

Anna Sala
(Updated July 2019)

Present: Professor
Division of Biological Sciences, University of Montana, Missoula, MT-59812
Phone: (406) 243 6009
Fax: (406) 243 4184
email: anna.sala@umontana.edu
web: <http://cas.umt.edu/dbs/labs/sala>

Adjunct Professor
W.A. Franke College of Forestry & Conservation, University of Montana, Missoula,
MT-59812

Education:
1984 B.S. Biology (Botany) University of Barcelona (Spain).
1986 Advanced degree in Biology. Dept. of Ecology. University of Barcelona.
1992 Ph.D. Biology (Ecology). Dept. of Ecology. University of Barcelona (Spain).

Research Interests:
Plant Physiological Ecology: Plant Resource Allocation; Water Relations; Carbon Dynamics;
Responses to drought, fire and bark beetles; Growth-Related Tradeoffs. Fire ecology.

[Google Profile](#)

Professional experience:

Research

June 07- Present	Professor. Division of Biological Sciences. University of Montana. USA Adjunct Professor. College of Forestry and Conservation. University of Montana. USA
June 01- May 07	Associate Professor. Division of Biological Sciences. University of Montana. USA Adjunct Associate Professor. School of Forestry. University of Montana. USA
Sept. 2015	Faculty Exchange. Department of Plant Biology, Animal Biology and Ecology and Institute of Environmental Science and Technology (ICTA). Universitat Autònoma de Barcelona. Spain.
Sept. 03- May 04	Visiting Research Professor. Department of Plant Biology, Animal Biology and Ecology and Institute of Environmental Science and Technology (ICTA). Universitat Autònoma de Barcelona. Spain.
Jan 95- June 01	Assistant Professor. Division of Biological Sciences. University of Montana. USA
Aug. 93-Dec. 94	Post-Doctoral Associate. Dept. Biological Sciences. University of Nevada, Las Vegas. USA.
Sept.- Dec. 92	Research Associate. Department of Biological Sciences. University of Nevada, Las Vegas. USA.
Oct. 91-Aug. 92	Post-Doctoral Associate. Department of Environmental and Resource Sciences. University of Nevada, Reno. USA.
May 90-June 91	Research Specialist/ Visiting Fellow. Systems Ecology Research Group. San Diego State University. USA.
1985-1989	Research Assistant. Department of Ecology. University of Barcelona. Spain.
Oct. 85-Nov. 86	Research Assistant. Botanical Institute of Barcelona. Barcelona. Spain.
1984	Undergraduate Research Assistant. Department of Plant Physiology. University of Barcelona. Barcelona. Spain.

Teaching

- 1995- 2017 Division of Biological Sciences. University of Montana. Regular teaching load until 2016: 9-11 credits per year (Current: 7-9). Freshman Seminar. Introductory Ecology (non-majors); Introductory Botany (non-majors); Plant Physiology (senior level); Topics in Environmental Physiology (senior/graduate). Trends in Plant Ecology (graduate seminar); Plant Physiological Ecology (graduate level);
- 2016 Evolutionary Ecology of East Africa (fall 2016). Graduate Seminar.
- 2015 Speaking of Science (Graduate seminar University Autonomous of Barcelona, Spain)
- 2004 Department of Plant Biology, Animal Biology and Ecology and Institute of Environmental Science and Technology. University Autonomous of Barcelona (Spain). Conservation Biology. Graduate level.
- 1993- 1994 Department of Biological Sciences. University of Nevada, Las Vegas. Physiological Plant Ecology (graduate level); Human Biology (non-majors)
- September 1989 Seminar instructor in the international course "Primary production in Mediterranean forest ecosystems" (graduate students). Instituto Mediterráneo Agronómico de Zaragoza (IAMZ). Zaragoza, Spain.
- June 1988 Seminar instructor in international the course "Terrestrial Ecology: Ecological basis for the management of Mediterranean Ecosystems" (graduate students). Instituto Mediterráneo Agronómico de Zaragoza (IAMZ). Zaragoza, Spain.
- 1987-1989 Laboratory and field instructor in Terrestrial Ecology (Biology majors). Department of Ecology, University of Barcelona, Spain.
- 1983-1984 Instructor. High school students' course: "Environmental Education in Collserola (Barcelona, Spain)". City Council of Barcelona (Spain).

Invited Lectures, Symposiums and Workshops

- March 18 Forestry Mini-College for Landowners and Citizens. University of Montana. Invited.
- February 18 Missoula Community Lecture Series. University of Montana. Invited.
- July 17 Flathead Lake Biological Station. Montana. Invited.
- August 17 Ecological Society of America. Organized Session. Invited.
- December 15 University of Barcelona. Invited.
- December 15 CREAM. University Autonomous of Barcelona. Invited
- August 15 Treeline workshop. Participant.
- July 15 Botanical Society of America. Symposium. Invited
- May 15 NSF Plant Hydraulics Workshop. Washington DC. Invited.
- March 15 Inland Empire Tree Improvement Cooperative 41st Annual Meeting. Invited.
- January 15 Tufts University. Department of Biology. Invited Seminar.
- October 15 International workshop on Tree Mortality. Max Planck Institute of Biogeochemistry. Jena. October 2015. Participant.
- August 14 Ecological Society of America meeting IGNITE session. Organizer and presenter. Sacramento, California August 12, 2014
- July 14 24th Annual North American Dendroecological Fieldweek (NADEF) July 21-29, 2014. Wyoming. Workshop Participant.
- March 14 Inland Empire Tree Improvement Cooperative 41st Annual Meeting. Two invited presentations
- February 14 School of Biological Sciences. Washington State University. Graduate Keynote Speaker.
- December 13 American Geophysical Union. Annual Meeting. Invited
- Feb./Aug. 13 Tree Mortality Working Group. National Center for Ecological Analysis and Synthesis (NCEAS). Santa Barbara, California.
- January 13 Department of Biology. University of Calgary.

December 12 American Geophysical Union. Annual Meeting. Invited

November 12 Los Alamos National Laboratory, New Mexico.

October 12 Cary Institute of Ecosystem Studies. Millbrook, New York.

August 12 Ecological Society of America. Annual Meeting. Invited.

June 12 Estación Biológica de Doñana. CSIC, Sevilla, Spain.

May 12 University of Barcelona, Spain.

March 12 Instituto Pirenaico de Ecología. Zaragoza. Spain.
University of Girona, Spain.

