S. Dziemian-Zwolak, C. Lo Presti, A. Wróbel, M. Zduniak, and R. ZWOLAK. 2023. From fleas to trees: masting indirectly affects flea abundance on a rodent host. **Integrative Zoology**, 18: 440-452.
7. ZWOLAK R., P. Celebias, and M. Bogdziewicz. 2022. Global patterns in the predator satiation effect of masting – a meta-analysis. **Proceedings of the National Academy of Sciences**, 119: e2105655119.
8. Bogdziewicz M., B. Jędrzejewska, E. Wysocka-Fijorek, A. Gazda, S. Miścicki, D. Kuijper, R. ZWOLAK, M. Churski i T. Podgórski. 2022. Emerging infectious disease triggered a trophic cascade and enhanced recruitment of a masting tree. **Proceedings of the Royal Society B**, 289: 20212636.
9. Bednarz P. and R. ZWOLAK. 2022. Body mass and sex, but not breeding condition and season, influence open-field exploration in the yellow-necked mouse. **Ecology and Evolution**, 12: e8771.
10. Wróbel A., P. Kurek, M. Bogdziewicz, D. Dobrowolska, and R. ZWOLAK. 2022. Avian dispersal of an invasive oak is modulated by acorn traits and the presence of a native oak. **Forest Ecology and Management** 505: 119866.
11. ZWOLAK R., D. Clement, A. Sih, and S. J. Schreiber. 2021. Mast seeding promotes evolution of scatter-hoarding. **Philosophical Transactions of the Royal Society B**, 376: 202003754.
12. ZWOLAK R., M. Bogdziewicz, and E. E. Crone. 2020. On the need to evaluate costs and benefits of synzoochory for plant populations. **Journal of Ecology**, 108: 1784-1788.
13. ZWOLAK R. and A. Sih. 2020. Animal personalities and seed dispersal: A conceptual review. **Functional Ecology**, 34: 1294-1310.

14. Bogdziewicz M., E. E. Crone, and R. ZWOLAK. 2020. Do benefits of seed dispersal and caching by scatterhoarders outweigh the costs of predation? An example with oaks and yellow-necked mice. **Journal of Ecology** 108: 1009-1018.
Article shortlisted for the Harper Prize, awarded by the British Ecological Society
15. Schupp E. W., R. ZWOLAK, (...), and K. Shea (14 authors). 2019. Intrinsic and extrinsic drivers of intraspecific variation in seed dispersal are diverse and pervasive. **AoB Plants** 11: plz067.
16. Meagher S., K. L. Winters, K. W. McCravy, and R. ZWOLAK. 2019. Complex and diverse drivers of parasite loads in a cosmopolitan insect. **Journal of Parasitology** 105: 659-668.
17. #Wróbel A., E. E. Crone, and R. ZWOLAK. 2019. Differential impacts of soil microbes on native and co-occurring invasive tree species. **Ecosphere** 10: e02802.
18. Snell R. S., N. G. Beckman, (...), R. ZWOLAK, and E. Schupp (22 authors). 2019. Consequences of intraspecific variation in seed dispersal for plant demography, communities, evolution, and global change. **AoB Plants** 11: plz016.
19. Bogdziewicz M., N. Lichti, and R. ZWOLAK. 2019. Consumer-mediated indirect interaction with a native plant lowers the fitness of an invasive competitor. **Journal of Ecology** 107: 12-22.
20. Wróbel A., and R. ZWOLAK. 2019. Habitat-dependent seed dispersal of an introduced tree species by native rodents. **Forest Ecology and Management** 433: 563-568.
21. Bogdziewicz M., S. Marino, R. Bonal, R. ZWOLAK, and M. Steele. 2018. Rapid aggregative and reproductive responses of weevils to masting of North American oaks counteract predator satiation. **Ecology** 99: 2575-2582.
22. ZWOLAK R., J. Witczuk, M. Bogdziewicz, L. Rychlik, and S. Pagacz. 2018. Simultaneous population fluctuations of rodents in montane forests and alpine meadows suggest indirect effects of tree masting. **Journal of Mammalogy** 99: 586-595.
23. Bogdziewicz M., R. Bonal, J. M. Espelta, E. M. Kalembe, M. A. Steele, and R. ZWOLAK. 2018. Invasive oaks escape pre-dispersal insect predators and trap enemies in their seeds. **Integrative Zoology** 12: 457-467.
24. ZWOLAK R. 2018. How individual variation in seed dispersing animals matters for plants. **Biological Reviews** 93: 897-913.
25. von Merten S., R. ZWOLAK, and L. Rychlik. 2017. Social personality: a more social shrew species exhibits stronger differences in personality types. **Animal Behaviour** 127: 125-134.
26. Bogdziewicz M., E. E. Crone, M. A. Steele, and R. ZWOLAK. 2017. Effects of nitrogen deposition on reproduction in a masting tree: benefits of higher seed production are trumped by negative biotic interactions. **Journal of Ecology** 105: 310-320.

