CURRICULUM VITAE

DR. ADAM S. HADLEY

[1]Department of Ecology & Evolutionary Biology, University of Toronto
[2]Department of Forest Ecosystems and Society, Oregon State University
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EDUCATION

2007-2012:	**Ph.D.,** Forest science**,** Faculty of Forest Ecosystems and Society, Oregon State University. **Dissertation:** *Independent Effects of Habitat Loss and Fragmentation on Pollination: Tropical Forest Fragmentation Alters Hummingbird Movements and Pollination Dynamics.*
2003–2006:	**M.Sc.**, Forest science, Faculté de foresterie et de géomatique, Université Laval, Québec. **Thesis:** *Winter Habitat Use by Boreal Chickadee Flocks Within a Managed Forest Landscape*.
1999–2003:	**B.Sc. Honours,** Faculty of Biology, University of New Brunswick. **Thesis**: *Avian Mobbing Response is Restricted by Territory Boundaries: Experimental Evidence from Two Species of Forest Warblers.*

EMPLOYMENT

Current:	**NSERC Postdoctoral Fellow**, Department of Ecology & Evolutionary Biology, University of Toronto. *Job description:* National Science and Engineering Research Counsel of Canada postdoctoral appointment - using behavioral ecology to reveal mechanisms in landscape genetics and plant/pollinator coevolution.
2012 –2014:	**Postdoctoral Scholar**, Department of Forest Ecosystems and Society, Oregon State University. *Job description:* NSF postdoctoral appointment investigating landscape effects on hummingbird movements and pollination services.

April - June 2012:	**Instructor**, Department of Fish and Wildlife, Oregon State University. *Job description:* Teaching 'Systematics of Birds' (FW312).
Jan –April 2012:	**Instructor**, Department of Fish and Wildlife, Oregon State University. *Job description:* Teaching 'Avian Conservation and Management' (FW451).
May - July 2009-2011:	**Graduate Research Assistant**, H.J. Andrews Experimental Forest, Department of Forest Ecosystems and Society, College of Forestry, Oregon State University. *Job description:* Helped design and implement a long-term bird sampling protocol across an elevational gradient. Trained and led field crews.
Sept. - Dec. 2010:	**Instructor**, Department of Fish and Wildlife, Oregon State University. *Job description:* Taught 'Avian Conservation and Management' (FW451).
Sept. - Dec. 2009:	**Graduate Teaching Assistant**, Department of Fish and Wildlife, Oregon State University. *Job description:* Taught 'Bird Systematics' (FW312) and the lab portion of 'Wildlife Ecology' (FW481/581).
May - July 2007:	**Researcher**, Hubbard Brook Experimental Forest and Department of Forest Science, College of Forestry, Oregon State University. *Job description:* Co-designed and executed a controlled, replicated experiment examining fall prospecting by migrant forest birds.
May - Aug. 2006:	**Field Technician**, Valley-wide bird research, Hubbard Brook Experimental Forest and Wellesley College. *Job description*: Conducted a landscape-level songbird census in the Hubbard Brook Valley, N.H.
April - May 2004/2005:	**Project co-ordinator**, Faculté de foresterie et géomatique, Université Laval, Quebec. *Job description*: Study design, research implementation, and data collection for a research project including: (1) Examination of territory characteristics, (2) Assessing breeding dispersal using mark-recapture techniques, (3) An experimental approach to uncovering the mechanisms of habitat selection.
May – Aug. 2001-2005:	**Field Technician**, University of New Brunswick Department of Biology and Fundy Model Forest.

Job description: Assisted in a landscape study the effects of forestry on stand and landscape-level biodiversity in and around Fundy National Park. (1) Extensive point counting, (2) Assessing breeding dispersal using mark-recapture techniques, and (3) Detailed vegetation sampling.

CONTRIBUTIONS TO RESEARCH

Articles Published in Refereed Journals

Betts, M. G., **A. S. Hadley**, and W. J. Kress. (2015). Pollinator recognition by a keystone tropical plant. *Proceedings of the National Academy of Sciences of the United States of America.* 112:3433-3438.

Betts, M. G., K. J. Gutzwiller, W. D. Robinson, M. J. Smith, and **A. S. Hadley**. (2015). Improving inferences about functional connectivity from animal translocation experiments. *Landscape Ecology.* **37**:517-527.