February 12 Center for Ecological and Forestry Research Applications (CREAF). Autonomous University of Barcelona.

May 11 Department of Global Ecology. Carnegie Institution. Stanford University.

October 10 International Organization of Forestry Research Organizations (IUFRO). Canopy Processes Travelling Workshop. Australia. Keynote lecture.

April 10 Trees and the Global Environment. 6th Annual Harvard Plant Biology Symposium. 29-30 April 2010.

April 10 Western Forest Insect Work Conference Annual Meeting. Flagstaff, Arizona.

April 10 Frontiers in Forestry and Forest Science. Annual Meeting of the Montana Society of American Foresters. Missoula, Montana.

December 09 Symposium: Global Change in Harsh Environments. Coyhaique, Chile.

August 09 Crone E, Miller E. Sala A. 2009. 10th International Congress of Ecology (INTECOL). Brisbane, Australia.

October 08 College of Forestry and Conservation. University of Montana.

November 06 3rd International Conference on Fire Ecology and Management. San Diego;
Symposium organizer and speaker.

September 06 Northern Rockies Nature Forum. Missoula, Montana.

February 06 Restoring Fire-adapted Ecosystems. Montana Communities and Wildfire Conference. Helena, Montana.

October 05 Fire Sciences Laboratory Seminar Series. U.S. Forest Service, Rocky Mountain Research Station. Missoula, Montana.

May 05 International conference on prevention strategies for fire in Southern Europe. Barcelona. Spain. Keynote Speaker.

March 05 Regional Training Academy, U.S. Forest Service. Montana.

November 04 Black Hills State University, South Dakota.

September 04 Montana State University, Montana.

April 04 Department of Environmental Sciences. University of Girona. Spain.

March 04 Centre Tecnològic Forestal de Catalunya. Spain
Graduate Seminars in Environmental Sciences. Institute of Environmental Science and Technology. Universitat Autònoma de Barcelona. Spain.

December 03 Institute of Environmental Science and Technology. Universitat Autònoma de Barcelona. Spain. Graduate Program Inaugural keynote lecture.
Centre de Recerca Ecològica i d'Aplicacions Forestals. Universitat Autònoma de Barcelona. Spain

March 03 Northern Arizona University. Flagstaff, Arizona.

September 02 University of California at Berkeley. California.

October 02 University of California at Davis. California.

August 02 Symposium: The Ecology of high elevation five needle pines. Ecological Society of America. 87th Annual Meeting. Tucson, Arizona. (Co-authored with A. Schoettle).

January 02 USDA Forest Service. Intermountain Research Station. Intermountain Fire laboratory. Missoula, Montana.

March 01 Central Washington University. Ellensburg.

March 00 Department of Biology. Montana State University. Bozeman.

March 00 Bitterroot Ecosystem Management Project. Vegetation Section Workshop. Missoula Montana. Field Workshop.

June 99 Centre de Recerca Ecològica i d'Aplicacions Forestals. Universitat Autònoma de Barcelona. Spain.

- May 99 Symposium "Bitterroot Ecosystem Management Research Project; What we have learned". USDA Forest Service and The University of Montana. Missoula, Montana.
- April 99 USDA Forest Service. Rocky Mountain Research Station. Fire Sciences Laboratory. Missoula, Montana.
- December 97 Centre de Recerca Ecològica i d'Aplicacions Forestals. Universitat Autònoma de Barcelona. Spain.
- October 97 MEDECOS VIII. Global Change and Mediterranean Ecosystems. Symposium V. Effects of Global Climate and land-use changes on Mediterranean-type oak woodlands. San Diego, California.
- March 96 Montana Native Plant Society. Missoula, Montana
- November 95 Annual Conference of the Montana Weed Control Association. Billings, Montana.
- March 95 The University of Montana Sigma Xi Chapter. Missoula, Montana.
- June 93 Bayreuther Institut für Terrestrische Oekosystemforschung (BITOEK), Pflanzenökologie. Universität Bayreuth. Germany.

Honors, Fellowships and Faculty Exchanges:

- 2019 Bullard Fellow. Harvard University.
- 2018 Recognized among women leaders in fire science by Smith et al. (2018) <http://dx.doi.org/10.3390/fire1020030>
- 2015 Visiting Professor. Department of Animal Biology, Plant Biology and Ecology and Institute of Environmental Science and Technology. Universitat Autònoma de Barcelona. Bellaterra, Spain. University of Montana-UAB faculty exchange program.
- 2014 University of Montana. Division of Student Affairs. Student Support Honor.
- 2003-2004 Visiting Research Professor. Department of Animal Biology, Plant Biology and Ecology and Institute of Environmental Science and Technology. Universitat Autònoma de Barcelona. Bellaterra, Spain. Funded by the Government of Catalonia (Generalitat de Catalunya, Spain)
- 2003 Graduate Program Inaugural keynote lecture. Institute of Environmental Science and Technology. Universitat Autònoma de Barcelona. Spain.
- 1997 and 1998 Nominated for Helen Cox Teaching Award. University of Montana.
- 1993 Visiting Fellow. Bayreuther Institut für Terrestrische Oekosystemforschung (BITOEK) Pflanzenökologie. Universität Bayreuth. Funded by the German Ministry of Education
- 1990 Visiting Fellow. Systems Ecology Research Group. San Diego State University. Funded by the Government of Catalonia (Spain)
- 1987-1990 Pre-Doctoral Fellow (F.P.I.). Department of Ecology. University of Barcelona, Barcelona (Spain). Funded by the Ministry of Education of Spain
- 1987 Visiting Student. Institute of Ecology and Resources Management. University of Edinburgh. United Kingdom. Funded by the British Council

Grants:

- 2018-2019 MT EPSCoR NASA Research Initiation Grant. \$72,754. Key indicators of plant drought-induced mortality risk: from physiology to remote sensing. PI
- 2017 MT EPSCoR. Institute on Ecosystems. Drought Response in trees. \$20,000.
- 2015-2018 NSF. BCS 1461576. Quantifying Risk of Tree Species Regeneration Failure and Ecosystem Transitions in Lower Elevation Forests. Co-PI with S. Dobrowski, M. Maneta, W. Kleiber, and Z. Holden. \$410,000.
- 2015-2018 Joint Fire Sciences Program. Project number: 15-1-07-30. Lick Creek Demonstration-Research Forest: 25-Year Fire and Cutting Effects on Vegetation and Fuels. Co-PI, with C. Keyes, S. Hood, D Lutes. \$296,000.
- 2013-2016 USDA Forest Service. Rocky Mountain Research Station. 13-JV-11221637-142. Joint Venture Agreement. Exploring the causal mechanisms of fire-caused mortality. Co-PI with Sharon Hood. \$10,000.