27. Wróbel A., and R. ZWOLAK. 2017. Deciphering the effects of disperser assemblages and seed mass on patterns of seed dispersal in a rodent community. **Integrative Zoology** 12: 457-467.
28. Bogdziewicz M., R. ZWOLAK, L. Redosh, L. Rychlik, and E. E. Crone. 2016. Negative effects of density on space use of small mammals differ with the phase of the masting-induced population cycle. **Ecology and Evolution** 6: 8423-8430.
29. ZWOLAK R., M. Bogdziewicz, A. Wróbel, and E. E. Crone. 2016. Advantages of masting in European beech: timing of granivore satiation and benefits of seed caching support the predator dispersal hypothesis. **Oecologia** 180: 749-758.
30. Bogdziewicz M., R. ZWOLAK, and E. E. Crone. 2016. How do vertebrates respond to mast seeding? **Oikos** 125: 300-307.
31. ZWOLAK R., M. Bogdziewicz, and L. Rychlik. 2016. Beech masting modifies the response of rodents to forest management. **Forest Ecology and Management** 359: 268-276.
32. Dziemian S., B. Sikora, B. Piłacińska, J. Michalik, and R. ZWOLAK. 2015. Ectoparasite loads in sympatric urban populations of the northern white-breasted and the European hedgehog. **Parasitology Research** 114: 2317-2323.
33. Dziemian S., J. Michalik, B. Piłacińska, S. Bialik, B. Sikora, and R. ZWOLAK. 2014. Infestation of urban populations of the Northern white-breasted hedgehog, *Erinaceus roumanicus*, by *Ixodes* spp. ticks in Poland. **Medical and Veterinary Entomology** 28: 465-469.
34. Bogdziewicz M., and R. ZWOLAK. 2014. Responses of small mammals to clear-cutting in temperate and boreal forests of Europe: a meta-analysis and review. **European Journal of Forest Research** 133: 1-11.
35. Wróbel A., and R. ZWOLAK. 2013. The choice of seed tracking method influenced fate of beech seeds dispersed by rodents. **Plant Ecology** 214: 471-475.
36. ZWOLAK R., S. Meagher, J. W. Vaughn, S. Dziemian, and E. E. Crone. 2013. Reduced ectoparasite loads of deer mice in burned forest: From fleas to trees? **Ecosphere** 4: art132.
37. ZWOLAK R., and E. E. Crone. 2012. Quantifying the outcome of plant-granivore interactions. **Oikos** 121: 20-27.
38. ZWOLAK R., D. E. Pearson, Y. K. Ortega, and E. E. Crone. 2012. Mechanisms driving postfire abundance of a generalist mammal. **Canadian Journal of Zoology** 90: 51-60.
39. ZWOLAK R., D. E. Pearson, Y. K. Ortega, and E. E. Crone. 2010. Fire and mice: Seed predation reduces fire's influence on conifer recruitment. **Ecology** 91: 1124-1131.
40. ZWOLAK R. 2009. A meta-analysis of the effects of wildfire, clearcutting, and partial harvest on the abundance of North American small mammals. **Forest Ecology and Management** 258: 539-545.
41. ZWOLAK R., and K. R. Foresman. 2008. Deer mouse demography in burned and unburned forest: no evidence for source-sink dynamics. **Canadian Journal of Zoology** 86: 83-91.

42. ZWOLAK R., and K. R. Foresman. 2007. Effects of a stand-replacement fire on small mammal communities in montane forest. **Canadian Journal of Zoology** 85: 815-822.
43. ZWOLAK R. 2007. Ogniu, kroc za mną: ekologia i polityka pożarów lasów Ameryki Północnej. [Fire walk with me: Ecology and politics of forest fires in North America] **Wiadomości Ekologiczne** 53: 191–200. – in Polish with English summary.
44. Rychlik L., and R. ZWOLAK 2006. Interspecific behavioural domination among four sympatric species of shrews. **Canadian Journal of Zoology** 84: 434–448.
45. ZWOLAK R. 2006. Długi i skuteczny pościg w konflikcie dwóch ryjówek aksamitnych *Sorex araneus*. **Przegląd Przyrodniczy** 17: 137-138. – in Polish.
46. Rychlik L., and R. ZWOLAK 2005. Behavioural mechanisms of conflict avoidance among shrews. **Acta Theriologica** 50: 289–308.
47. ZWOLAK R., and L. Rychlik 2004. Does the reduction of locomotor activity serve as an aggression avoidance mechanism in shrews (Soricidae)? **Electronic Journal of Polish Agricultural Universities** 7(2), issue Biology.
48. ZWOLAK R. 2002. Zachowania agonistyczne ryjówkowatych - problem postaw ciała. [Agonistic behaviour of shrews - the problem of body postures] **Wiadomości Ekologiczne** 48: 3–17. – in Polish with English summary.