Hadley, A. S., S. J. K. Frey, W. D. Robinson, W. J. Kress, and M. G. Betts. (2014). Tropical forest fragmentation limits pollination of a keystone understory herb. *Ecology*. 95:2202-2212

Volpe, N., **A. S. Hadley**, W. D. Robinson, and M. G. Betts. (2014). Functional connectivity experiments reflect routine movement behaviors. *Ecological Applications*. 24:2122-2131

Betts, M. G., L. Fahrig, **A. S. Hadley**, K. E. Halstead, W. D. Robinson, B. C. McComb, J. A. Wiens, and D. Lindenmayer. (2014). A test for generality in habitat loss and fragmentation research. *Ecography*. 37:517-527.

Pfeifer, M., V. Lefebvre, T. A. Gardner, V. Arroyo-Rodriguez, L. Baeten, C. Banks-Leite, J. Barlow, M. G. Betts, J. Brunet, A. Cerezo, L. M. Cisneros, S. Collard, N. D'Cruze, C. da Silva Motta, S. Duguay, H. Eggermont, F. Eigenbrod, **A. S. Hadley**, T. R. Hanson, J. E. Hawes, T. Heartsill Scalley, B. T. Klingbeil, A. Kolb, U. Kormann, S. Kumar, T. Lachat, P. Lakeman Fraser, V. Lantschner, W. F. Laurance, I. R. Leal, L. Lens, C. J. Marsh, G. F. Medina-Rangel, S. Melles, D. Mezger, J. A. Oldekop, W. L. Overal, C. Owen, C. A. Peres, B. Phalan, A. M. Pidgeon, O. Pilia, H. P. Possingham, M. L. Possingham, D. C. Raheem, D. B. Ribeiro, J. D. Ribeiro Neto, W. D. Robinson, R. Robinson, T. Rytwinski, C. Scherber, E. M. Slade, E. Somarriba, P. C. Stouffer, M. J. Struebig, J. M. Tylianakis, T. Tscharntke, A. J. Tyre, J. N. Urbina Cardona, H. L. Vasconcelos, O. R. Wearn, K. Wells, M. R. Willig, E. Wood, R. P. Young, A. V. Bradley, and R. M. Ewers. (2014). BIOFRAG – A new database for analysing BIOdiversity responses to forest FRAGmentation. *Ecology and Evolution*. 9:1524-1537.

Briggs, F., B. Lakshminarayanan, L. Neal, X. Fern, R. Raich, S. J. K. Hadley, **A. S. Hadley**, and M. G. Betts. (2012) Acoustic classification of multiple simultaneous

bird species: A multi-instance multi-label approach. *The Journal of the Acoustical Society of America* DOI: 10.1121/1.4707424.

Rousseau, P., A. Desrochers, and **A. S. Hadley**. (2012) Habitat selection and fidelity by White-throated Sparrows (Zonotrichia albicollis): generalist species, specialist individuals? *Canadian Journal of Zoology-Revue Canadienne De Zoologie* 90:595–601.

Hadley, A. S., and Betts, M. G. (2012) The effects of landscape fragmentation on pollination dynamics: absence of evidence not evidence of absence. *Biological Reviews*. DOI: 10.1111/j.1469-185X.2011.00205.x

Betts, M. G., Nocera, J. J. and **Hadley, A. S**. (2010) Settlement in novel habitats induced by social information may disrupt community structure. *Condor* **112**:265-273.

Hadley, A. S., and Betts, M. G. (2009) Tropical deforestation alters hummingbird movement patterns. *Biology Letters* **5**:207-210. (Highlighted in *Science* (Feb. 20, 2009) 323:989)

Betts, M. G., **Hadley**, **A. S.** Rodenhouse, N. and Nocera, J. J. (2008). Social information trumps vegetation structure in breeding-site selection by a migrant songbird. *Proceedings of the Royal Society B-Biological Sciences* 275:2257-2263.

Hadley, A. S. and Desrochers, A. (2008). Response of wintering Boreal Chickadees (Poecile hudsonica) to forest edges: Does weather matter? *Auk* 125:30-38.

Hadley, A. S. and Desrochers, A. (2008). Winter habitat use by Boreal Chickadee flocks in a managed forest. *Wilson Journal of Ornithology* 120:139-145.