- 2012-2016 USDA. McIntire Stennis Cooperative Forestry Research Program. MONTZ-School of Forestry and Conservation. University of Montana. Tree improvement programs: does breeding for productivity compromise resilience to drought? P.I. \$98,735. Project extended one year in 2015 with \$24,100 supplemental funds.
- 2013-2015 USDA Forest Service. Rocky Mountain Research Station. Joint Venture Agreement. Spatial fuel and fire hazard dynamics of northern Rocky Mountain landscapes. Co-PI with Sharon Hood. \$17,000.
- 2012 Montana NSF-EPSCoR Incubation Grant. Tree responses to drought: carbon reserves and associated trade-offs. \$16,000.
- 2011-2013 McIntire-Stennis Cooperative Forestry Research Program. School of Forestry and Conservation. The University of Montana. Efficacy and ecological effects of treatments to restore whitebark pine in the Northern Rocky Mountains and Inland Northwest. Co-PI with C. Nelson and A. Larson. \$99,979.
- 2010-2013 DRIM: understanding the mechanism of DRought-Induced Mortality in trees. Collaborator, Jordi Martínez-Vilalta, PI. €124,630. CGL-2010-16373.
- 2010-2011 NSF REU Supplement. DEB-Population Biology. Co-PI, with Elizabeth Crone. DEB 0515756. \$7,000.
- 2009-2010 NSF REU Supplement. DEB-Population Biology. Co-PI, with Elizabeth Crone. DEB 0515756. \$14,000.
- 2005-2010 NSF. Mast-seeding in perennial plants: a test of the pollen coupling model. Co-P.I. with Elizabeth Crone. DEB 0515756. \$511,000.
- 2008-2010 Rocky Mountain Research Station. U.S. Forest Service. Mountain Pine Beetle outbreaks in Whitebark pine: do sapwood stored carbon reserves enhance beetle preference and performance? JV-11221637-262 \$8,000.
- 2007-2008 NSF-REU Supplement. DEB-Population Biology. Mast seeding in perennial plants: a test of the pollen coupling hypothesis. PI (in practice), Co-PI, with Elizabeth Crone (official). DEB 0515756. \$6,000.
- 2006-2007 UM Faculty Professional Enhancement Program. Visiting Scholar Award. \$1,200.
- 2006-2008 Yellowstone to Yukon Conservation Initiative. Wilburforce Foundation. Do past logging activities in ponderosa pine/Douglas-fir forests exacerbate the effects of fire exclusion? \$29,000. PI. Funded to the Forest Native Network. P.I.
- 2005-2007 USDA. Forest Service, Rocky Mountain Research Station. Determining dynamics of whitebark pine cone production, pollination, and masting. With E. Crone and Eliot McIntire. \$17,000.
- 2002-2006 USDA-NIRCGP. Fire suppression in ponderosa pine ecosystems causes shifts in soil resource partitioning. P.I. with T.H. DeLuca, co-Pi. # 2002-35107-12267. \$260,989.
- 2003-2004 USDA. Forest Service, Rocky Mountain Research Station. Effects of fire suppression on soil resource availability in ponderosa pine/Douglas-Fir ecosystems. Joint Venture Agreement. P.I. 03-JV-11222044-052. \$15,000.
- 2003-2004 NSF Dissertation Improvement Grant (J. Perkins). Dissertation Research: *Pinus albicaulis* regeneration within a community context: restoring a keystone species. DEB-0309223. \$12,000.
- 2001-2004 USDA. Forest Service, Rocky Mountain Research Station. Ecophysiological responses of post-fire whitebark pine seedling restoration. Research Joint Venture. P.I., with Judy Perkins, co-P.I. 01-JV-11222022-116. \$40,000.
- 2001-2003 USDA. Forest Service. Rocky Mountain Research Station. Effects of thinning and prescribed burning on the physiological performance of second-growth ponderosa pine. Research Joint Venture. P.I., with G. Peters, co-P.I. 01-JV-11222048-149. \$37,500.
- 2000-2003 McIntire-Stennis Program. School of Forestry. University of Montana. Replacement of fire-maintained ponderosa pine by Douglas-fir: the consequences for water and nitrogen resources and forest productivity. co-P.I., with T.H. DeLuca. \$65,000.
- 1999-2003 USDA. Forest Service. Rocky Mountain Research Station. Fire Sciences Laboratory. Physiological responses of old growth ponderosa pine and western larch to restoration