NON-REFEREED ARTICLES

- ZWOLAK R. 2023. Błąd non stop. **Polityka** 48 (3441), 22.11-28.11.2023. Available at: <https://www.projektpulsar.pl/struktura/2235864,1,zaskakujaco-duza-czesc-artykulow-naukowych-jest-bledna.read>
- ZWOLAK R. 2022. Naukowcy równi i równiejsi. **Polityka** 41 (3384), 5.10 – 11.10.2022. Available at: www.polityka.pl/tygodnikpolityka/nauka/2183656,1,naukowcy-rowni-i-rowniejsi.read
- ZWOLAK R. 2022. Klęska urodzaju. Czy nauka sama zastawiła na siebie pułapkę? **Polityka**, 11.03.2022. Available at: www.polityka.pl/tygodnikpolityka/nauka/2159263,1,kleska-urodzaju-czy-nauka-sama-zastawila-na-siebie-pulapke.read
- ZWOLAK R. 2009. Czwarty Żywiół. **Wiedza i Życie**, 8/2009, 36-38.
- ZWOLAK R., D. E. Pearson, K. R. Foresman, E. E. Crone, and Y. K. Ortega. 2008. Are mice eating up all the pine seeds? **EcoReport**, USDA Forest Service, RMRS, Forestry Sciences Laboratory, Missoula, MT.
- ZWOLAK R. 2002. Wielki mały terytorialista – rzecz o ryjówkach. **Wszechświat** 4-6, 130.

MENTORING

PhD students

Paulina Celebias (graduated 2024, co-advised with Michał Bogdziewicz): recipient of Faculty of Biology, Adam Mickiewicz University Dean's Grant

Milena Zduniak (graduated 2023): recipient of National Science Centre "Preludium" grant and the Israeli Council for Higher Education Academic Internship.

Paula Bednarz (graduated 2023): recipient of Faculty of Biology, Adam Mickiewicz University Dean's Grant, and the IDEAMU Grant (awarded by the Adam Mickiewicz University).

Aleksandra Wróbel (graduated 2019): recipient of the National Science Centre "Preludium" Grant, and the POWER fellowship (awarded by the Faculty of Biology, Adam Mickiewicz University).

Michał Bogdziewicz (graduated 2017): recipient of the National Science Centre „Preludium” and „Etiuda” grants, Foundation for Polish Science START fellowship, Minister of Science and Higher Education fellowship, City of Poznań fellowship, and Adam Mickiewicz University Foundation fellowship.

M.S. students

Sarah Serafini (graduated 2020, Tuscia University, Italy, co-adviser)

Ewelina Mikołajczyk (graduated 2020)

Aleksandra Konieczna (graduated 2019)

Milena Zduniak (graduated 2015)

Aleksandra Wróbel (graduated 2013)

HONORS

- 2020, 2022 Excellence Award, *project “Initiative of Excellence – Research University”, Adam Mickiewicz University* (two consecutive biennial editions)
- 2018, 2019, 2023 First Degree Award (for research publications), *Adam Mickiewicz University*
- 2017 Fulbright Senior Award (9-month research stay at the University of California in Davis, prof. Andrew Sih’s lab)
- 2017 Third Degree Award (for research publications), *Adam Mickiewicz University*
- 2014 “Mentor” fellowship, *Foundation for Polish Science*
- 2011 Scholarship for outstanding young researchers, *(Polish) Ministry of Science and Higher Education*
- 2011 Third Degree Award (for acquiring research grants), *Adam Mickiewicz University*
- 2009 “Homing” scholarship, *Foundation for Polish Science*
- 2008 Bertha Morton Graduate Scholarship, *University of Montana*
- 2006 Outstanding Presentation Award, *University of Montana Graduate Student and Faculty Conference*
- 2005 Thesis Award, *University of Montana*
- 2003 Outstanding Senior Award, Faculty of Biology, *Adam Mickiewicz University*