Betts, M. G., Zitske, B., **Hadley, A. S.**, and Diamond, A. W. (2006) Migrant forest songbirds undertake breeding dispersal following timber harvest. *Northeastern Naturalist* 13: 531-536.

Betts, M. G., **Hadley, A. S.** and Doran, P. J. (2005) Avian mobbing response is restricted by territory boundaries: experimental evidence from two species of forest warblers. *Ethology* 111: 821–835.

Manuscripts in review or in prep

Hadley, A. S., Zeller, K., Jones, F. A., Volpe, N. Wagner, H., and Betts, M. G., *In prep*. Evaluating methods for parameterizing landscape connectivity surfaces using ecological data.

Givot, R., Oconnell, K. E., **Hadley, A. S** and Betts, M. G. *In review*. Hummingbird Citizen Science: Students contribute to hummingbird conservation research while connecting content standards to the natural world. *The Science Teacher*

Hadley, A. S., S. J. K. Frey, W. D. Robinson, and M. G. Betts. *In Prep*. Tropical deforestation reduces hummingbird availability as pollinators.

Frey, S. J. K., **Hadley, A. S.**, Johnson, S. S., Schulze, M., Jones, J., and Betts M. G. *In Prep*. Spatial models reveal microclimatic buffering capacity of old-growth forest.

Volpe, N., **A. S. Hadley**, W. D. Robinson, and M. G. Betts. *In Prep*. Tropical forest fragmentation limits movements, but not persistence of a generalist pollinator species.

Kormann, U., C. Scherber, N. Klein, T. Kneib, M. Larbig, T. Tscharntke, **A. S. Hadley**, and M. G. Betts. *In prep*. Interacting effects of landscape structure and resource availability limit hummingbird movements.

Non-Refereed Contributions

Hadley, A. S. 2012. Independent Effects of Habitat Loss and Fragmentation on Pollination: Tropical Forest Fragmentation Alters Hummingbird Movements and Pollination Dynamics. Doctor of Philosophy in Forest Science (Ph.D.), Oregon State University.

Hadley, A. S. (2008) The effects of landscape disturbance on hummingbird movements and pollination services. Organization for Tropical Studies.

Hadley, A. S. 2006. Winter habitat use by Boreal Chickadee flocks within a managed forest landscape. Maître ès sciences (M.Sc.) Université Laval, Québec.

Hadley, A. S., and Desrochers, A. D. (2006) Winter habitat use by boreal chickadee flocks within a managed forest landscape. *Picoides*.

Hadley, A. S., (2004) The boreal chickadee. Boreal songbird initiative. Available online: http://www.borealbirds.org/birdguide/BD0644_species.html. Species account.

Hadley, A. S., (2003) Avian Mobbing Response is Restricted by Territory Boundaries: Experimental Evidence from Two Species of Forest Warblers. Undergraduate Honors Thesis. University of New Brunswick.

Presentations

Wagner, H. & **Hadley, A. S. (co-presenting)** 2015. Challenges of adopting an organism perspective for plants. International Association for Landscape Ecology World Congress. Portland. July 2015.

Hadley, A.S. & Betts, M.G. 2015. Intricacies of tropical pollination ecology. Guest lecture, Organization for Tropical Studies, Feb. 2015.

Birkett, C., **Hadley, A.S.** & Betts, M.G. 2015. Nectar sampling techniques in pollination ecology. Guest lecture, Organization for Tropical Studies, Feb. 2015.

Hadley, A.S.. Applying behavioral landscape ecology to tropical hummingbird pollination systems. Guest lecture, FOR341-Forest Ecology, Oregon State University, Dec. 2014.

Hadley, A. S. 2014. Opportunities for landscape genetics in a tropical hummingbird pollination system. Invited speaker. Landscape Genetics Mini-Symposium, University of Toronto, Oct. 2014.

Hadley, A. S. 2014. Behavioral Landscape Ecology. Guest lecture BIO311, University of Toronto Mississauga, Oct. 2014.

Betts, M. G., and **Hadley, A. S.** 2014. How and why a tropical plant can distinguish hummingbird species. American Ornithological Union.

Hadley, A.S. & Betts, M.G. 2013. Applying behavioral landscape ecology to tropical hummingbird pollination systems. Guest lecture, FOR341-Forest Ecology, Oregon State University, Oct. 2013.