- cutting and burning treatments. P.I., with R. Callaway and TH DeLuca, co-P.I.s. RMRS-99-99563-RJVA. \$105,280.
- 1999-2001 United States Department of Interior. Bureau of Land Management. Ecophysiology of *Astragalus lentiginosus*. Co-P.I., with K. Murray. BGP990056. \$14,300.
- 1999 University of Montana. University Grant Program. Vulnerability to cavitation in roots of six rocky Mountain conifer trees. \$3,500
- 1999 University of Montana. Faculty Development Grants. Mini-Sabbatical to the Department of Ecology and Centre de Recerca Ecologica i d'Aplicacions Forestals. Universitat Autònoma de Barcelona. December 1999. \$970.
- 1998 NSF. Small Grants for Exploratory Research (SGER). Restoring old-growth ponderosa pine and western larch stands in western Montana. P.I., with R. Callaway co-P.I. DEB-9814835. \$15,000.
- 1998 Montana Department of Agriculture. The occurrence and spread of saltcedar (*Tamarix ramosissima*) in Montana. P.I., with K. Murray and R. Sheley, co P.I.'s. MDA 98-83. \$25,725.
- 1998 University of Montana. Faculty Development Grants. Visiting Scholar for Dr. Todd Dawson. \$1,230.
- 1998 University of Montana. University Grant Program. An integrated view of the water relations of conifer trees. \$2,200.
- 1997-2000 USDA. National Initiative Research Competitive Grant Program (NIRCGP). Replacement of fire-maintained ponderosa pine by Douglas fir: the consequences for stand water cycles. # 97-35106-5061. \$50,000.
- 1997 University of Montana. University Grant Program. Geographical variation of freezing tolerance of *Tamarix ramosissima* seedlings. \$2200.
- 1997 National Park Service. Bighorn Canyon Recreation Area. The Spread of *Tamarix* in the northwestern United States. \$900.
- 1996 University of Montana. University Grant Program. Physiological Ecology of whitebark pine and subalpine fir seedlings in subalpine forests of western Montana. \$2,200.
- 1996 NSF-MONTS (Montana- National Science Foundation EPSCoR program). Invasion of *Tamarix ramosissima* in the Northwestern United States: temperature effects on seed germination and seedling growth along a latitudinal gradient. MSU Contract # 291737. \$25,000.
- 1996 NSF. Academic Infrastructure Program. Acquisition of Equipment for Research and Education in Plant Ecophysiology, Ecology and Evolutionary Genetics. P.I., with Mitchell-Olds T, Brewer C, Callaway R, Zabinski C., Siemens D. co-P.I.'s. DBI-9601816. \$160,545.
- 1995 USDA. U.S. Forest service. Intermountain Research Station. Replacement of whitebark pine by subalpine fir in western Montana: the consequences for stand carbon, water and nitrogen cycles. \$ 32,000. Co-P.I. with R.M. Callaway.
- 1995 University of Montana. University Grant Program 1995-1996. Long-term mechanisms of xylem cavitation avoidance in *Pinus albicaulis* and *Pinus contorta* along elevational gradients. \$ 2,200.
- 1989 Research Foundation Caixa de Barcelona. Barcelona, Spain. \$3,800 (approx.). Factors controlling stomatal conductance in *Quercus ilex*.
- 1988 C.I.R.I.T., Government of Catalonia, Spain. Water Relations and Transpiration in a *Quercus ilex* Forest. \$3,800 (approx).
- 1985 Research Foundation Caixa de Barcelona. Barcelona, Spain. Effects of forest fires on the soil and vegetation in Mediterranean plant communities. \$16,000 (approx.). Funded to a four member team of undergraduate students.

Service:

Program Director. Organismal Biology and Ecology Graduate Program. The University of Montana. Sept. 2006-May 09.

Manuscript Referee: Nature; Science, Nature Climate Change; Ecology; Ecological Applications; Ecological Monographs; PNAS, Ecology Letters, Plant, Cell and Environment; Bioscience; New Phytologist; Phil Trans. Royal Soc. B; American Journal of Botany; Oecologia, Functional Ecology, Tree Physiology, Ecosystems, Trees, Journal of Biogeography, Canadian Journal of Forest Research, Forest ecology and Management, Annales des Sciences Forestières, Great Basin Naturalist (Western American Naturalist), Southwestern Naturalist, American Midland Naturalist, Madroño, Wetlands, International Journal of Plant Sciences, Annals of the Association of American Geographers, Journal of Arid Environments, Conservation Physiology.

Editorial Boards: Associate Editor, Frontiers in Forest and Global Change, Forest Ecophysiology (2018-)
Associate Editor, Functional Ecology (2015-)
Editorial Review Board of Tree Physiology (01-03).

Grant Reviewer: National Biological Survey, National Science Foundation, USDA NIRC GP, University of Montana, University of Northern Arizona, Natural Environment Research Council (UK), Canadian Research Council, NASA EPSCoR (Montana State University), Agencia Nacional de Evaluación y Prospectiva (ANEP, Spain)

Panels: NSF (Ecology and Evolutionary Biology). Fall 1999.
USDA External Review Panel for the Department of Forest Sciences, Oregon State University. April 2006.
Program Ramón y Cajal y Juan de La Cierva. Spanish Ministry of Education and Science. May 2007, 2009 & 2017
External Review Department of Ecology. Montana State University. March 2009.
NASA-Montana Spatial Grant Consortium, Montana. Fall 2012.
Department of Energy. Office of Biological & Environmental Research; Terrestrial Ecosystem Science. May 2019.

Committees: Over 32 graduate student committees since 1995
Strategic and Advisory Committee: College of Humanities and Sciences. University of Montana. (2010-2015)
Strategic Committee: Division of Biological Sciences. The University of Montana. (2008-2010)
Global Studies Major Committee. University of Montana (Major design). 2009-2011.
International Committee. University of Montana.
General Education Committee. University of Montana. 2017-Present.
ASCRC. UM senate Curriculum committee. University of Montana. 2017-2018.
Many other departmental and University committees including chairing several faculty searches.

Graduate Students:

MS: Jason Sexton (May 2000), Dawn White (December 2002), Gregory Peters (December 2002), Cameron Naficy (December 2008), Sean Pinnell (MS 2016), Beth Roskilly (MS 2018)

PhD: John McKay (December 2001; Co-advised), October Seastone (May 2002; Co-advised), Judy Perkins (May 2004), Derek Mackenzie (May 2004; co-advised), Eric Keeling (May 2009), Jennifer Gremer (December 2010; co-advised), Eleanor Lahr (June 2012), Sharon Hood (December 2014), Gerard Sapés (December 2018).

Outreach

- Whitebark pine Ecosystem Foundation Education and Outreach Committee (2004-2008)
- Bridging research and management: several workshops to managers in collaboration with the Forest Service.

- Bridging Research and Education: Workshop to high school teachers (Improving Science teaching Project; School of Education; The University of Montana)
- Montana in the classroom: UM outreach to middle schools (2017).
- Missoula Community Lecture Series (2018)
- Forestry Mini-College for Landowners and Citizens. (2018)
- Work on interaction between fire and bark beetles by my graduate student led to [a testimony to the US Senate Committee on Energy and Natural Resources](#) (May 2015).
- Radio Interviews and highlights: [Montana Public Radio 2012](#); [Catalunya Radio, Catalonia, Spain, 2014](#) and [2016](#); [Washington National Public Radio](#) 2017. [MTPR](#) 2017.
- Press: [The New York Times](#); [The Economist](#); [The Missoulian](#); [CNN](#); [The Scientist](#).
- Featured in [Montana Divided. A Climate Change Story](#) by Justin Davey and Samantha Harris.

Other:

2008-Pres. Member Botanical Society of America
 2001-Pres. Member Whitebark Pine Foundation
 1994-Pres. Member of the Ecological Society of America.
 1988-Pres. Member of the Catalan Institution of Natural History (I.C.H.N.).
 2005-2009 Member Society of Fire Ecologists
 1989 Member of the directive board of the Catalan Institution of Natural History (I.C.H.N.).