SEMINARS

- 2023 Senckenberg Biodiversity and Climate Research Centre, Frankfurt, Germany
- 2018 Seminars in Ecology and Evolution, University of California in Davis, USA
- 2017 Animal Behavior Graduate Group Seminar Series, University of California in Davis, USA
- 2017 Seminars in Ecology and Evolution, Adam Mickiewicz University, Poznań
- 2013 Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Slovakia
- 2012 Laboratory of Forest Biology, Uniwersytet Wrocławski
- 2011 II Conference on Research and Education of the Biology Department, Adam Mickiewicz University, Poznań
- 2009 Seminar of the Department of Behavioral Ecology, Adam Mickiewicz University, Poznań

SELECTED CONFERENCE PRESENTATIONS

- 2022 8th Polish Evolutionary Conference, Toruń, Poland
- 2019 7th Polish Evolutionary Conference, Gdańsk, Poland
- 2019 Conference “Forests at risk”, Warsaw, Poland
- 2016 Conference “Trees and forests in changing environments”, Poznań, Poland
- 2015 100th Annual Meeting of the Ecological Society of America, Baltimore, MD, USA
- 2015 6th International Symposium on Frugivores & Seed Dispersal, Drakensberg, South Africa
- 2013 11th International Mammalogical Congress, Belfast, UK
- 2012 97th Annual Meeting, Ecological Society of America, Portland, OR, USA
- 2012 Rodens et Spatium, Rovaniemi, Finland
- 2010 95th Annual Meeting, Ecological Society of America, Pittsburgh, PA, USA
- 2009 IX National Mammalogy Conference, Poznań, Poland
- 2008 Montana Chapter of the Society for Conservation Biology, Missoula, MT, USA
- 2008 88th Annual Meeting of the American Society of Mammalogists, Brookings, SD, USA
- 2007 92nd Annual Meeting, Ecological Society of America, San Jose, CA, USA
- 2006 University of Montana Graduate Student and Faculty Research Conference, Missoula, MT, USA
- 2005 University of Montana Graduate Student and Faculty Research Conference, Missoula, MT, USA
- 2003 IV National Conference on Behavioral Ecology, Siedlce, Poland
- 2002 II International Colloquium on the Biology of the Soricidae, Powdermill Biological Station, PA, USA

OTHER PROFESSIONAL ACTIVITIES

- 2017 – present Member of **The Committee of Environmental and Evolutionary Biology**, Polish Academy of Sciences
- 2008 – present **Ad Hoc Reviewer** for *Acta Theriologica*, *Acta Oecologica* (x2), *Animal Cells and Systems*, *Basic and Applied Ecology*, *Behavioral Ecology and Sociobiology* (x3), *Behavioural Processes*, *Biology Letters*, *Biotropica* (x3), *Canadian Journal of Forest Research* (x5), *Canadian Journal of Zoology* (x2), *Canadian Wildlife Biology & Management*, *Ecography*, *Ecology*, *Ecology and Evolution*, *Ecology Letters* (x3), *Ecoscience*, *Ecosphere*, *Ethology*, *European Journal of Forest Research*, *Fire Ecology*, *Forest Ecology and Management* (x8), *Global Ecology and Biogeography*, *Global Ecology and Conservation*, *Integrative Zoology* (x6), *Journal of Animal Ecology* (x2), *Journal of Applied Ecology* (x2), *Journal of Ecology* (x3), *Journal of Mammalogy* (x2), *Mammalian Biology*, *Natural Areas Journal*, *Oecologia* (x2), *Oikos*, *Parki Narodowe i Rezerваты Przyrody*, *Physiology & Behavior*, *Plant Biology*, *PLOS One* (x2), *Polish Journal of Ecology*, *Proceedings of the Royal Society B* (x2), *Scientific Reports*, and *Restoration Ecology* (x2).
- 2009-present **Ad Hoc Reviewer** of grant proposals for (Polish) *National Science Center*, *National Science Foundation* (USA) - twice, *Foundation for Polish Science*, *United States – Israel Binational Science Foundation*, and *French National Research Agency (ANR)*.
- 2018-2019 **Mentor**, Polish-U.S. Fulbright Commission
- 2014 **Expert** at XXIV Workshop on Scientific Presentation Techniques “OAK”, Spała, Poland
- 2008 **Organization** of the 1st MT-SCB Annual Symposium “Applying Conservation Science to Action”, Missoula, MT
- 2007 – 2008 **Board Member** of the Montana Chapter of the Society for Conservation Biology
- 2006, 2008 **Graduate Student Representative**, Organismal Biology & Ecology, Division of Biological Sciences, University of Montana
- 2002 **Organization** of the X Workshop on Scientific Presentation Techniques “OAK”, Jeziory, Poland