Hadley, A. S., S. J. K. Frey, W. D. Robinson, and M. G. Betts. 2013 Deforestation effects on tropical hummingbirds and the plants they pollinate. Bird Nerds undergraduate club. Oregon State University.

Hadley, A. S., S. J. K. Frey, W. D. Robinson, W. J. Kress, and M. G. Betts. 2012. Independent Effects of Habitat Loss and Fragmentation on Pollination: Size of tropical forest patches, not total forest cover, is associated with pollination of an understory herb. AVES, Oregon State University.

Hadley, A. S. 2012. Independent Effects of Habitat Loss and Fragmentation on Pollination: Tropical Forest Fragmentation Alters Hummingbird Movements and Pollination Dynamics. Dissertation Defense, Oregon State University.

Hadley, A. S., S. J. K. Frey, W. D. Robinson, W. J. Kress, and M. G. Betts. 2012. Bigger is better: Size of tropical forest patches, not total forest cover, is associated with pollination of an understory herb. Ecological Society of America, Portland, Oregon.

Briggs, F., B. Lakshminarayanan, L. Neal, X. Fern, R. Raich, S. J. K. Frey, **A. S. Hadley**, and M. G. Betts. 2012. Acoustic classification of multiple simultaneous bird species: A multi-instance multi-label approach. North American Ornithological Conference, Vancouver, British Columbia.

Hadley, A. S., S. J. K. Frey, W. D. Robinson, W. J. Kress, and M. G. Betts. 2012. Landscape fragmentation reduces pollination services by tropical forest

hummingbirds. North American Ornithological Conference, University of British Columbia, Vancouver, Canada.

Hadley, A. S., M. G. Betts, and W. D. Robinson. 2011a. The effects of landscape fragmentation on pollination dynamics: some evidence from a tropical system. **Invited speaker**, Georg-August-University Göttingen, Göttingen, Germany.

Hadley, A. S., Betts, M. G., and W. D. Robinson. 2011b. Independent effects of tropical forest fragmentation and habitat loss on hummingbird movement and pollination dynamics. **Invited speaker**, Schweizerische Vogelwarte (Swiss Ornithological Institute), Sempach, Switzerland.

Hadley, A. S., and Betts, M. G. 2010. Forest pattern and Ecosystem function - Pollination. Scoutmasters education session, Corvallis, Oregon.

Hadley, **A. S.,** Betts, M. G., Rodenhouse, N. R., and Nocera, J. J. (2009) Social information trumps vegetation structure in breeding site selection by a migrant songbird. Wildlife Society annual meeting, Newport, OR.

Hadley, A. S. and Betts, M. G. (2008) Tropical hummingbird movements in agricultural and forested landscapes. Fisheries, Wildlife, and Ecology Symposium, Corvallis, OR.

Hadley, A. S. and Betts M. G. 2008. Tropical hummingbird movements in agricultural and forested landscapes American Ornithologists' Union (AOU/COS/SCO) Portland, OR.

Betts, M. G., **Hadley**, **A. S.,** Rodenhouse, N. R., and Nocera, J. J. (2008) Social information trumps vegetation structure in breeding site selection by a migrant songbird. American Ornithologists' Union (AOU/COS/SCO) Portland, OR.

Betts, M.G.**, Hadley, A.S.,** Rodenhouse, N.L., and Nocera, J.J. (2007). Singing after success: Post-breeding singing is used as public information by a migratory songbird. Ecologicial Society of America, San Jose, California, August 2007.

Hadley, A. S., and Desrochers, A. D. (2005) Edge effects on the use of winter habitat by boreal chickadee flocks. American Ornithologists' Union, Santa Barbara, California, August 2005.

PRESS Highlights

http://www.sciencedaily.com/releases/2015/03/150303095842.htm
http://oregonstate.edu/ua/ncs/archives/2015/mar/some-tropical-plants-pick-best-hummingbirds-pollinate-flowers
http://www.cbc.ca/m/touch/news/story/1.2978916
https://www.sciencenews.org/article/tropical-plant-knows-whose-bill-its-flowers
http://www.scienceworldreport.com/articles/22965/20150304/tropical-plants-pick-best-hummingbirds-pollinate-flowers.htm
Research in Costa Rica (Democrat-Herald)
Inspiration Dissemination, 88.7 FM KBVR on 13 January 2013, 30 minute piece on hummingbird work
Focus on Forestry (Fall 2012): Bioacoustics in Birdland (http://www.fsl.orst.edu/flel/pdfs/FocusFall2012Betts.pdf)