Publications:

- Roskilly B, Keeling E, Hood S, Giuggiola A, **Sala A**. 2019. Conflicting functional effects of xylem pit structure relate to the growth-longevity tradeoff in a conifer species. **Proceedings of the National Academy of Sciences, USA**. doi/10.1073/pnas.1900734116
- Sapes G, Roskilly B, Dobrowski S, Maneta M, Anderegg WRL, Martínez-Vilalta J, **Sala A**. 2019. Plant water content integrates hydraulics and carbon depletion to predict drought-induced seedling mortality. **Tree Physiology**. doi:10.1093/treephys/tpz062
- Davis KT, Dobrowski SZ, Higuera PE, Holden ZA, Veblen TT, Rother MT, Parks SA, **Sala A**, Maneta M. 2019. Wildfires and climate change push low-elevation forests across a critical climate threshold for tree regeneration. **Proceedings of the National Academy of Sciences, USA**. Doi:10.1073/pnas.1815107116
- Martínez-Vilalta J*, Anderegg WRL*, Sapes G, **Sala A***. 2019. Greater focus on water pools may improve our ability to understand and anticipate drought-induced mortality in plants. **New Phytologist**. **Equal Contribution*
- Brodersen CR, Germino MJ, Johnson DM, Reinhardt K, Smith WK, Resler LM, Bader MY, **Sala A**, Kueppers LM, Broll G, Cairns DM, Holtmeier F-K and Wieser G. 2019. Seedling Survival at Timberline Is Critical to Conifer Mountain Forest Elevation and Extent. **Frontiers in Forest and Global Change** 2:9. doi: 10.3389/ffgc.2019.00009
- Rao K, Anderegg WRL, **Sala A**, Martínez-Vilalta J, Konings AG. 2019. Satellite-based vegetation optical depth as an indicator of drought-driven tree mortality. **Remote Sensing of Environment** 227:125-136.
- Huang J, Hammerbacher A, Weinhold A, Reichelt M, Gleixner G, Behrendt T, van Dam NM, **Sala A**, Gershenson J, Trumbore S, Hartmann H. 2019. Eyes on the future – evidence for trade-offs between growth, storage and defense in Norway spruce. **New Phytologist** 222:144-158.
- Simeone C, Maneta MP, Holden ZA, Sapes G, **Sala A**, Dobrowski SZ. 2018. Coupled ecohydrology and plant hydraulics modeling predicts ponderosa pine seedling mortality and lower treeline in the U.S. Northern Rocky Mountains. **New Phytologist** 221: 1814–1830.
- Crotteau JS, Keyes CR, Hood SM, Affleck DLR, **Sala A**. 2018. Fuel dynamics after a bark beetle outbreak impacts experimental fuel treatments. **Fire Ecology** 14:13.
<https://doi.org/10.1186/s42408-018-0016-6>
- Davis KT*, Higuera PE*, **Sala A***. 2018. Anticipating fire-mediated impacts of climate change using a demographic framework. **Functional Ecology** 32:1729–1745. *Equal Contribution*.

- Reed CC, Ballantyne AP, Cooper A, **Sala A**. 2018. Limited evidence for CO₂-related growth enhancement in northern Rocky Mountain lodgepole pine populations: Trends in growth and intrinsic water-use efficiency across climate gradients. **Global Change Biology** 24:3922–3937.
- Maher C, Nelson CA, Larson AJ, **Sala A**. 2018. Ecological effects and effectiveness of silvicultural restoration treatments in whitebark pine forests. **Forest Ecology and Management** 429:534–548.
- Crotteau JS, Hood SM, Lutes DC, Keyes CR, **Sala A**, Harrington MG. 2018. Management and Succession at the Lick Creek Demonstration/Research Forest, Montana. **Journal of Forestry**. doi: 10.1093/jofore/fvy030
- Lloret F, Sapes G, Rosas T, Galiano L, Saura-Mas S, **Sala A**, Martínez-Vilalta J. 2018. Non-structural carbohydrates dynamics associated with drought-induced die-off in woody species of a shrubland community. **Annals of Botany** 121: 1383–1396.
- Madani N, Kimball JS, Ballantyne AP, Affleck DLR, van Bodegom PM, Reich PB, Kattge J, **Sala A**, Nazeri M, Jones, MO, Zhao M, Running SW. 2018. Future global productivity will be affected by plant trait response to climate. **Scientific Reports** 8:2870 | DOI:10.1038/s41598-018-21172-9
- Verdaguer D, **Sala A**. 2017. La fisiologia vegetal a través de preguntas: Les plantes, l'aigua i els nutrients. Documenta Universitaria. Universitat de Girona. 162 pp.
- Adams HD, Zeppel MJB, Anderegg WRL, Hartmann H, Landhäusser SM, Tissue DT, Huxman TE, Hudson PJ, Franz TE, Allen CD, Anderegg LDL, Barron-Gafford GA, Beerling DJ, Breshears DD, Brodrigg TJ, Bugmann H, Cobb RC, Collins AD, Dickman LT, Duan H, Ewers BE, Galiano L, Galvez DA, Garcia-Forner N, Gaylord ML, Germino MJ, Gessler A, Hacke UG, Hakamada R, Hector A, Jenkins MW, Kane JM, Kolb TE, Law DJ, Lewis JD, Limousin JM, Love DM, Macalady AK, Martínez-Vilalta J, Mencuccini M, Mitchell PJ, Muss JD, O'Brien MJ, O'Grady AP, Pangle RE, Pinkard EA, Piper FI, Plaut JA, Pockman WT, Quirk J, Reinhardt K, Ripullone F, Ryan MG, **Sala A**, Sevanto S, Sperry JS, Vargas R, Vennetier M, Way DA, Xu C, Yepez EA, McDowell NG. 2017 A multi-species synthesis of physiological mechanisms in drought-induced tree mortality. **Nature Ecology and Evolution** 1: 1285–1291
- De la Mata R, Hood S, **Sala A**. 2017. Insect outbreak shifts the direction of selection from fast to slow growth rates in the long-lived conifer *Pinus ponderosa*. **Proceedings of the National Academy of Sciences, USA** 114:7391–7396. doi: 10.1073/pnas.1700032114
- Lahr EL, **Sala A**. 2016. Sapwood Stored Resources Decline in Whitebark and Lodgepole Pines Attacked by Mountain Pine Beetles (Coleoptera: Curculionidae). **Environmental Entomology**. 45:1463–1475. doi: 10.1093/ee/nvw138
- Garcia-Forner N, **Sala A**, Biel C, Savé R, Martínez-Vilalta J. 2016. Individual traits as determinants of time to death under extreme drought in *P. sylvestris*. **Tree Physiology** 36:1196-1209. doi: 10.1093/treephys/tpw040
- Martínez-Vilalta* J, **Sala A***, Asensio D; Galiano L, Hoch G, Palacio S, Piper FI, Lloret F. 2016. Dynamics of non-structural carbohydrates in terrestrial plants: a global synthesis. **Ecological Monographs** 86:495-516. **equal contribution*
- Hood S, Baker S, **Sala A**. 2016. Fortifying the Forest: Thinning and Burning Increase Resistance to a Bark Beetle Outbreak and Promote Forest Resilience. **Ecological Applications**. 26: 1984–2000. doi: 10.1002/eap.1363. **Featured in The Economist (May 26, 2016)**.
- Sack L, Ball MC, Brodersen C, Davis SD, Des Marais DL, Donovan LA, Givnish TJ, Hacke UG, Huxman T, Jansen S, Jacobsen AL, Johnson D, Koch GW, Maurel C, McCulloh KA, McDowell NG, McElrone A, Meinzer FC, Melcher PJ, North G, Pellegrini M, Pockman WT, Pratt RB, **Sala A**, Santiago LS, Savage JA, Scoffoni C, Sevanto S, Sperry J, Tyerman SD, Way D, Holbrook M. 2016. Plant hydraulics as a central hub integrating plant and ecosystem function: meeting report for “Emerging Frontiers in Plant Hydraulics” (Washington, DC, May 2015). **Plant, Cell and Environment** 39, 2085–2094

- Naficy CE, Keeling E, Landres P, Hessburg PF, **Sala A**, Veblen TT. 2016. Wilderness in the Anthropocene: testing the assumptions for ecological intervention and restoration in wilderness. **Journal of Forestry** 114:384–395.
- Hood S, **Sala A**. 2015. Ponderosa pine resin defenses and growth: Metrics matter. **Tree Physiology** 35: 1223–1235. doi:10.1093/treephys/tpv098
- Quentin AG, Pinkard EA, Ryan MG, Tissue DT, Baggett LS, Adams HD, Maillard P, Marchand J, Landhäuser SM, Lacoite A, Gibon Y, Anderegg WRL, Asao S, Atkin OK, Bonhomme M, Claye C, Chow PS, Clément-Vidal A, Davies NW, Dickman LT, Dumbur R, Ellsworth DS, Falk K, Galiano L, Grünzweig JM, Hartmann H, Hoch G, Hood S, Jones JE, Koike T, Kuhlmann I, Lloret F, Maestro M, Mansfield SD, Martínez-Vilalta J, Maucourt M, McDowell NG, Moing A, Muller B, Nebauer SG, Niinemets Ü, Palacio S, Piper F, Raveh E, Richter A, Rolland G, Rosas T, Saint Joanis B, **Sala A**, Smith RA, Sterck F, Stinziano JR, Tobias M, Unda F, Watanabe M, Way DA, Weerasinghe LK, Wild B, Wiley E, Woodruff DR. 2015. Non-structural carbohydrates in woody plants cannot be quantitatively compared among laboratories. **Tree Physiology** 35:1146-1165. doi:10.1093/treephys/tpv073
- Anderegg WRL, Hicke JA, Fisher RA, Allen CD, Aukema J, Bentz B, Hood S, Lichstein JW, Macalady AK, McDowell N, Pan Y, Raffa K, **Sala A**, Shaw JD, Stephenson NL, Tague C, Zeppel M. 2015. Tree mortality from drought, insects, and their interactions in a changing climate. **New Phytologist** 208: 674–683. doi: 10.1111/nph.13477. **Faculty of 1000 Biology.**
- Hood S, **Sala A**, Heyerdahl EK, Boutin M. 2015. Low-severity fire increases tree defense against bark beetle attacks. **Ecology** 96: 1846-1855. doi: 10.1890/14-0487.1. **Led to US Senate Committee on Energy and Natural Resources testimony. May 2016, Washington D.C.**
- Ryan MG, Sapes G, **Sala A**, Hood SM. 2015. Tree Physiology and bark beetles. **New Phytologist** 205:955-957.
- Lahr E, **Sala A**. 2014. Species, elevation, and diameter affect whitebark pine and lodgepole pine stored resources in the sapwood and phloem: implications for bark beetle outbreaks. **Canadian Journal of Forestry** 44: 1312–1319.
- Sala A**, Mencuccini M. 2014. Plumb trees win under drought. **Nature Climate Change** 4:666-667.
- Dietze M, **Sala A**, Carbone M, Czimeczik C, Mantooth JA, Richardson AD, Vargas R. 2014. Nonstructural Carbon in Woody Plants. **Annual Review of Plant Biology** 65:667–87
- Palacio S, Hoch G, **Sala A**, Körner C, Millard P. 2014. Does carbon storage limit tree growth? 2014. **New Phytologist** 201: 1096–1100.
- Gremer JR, **Sala A**. 2013. It is risky out there: the costs of emergence and the benefits of prolonged dormancy. **Oecologia** 172: 937-947. (DOI 10.1007/s00442-012-2557-8)
- Sala A**. Hopping K, McIntire EJB, Delzon S, Crone EE. 2012. Masting in whitebark pine (*Pinus albicaulis*) depletes stored nutrients. **New Phytologist** 196: 189–199. **Faculty of 1000 Biology.**
- Sala A**, Woodruff DW, Meinzer FR. 2012. Carbon dynamics in trees: feast or famine? **Tree Physiology** 32: 764-775.
- Keeling EG, **Sala A**. 2012. Changing growth response to wildfire in old-growth ponderosa pine trees in montane forests of North Central Idaho. **Global Change Biology** 18:1117-1126.
- Lloret F, Keeling EG, **Sala A**. 2011. Components of tree resilience: effects of successive low-growth episodes in old ponderosa pine forests. **Oikos** 120:1909-1920.
- Keeling EG, **Sala A**, DeLuca TH. 2011. Lack of fire has limited physiological impact on old-growth ponderosa pine in dry montane forests of North Central Idaho, USA. **Ecological Applications** 21: 3227-3237.
- Sala A**, Fouts W, Hoch G. 2011. Carbon storage in trees: does relative carbon supply decrease with tree size? In: Meinzer FC, Lachenbruch B, Dawson TE (eds). Size- and age-related changes in tree structure and function. Springer, Dordrecht. pp: 287-306.
- Delzon S, Douthe C, **Sala A**, Cochard H. 2010. Mechanism of water-stress induced cavitation in conifers: bordered pit structure and function support the hypothesis of seal capillary-seeding. **Plant, Cell and Environment** 33:2101-2111.
- Gremer JR, **Sala A**, Crone EE. 2010. Disappearing plants: why they hide and how they return. **Ecology** 91: 3407-3413.