KGW.com (May 31, 2012): OSU high-tech team monitors bird songs (http://www.kgw.com/news/local/OSU-researchers-create-high-tech-way-to-monitor-birdsongs-156085895.html)
Albany Democrat-Herald (May 14, 2012): Feeding the birds (http://democratherald.com/news/local/feeding-the-birds/article_c08e2f2c-9d84-11e1-8e3f-001a4bcf887a.html)
BBC 'Saving species', Episode 6 (May 2010). (www.bbc.co.uk/savingspecies)
BBC 'Saving species', Episode 9 (May 2010). (http://www.bbc.co.uk/programmes/b00sjbdw#synopsis)
***Science (AAAS)* (June 12, 2008): Hummingbird Fix. http://www.sciencemag.org/content/vol323/issue5917/r-samples.dtl**
***Science Daily* (Feb. 10, 2009): "Hummingbird 'Tag' Suggests Fragmentation May Be Part of Pollination Crisis". http://www.sciencedaily.com/releases/2008/06/080618082046.htm**
***Oregonian* (Feb 12, 2009): "OSU Researchers Tie Pollination Woes to Bird Travel Disruptions" http://www.oregonlive.com/environment/index.ssf/2009/02/pollinating_birds_wont_cross_c.html**
***Corvallis Gazette Times* (Feb. 10, 2009): "Study: Pollinating Birds Won't Cross Cleared Land" http://www.gazettetimes.com/articles/2009/02/11/news/community/5aaa04_birdstudy.txt**
***ScienceNOW (AAAS)* (June 12, 2008): What's in a Song ? http://sciencenow.sciencemag.org/cgi/content/full/2008/618/3**
***Science Podcast Update (AAAS)* (June 20, 2008): "Birdsong Bandwagon" http://www.scienceupdate.com/show.php?date=20080710**
***Science Daily* (June 10, 2008): "Birds Communicate Reproductive Success in Song". http://www.sciencedaily.com/releases/2008/06/080618082046.htm**
***Telegraph* (London): (June. 18, 2008) "Songbirds Eavesdrop to Find Nests" http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/06/18/scibirds118.xml**
Conservation Magazine* (Oct. 2008) (public outlet for the Society of Conservation Biology): "Word of Mouth" *http://www.conservationmagazine.org/articles/v9n4/word-of-mouth/
***Washington Post* (June 23, 2008) "The Siren Song of Avian Real Estate" http://www.washingtonpost.com/wp-dyn/content/article/2008/06/22/AR2008062201995.html**
***Oregonian (June 14, 2008)* "Whistle While You Work" http://www.oregonlive.com/environment/oregonian/index.ssf?/base/living/1216770921168030.xml&coll=7**

SERVICE

Curriculum development: I worked to develop the undergraduate curriculum for the new undergraduate program being developed in the Department of Forest Ecosystems and Society at Oregon State University. The new curriculum seeks to blend forest management, ecosystem science and social science in a singe cohesive program.

Workshops:

International science education workshop (2014) – I organized a workshop bringing together teachers from schools in Oregon and Costa Rica to share science education experiences, develop education materials that meet curriculum requirements in both countries. This workshop established links between classes from these two countries through which they can share the science experiences.

Importance of ecosystem services (2012, 2013) – I organized workshops to familiarize K-12 teachers with the importance of ecosystem services and to work with them to develop educational materials, exercises and experiences they can share with their students.

H. J. Andrews Experimental Forest Day (2013, 2014) – This educational event is designed to familiarize funders, local landowners, teachers and industry with the current research being conducted in the experimental forest.

Phenology and climate change (2009, 2012, 2013) – These workshops were designed to familiarize K-12 teachers with the study of global changes in climate and how researchers are studying how this affects phenology.

Reviewer for the following journals: Journal of Applied Ecology, Journal of Animal Ecology, Annals of Botany, Avian Conservation Ecology, Behavioral Ecology, Biological conservation Condor, Conservation Biology, Journal of Ecology, Journal of Environmental Management, Journal of field Ornithology, Journal of Ornithology, Plant Biology, PLOS ONE, Proceedings of the Royal Society B

Guest editor: Guest editor for a special issue in Condor

TEACHING

Species Distributions (FS599, Instructor) – I co-developed the course. I outlined course goals, selected education materials, lectured, lead group discussions, advised student projects, and evaluated student performance.