- Naficy CE, **Sala A**, Keeling EG, Graham J, Deluca TH. 2010. Strong effects of historical logging: fire exclusion alone does not explain contemporary forest structure. **Ecological Applications** 20: 1851-1864.
- Sala A**, Piper F, Hoch G. 2010. Physiological mechanisms of drought-induced tree mortality are far from being resolved. **New Phytologist** 186:274-281. **Selected for the virtual issue to mark the publication of the 200th volume of *New Phytologist*.**
- Verdaguer D, **Sala A**, Vilà M. 2010. Effect of environmental factors and bulb mass on the invasive geophyte *Oxalis pes-caprae* development. **Acta Oecologica** 36:92-99.
- Crone EE, Miller E, **Sala A**. 2009. How do plants know when other plants are flowering? Resource depletion, pollen limitation and mast-seeding in a perennial wildflower. **Ecology Letters** 11:1119-26. **Science Editor Choice (Nov. 27, 2009). Faculty of 1000 Biology.**
- Sala A**. 2009. Lack of direct evidence for the carbon-starvation hypothesis to explain drought-induced mortality in trees. **Proceedings of the National Academy of Sciences, USA** 106 (26) E68. doi:10.1073/pnas.0904580106
- Sala A**, Hoch G. 2009. Height-related growth declines in ponderosa pine are not due to carbon limitation. **Plant, Cell and Environment** 32:22-30. **Faculty of 1000 Biology.**
- Peters GD, **Sala A**. 2008. Ponderosa pine reproductive output is sensitive to thinning and burning treatments. **Canadian Journal of Forest Research** 38: 844-850
- Kolb TE, Agee JK, Fulé PZ, McDowell NG, Pearson K, **Sala A**, Waring RH. 2007. Perpetuating old ponderosa pine. **Forest Ecology and Management** 249:141-157.
- Sala A**, Verdaguer D, Vilà M. 2007. Sensitivity of the invasive geophyte *Oxalis pes-caprae* to nutrient availability and competition. **Annals of Botany** 99: 637 - 645
- Keeling EG, **Sala A**, DeLuca TH. 2006. Effects of fire-exclusion on forest structure and composition in unlogged ponderosa pine/Douglas-fir forests. **Forest Ecology and Management** 237:418-428.
- DeLuca TH, **Sala A**. 2006. Frequent fire alters nitrogen transformations in natural Ponderosa Pine stands of the Inland Northwest. **Ecology** 87: 2511-2522.
- Sala A**. 2006. Hydraulic compensation in Northern Rocky Mountain conifers: does successional position and life history matter? **Oecologia** 149:1-11.
- MacKenzie MD, DeLuca TH, **Sala A**. 2006. Fire exclusion and nitrogen mineralization in ponderosa pine ecosystems. **Soil Biology and Biogeochemistry** 38:952-961.
- Sexton JP, **Sala A**, Murray KJ. 2006. Occurrence, persistence and expansion of saltcedar (*Tamarix* spp.) populations in the Great Plains of Montana. **Western North American Naturalist** 66:1-11.
- Sala A**, Peters GD, McIntyre LR, Harrington MG. 2005. Physiological responses of ponderosa pine in western Montana to thinning, prescribed burning, and burning season. **Tree Physiology** 25:339-348.
- MacKenzie MD, DeLuca TH, **Sala A**. 2004. Forest structure and organic horizon analysis along a fire chronosequence in the low elevation forests of western Montana. **Forest Ecology and Management** 203:334-343.
- Martínez-Vilalta J, **Sala A**, Piñol J. 2004. The hydraulic architecture of Pinaceae. **Plant Ecology** 171: 3-13.
- Stout DL, **Sala A** 2003. Xylem vulnerability to cavitation in *Pseudotsuga menziesii* and *Pinus ponderosa* from contrasting habitats. **Tree Physiology** 23:43-50.
- Callaway RM, **Sala A**, Crone E, Maron J. 2003. Plant ecology textbooks: a new contender. **American Journal of Botany** 90: 960-964.
- Sexton JP, McKay JK, **Sala A**. 2002. Plasticity and adaptive evolution may allow saltcedar to invade cold climates in North America. **Ecological Applications** 12:1652-1660.
- McKay JK, Bishop JG, Jing-Zhong L, Richards JH, **Sala A**, Mitchell-Olds T. 2001. Local adaptation to climate despite small effective population size in the rare Sapphire Rockcress. **Proceedings of the Royal Society. Biological Series** 268:1-7.
- Sala A**, Carey EV, Keane RE, Callaway RM. 2001. Water use by whitebark pine and subalpine fir: consequences of fire suppression in subalpine forests. **Tree Physiology** 21:717-725.
- Carey EV, **Sala A**, Keane RB, Callaway RM. 2001. Are old growth forests underestimated as global carbon sinks? **Global Change Biology** 7:339-344.

- Sala A**, Carey EV, Callaway RM. 2001. Dwarf Mistletoe affects whole tree water relations of Douglas-fir and western larch primarily through changes in biomass allocation. **Oecologia** 126:42-52.
- Piñol J, **Sala A**. 2000. Ecological implications of xylem embolism of several Pinaceae of NW United States. **Functional Ecology** 14:538-545.
- Callaway RM, **Sala A**, Keane RE. 2000. Succession may maintain high leaf area:sapwood ratios and productivity in old subalpine forests. **Ecosystems** 3:254-268.
- Sabaté S, **Sala A**, Gracia CA. 1999. Leaf traits and canopy organization. *In*: Rodà F, Gracia CA, Retana J, Bellot J. (eds). Ecology of Mediterranean Evergreen Oak Forests. Ecological Studies 137. Springer-Verlag. pp:121-133.
- Sala A**. 1999. Modelling canopy gas exchange during summer drought. *In*: Rodà F, Gracia CA, Retana J, Bellot J. (eds). Ecology of Mediterranean Evergreen Oak Forests. Ecological Studies 137. Springer-Verlag. pp 149-161.
- Smith SD, Devitt DA, **Sala A**, Cleverly J, Busch DE. 1998. Water relations of riparian plants from warm desert regions. **Wetlands** 18(4): 687-696.
- Devitt DA, **Sala A**, Smith SD, Cleverly J, Shaulis LK, Hammett R. 1998. Bowen ratio estimates of evapotranspiration for *Tamarix ramosissima* stands on the Virgin River in southern Nevada. **Water Resources Research** 34: 2407-2414.
- Sala A**, Heidel B. 1997. Alert: Invasion of *Tamarix* in Montana. **Kelseya** 10:3/6.
- Sala A**, Nowak RS. 1997. Ecophysiological responses of three riparian graminoids to declining water table. **International Journal of Plant Sciences** 158: 835-843.
- Cleverly JR, Smith SD, **Sala A**, Devitt DA. 1997. Invasive Capacity of *Tamarix ramosissima* in a Mojave Desert floodplain: the role of drought. **Oecologia** 111: 12-18.
- Devitt DA, Piorkowski JM, Smith SD, Cleverly JR, **Sala A**. 1997. Plant Water Relations of *Tamarix ramosissima* in response to the imposition and alleviation of soil moisture stress. **Journal of Arid Environments** 36: 527-540.
- Devitt DA, **Sala A**, Mace KA, Smith SD. 1997. The effect of applied water on the water use of saltcedar in a desert riparian environment. **Journal of Hydrology** 192: 233-246.
- Oberbauer SF, Cheng W, Gillespie CT, Ostendorf B, **Sala A**, Gebauer R, Virginia R, Tenhunen JD. 1996. Landscape patterns of CO₂ exchange in Tundra ecosystems. *In*: Reynolds JF, Tenhunen JD (eds) Function and Disturbance in Arctic Tundra. Ecological Studies. Springer Verlag.
- Oberbauer SF, Gillespie CT, Cheng W, **Sala A**, Gebauer R, Tenhunen JD. 1996. Diurnal and seasonal patterns of ecosystem CO₂ efflux from upland tundra in the foothills of the Brooks Range, Alaska. **Arctic and Alpine Research** 28: 328-338.
- Sala A**, Smith SD, Devitt DA. 1996. Water use by *Tamarix ramosissima* and associated phreatophytes in a Mojave Desert floodplain. **Ecological Applications** 6: 888-898.
- Sala A**, Tenhunen JD. 1996. Simulation of net canopy photosynthesis and transpiration in *Quercus ilex* L. under the influence of seasonal drought. **Agricultural and Forest Meteorology** 78: 203-222.
- Tenhunen JD, Gillespie CT, Oberbauer SF, **Sala A**, Whalen S. 1995. Climate effects on the carbon balance of tussock tundra in the Philip Smith Mountains, Alaska. **Flora** 190: 273-283.
- Sabaté S, **Sala A**, Gracia CA. 1995. Nutrient content in *Quercus ilex* canopies: seasonal and spatial variation within a catchment. **Plant and Soil** 168-169: 297-304.
- Sala A**, Tenhunen JD. 1994. Site-specific stomatal response and water relations in *Quercus ilex* in a Mediterranean watershed. **Tree Physiology** 14: 601-617.
- Sala A**, Sabaté S, Gracia C, Tenhunen J.D. 1994. Canopy structure within a *Quercus ilex* forested watershed: variations due to location, phenological development, and water availability. **Trees** 8: 254-261.
- Oberbauer SF, Gillespie CT, Cheng W, Gebauer R, **Sala A**, Tenhunen JD. 1993. Environmental effects on CO₂ efflux from riparian tundra in the northern foothills of the Brooks Range, Alaska, USA. **Oecologia** 92: 568-577.
- Tenhunen JD, **Sala Serra A**, Harley PC, Reynolds JF, Dougherty RL. 1990. Factors influencing carbon fixation and water use by Mediterranean sclerophyll shrubs during summer drought. **Oecologia** 82: 381-393.

- Sala A**, Sabaté S, Gracia CA. 1989. Organización vertical en un matorral de *Quercus coccifera* y *Pistacia lentiscus* tras el fuego: índice foliar y gradientes morfológicos. **Mediterránea (Ser. Biol.)** 12: 47-58.
- Sala A**, Picolo R, Piñol P. 1989. Efectos del frío en las relaciones hídricas de *Quercus ilex* en la Sierra de Prades (Tarragona). **Options Méditerranéennes-Sér.Sémin** 3: 57-61.
- Sabaté S, **Sala A**, Gracia CA. 1989. Análisis de la ocupación del espacio después del fuego en matorrales de *Quercus coccifera* y *Pistacia lentiscus* en el mazizo del Garraf (SW Barcelona). **Mediterránea (Ser. Biol.)** 12: 26-46.
- Sala A**, Sabaté S, Gracia CA. 1988. Structure and organization of a garrigue ecosystem after fire. **Ecologia Mediterranea** 13: 99-110.
- Fransi A, Pons R, **Sala A**, Vallejo VR, Bertran C. 1987. Wheat and soil bromide dynamics after fumigation with methyl bromide in a Mediterranean climate. **Plant and Soil** 98: 117-124.
- Abril M, Gracia CA, Sabaté S, **Sala A**, Serrasolsas I. 1987. Evolució de l'estructura vertical en plantes mediterrànies després d'un incendi. *In*: J. Terradas (ed.) Els ecosistemes terrestres: la resposta als incendis forestals i d'altres perturbacions. Quaderns d'Ecologia Aplicada (Diputació de Barcelona) 10: 77-82.

Archived Data:

Hood SM, Lutes DC, Crotteau JS, Keyes CR, Sala A, Harrington MG, Munger GT. 2018. Lick Creek historic photographic series: a century of change in a ponderosa pine forest in western Montana, US. Fort Collins, CO: Forest Service Research Data Archive.
<https://doi.org/10.2737/RDS-2018-0023>