Avian Conservation and Management (FW451 [Online], Instructor) – I was the primary instructor for the course. I added new learning modules and new evaluation materials including a new final exam.

Systematics of Birds (FW312 [Online], Instructor) – I was the primary lecturer and evaluated student performance on tests and examinations. I developed new exam questions for the course.

Systematics of Birds (FW312, Instructor) – I was the primary lecturer for both classroom and lab portions of the course and evaluated student performance on tests and examinations.

Wildlife Ecology' (FW481/581, Instructor) – I was the primary instructor for the applied portion of the course. I lectured, lead group discussions and evaluated student performance.

GUEST LECTURER
Forest Conservation and Wildlife Management (FS/FW453)- I lectured on stand structures and composition important for specific wildlife in managed landscapes.

Silvicultural Practices (FOR 443/543)- I lectured on potential effects of stand structure on wildlife distributions.

Forest Ecology (FOR 341) – I lectured on applying behavioral landscape ecology to study the impacts of landscape change.

OTS Tropical Biology (Duke) – I lectured on effects of landscape configuration on ecosystem processes.

ADVISING

Current graduate students-

Evan Jackson (FES/FW, Masters student) - I have helped to develop a project with Evan using RFIDs to sample hummingbirds and continue to co-advise him. Evan will defend winter 2015.

Past graduate students-

Noelia Volpe (FES/FW, Masters student) - I have assisted Noelia with project design, setup, training and field implementation. I continue to help advise her during analysis and publication of the work. Noelia defended March 2014.

Current undergraduate students-

Christina Birkett (NSF REU, Undergraduate) - I am co-advising Christina on a research experience for undergraduates (REU) internship. Christina is investigating "The effects of forest fragmentation on the caloric landscape" and I am working with her to prepare a manuscript for publication.

Amber Newell (FW, Undergraduate) – I advised Amber on GIS analysis of citizen science data. I will also advise her during a second GIS internship fall 2015.

Past students-

Tyler Neal McFadden (NSF REU, Undergraduate) - I co-advised Tyler on a research experience for undergraduates (REU) internship. Tyler investigated "The effects of dominant resources and invasive species on pollination networks using experimental arrays".

Jessica Greer (FW, Undergraduate) - I advised Jessica on an undergraduate thesis project examining "The effects of forest fragmentation on hummingbird pollination networks".

Wesley Shinsato (Zoology, Undergraduate) - I worked with Wesley on an outreach project introducing K-12 students to research and a project examining floral traits and hummingbird specialization.

Mariah Dawson (FW, Undergraduate) - I worked with Mariah on an outreach project introducing K-12 students to research.

Mary Grant (FERM, Undergraduate) - I worked with Mary on a pollen ID project and an outreach project introducing K-12 students to research.

Bridget Guildner (FERM, Undergraduate) – I advised Bridget on a project designing limited delivery feeders for hummingbirds.

Todd Bertwell (FERM, Undergraduate) - I worked with Todd to design an outreach program and developed learning materials for K-12 school groups.

SCIENCE OUTREACH

Grade 4/5 student education – I work with schoolteachers and their students to highlight the importance of ecosystem services. We involve the students in discussions on the subject and also in 'pollination games' to demonstrate how plants and pollinators depend on each other and how these systems may be disrupted. This work provided >300 feeders to elementary schools for experiments during summer months (2012 and 2013). The students collect data on nectar depletion rates and hummingbird visitation for two months during the summer. Over 400 students have been involved in the program. Seven additional classes were visited this year (2014) and more student-generated data will be collected. We share our research experiences with the students on our research blog: (http://blogs.oregonstate.edu/tropicalhummingbird/).

Teacher research experiences - I have supervised three Oregon school teachers during their research experience for teachers (RET) projects in Costa Rica. The teachers executed their own project and experienced the research techniques we use. In Oregon I have worked with Several RETs to demonstrate research techniques and methods. I have presented at workshops for scout group leaders on conservation topics related to plant-insect-bird phenology, climate change and the effects of landscape change on plants and animals.

GRANTS (Total: $1,209,568)

1. Betts, M. G., **Hadley A. S.,** W. D. Robison. 2015 "Epifluorescence microscope and digital camera attachment and external display monitor." **Research Equipment Reserve Fund (RERF)**. Amount: $**18,730**.

2. Betts, M. G., **Hadley, A. S.,** Jones, F. A., and Kress, W. J. 2015. "Interactive effects of fragmentation and keystone species loss on the structure of a tropical pollination network" National Science Foundation (NSF-DEB- [Population and Community Ecology]). Amount $**641,000**.

3. Betts, M. G. and **Hadley A. S.** 2013. Board of visitors (BOV) funding to support undergraduate mentored work experiences. College of Forestry, Oregon State University. Amount **$3,740**.

4. **Hadley, A. S.,** Frey, S. J. K., and Betts, M. G. 2013. "Testing methods and collecting data that will enable the establishment of a long-term hummingbird monitoring and research site in the Oregon Cascades." Western Hummingbird Partnership. Amount **$5,000.**

5. **Hadley, A. S.** and Betts, M. G. 2013. REU supplement (NSF -DEB-1314953) on "Independent effects of tropical forest fragmentation and habitat loss on hummingbird movement and pollination dynamics". Amount **$6,250**.

6. Cornell, K., **Hadley, A. S.** and Betts, M. G. 2013. RET supplement (NSF-DEB-1314952) on "Independent effects of tropical forest fragmentation and habitat loss on hummingbird movement and pollination dynamics". Amount **$21,220**.

7. Betts, M. G. and **Hadley A. S.** 2012. Undergraduate Mentored Work Experience. Board of Visitors funds. **$3,000.**

8. Student co-author on: Betts, M.G. and Robinson, W.D. 2011-2013 (See support letter from Dr. Betts). "Independent effects of tropical forest fragmentation and habitat loss on hummingbird movement and pollination dynamics." National Science Foundation (NSF-DEB-1050954 [Population and Community Ecology]). Amount $**500,628**.

9. Betts, M. G. and **Hadley A. S.** 2009. "Independent effects of tropical forest fragmentation and habitat loss on hummingbird movement and pollination dynamics." Oregon State University, General research funding. **$10,000.**

AWARDS AND SCHOLARSHIPS (Total: $222,700)

2014:	NSERC Postdoctoral fellowship (PDF) ($45,000/ 2 years)
2012:	Faculty award for outstanding achievement by a PhD student ($500)
2009-2011:	1. James Duke Memorial Scholarship ($3000) 2. James Duke Memorial Scholarship ($2000) 3. Oregon Lottery Scholarship ($3000)
2007–2009:	1. NSERC Post Graduate Scholarship (PGS D) ($42,000/ 2 years) 2. Tuition Scholarship ($29,600/2 years)
2003–2005:	NSERC Post Graduate Scholarship (PGS A) ($34,600/ 2 years)
2002-2003:	1. NSERC (Undergraduate Student Research Award) ($4000)

	2. Kingsbury Browne Sr. Memorial Prize ($1500) 3. Dr. GFM Smith Memorial Scholarship ($1500) 4. Fredericton Society of Saint Andrew ($500)
2001-2002:	1. NSERC (USRA) ($4000) 2. Fredericton Society of Saint Andrew ($500) 3. U.N.B. Field Biologist award
2000–2001:	1. NSERC (USRA) ($4000) 2. Academic Scholarship ($1000)
1999-2000:	Academic Scholarship ($1000)

REFERENCES

1. Dr. Matthew Betts, Associate Professor, Department of Forest Ecosystems and Society, Oregon State University. (541) 737-3841, matt.betts@oregonstate.edu
2. Dr. Helene Wagner, Associate Professor, Department of Biology, University of Toronto Mississauga (905) 569-4702, helene.wagner@utoronto.ca
3. Dr. W. Doug Robinson, Associate Professor, Department of Fish and wildlife, Oregon State University. (541) 737-9501, douglas.robinson@oregonstate.edu
4. Dr. André Desrochers, Professor, Faculté de foresterie et géomatique, Université Laval. (418) 656-2131 ext: 2908, andre.desrochers@sbf.ulaval.ca
5. Dr. Tony Diamond, Professor, Department of Biology, University of New Brunswick. (506) 453-4926, diamond@unb.ca
6. Dr. Graham Forbes, Associate Professor, Faculty of Forestry and Environmental Management, University of New Brunswick. (506) 453-4929, forbes@unb.ca