

Curriculum Vitae
Steven C. Pennings
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Address

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Born

February 3, 1962

Education

Ph.D. in Ecology, University of California, Santa Barbara, CA (1990)

Sc.B. in Aquatic Biology, Magna Cum Laude, Brown University, Providence, RI (1984)

Professional Experience

2013-present: John and Rebecca Moores Professor, University of Houston.

2010-present: Director, University of Houston Coastal Center.

2009-present: Professor, Department of Biology and Biochemistry, University of Houston.

2002-2009: Assistant, Associate Professor, Department of Biology and Biochemistry, University of Houston.

1994-2001: Assistant, Associate Research Professor, University of Georgia Marine Institute, Sapelo Island, GA.

1990-1993: Post-doctoral Research Associate, University of Guam.

Awards

2013: John and Rebecca Moores Professor, University of Houston.

2012: Society of Wetland Scientists Service Award for editorial service for the society journal "Wetlands".

2010: Society of Wetland Scientists Merit Award for outstanding research.

Grants

- 2013 Mangroves are invading Texas salt marshes: what are the consequences? TX Sea Grant. Steve Pennings PI. \$176,603. 2/2014-1/2016.
- 2012 LTER: Georgia Coastal Ecosystems III. National Science Foundation. Merryl Alber PI, Steve Pennings Co-PI. \$5,880,000. 6 years.
- Climate effects on ANPP of saltmarshes of the North American Atlantic coast—a hierarchical model approach. (Postdoctoral proposal for Kazik Wieski). \$37,648. 2012-2013.
- Coastal Wetland Ecology and Geomorphology. LTER Network Working Group. \$12,800. 2012-2013.
- 2011 Collaborative Research: Biophysical alteration of wetland geomorphology in response to rising sea level. National Science Foundation. \$105,854. 2011-2014.
- Mangroves invading Texas salt marshes: does it matter? Texas Sea Grant. \$176,603 to UH, with parallel award to Anna Armitage at Texas A&M Galveston. 2012-2014.
- 2010 RAPID Deepwater Horizon Oil Spill: Insights into salt marsh food webs from the Deepwater Horizon oil spill. National Science Foundation. \$131,115. 2010-2011.
- 2009 Marsh platform dissection as a response to sea level rise: physical mechanisms of erosion. DOE National Institute for Climatic Change Research. \$28,000.
- Elucidating the mechanisms linking crab herbivory to salt marsh dieback. University of Houston Coastal Center. \$14,940.
- Global warming and the interaction between mangroves and salt marshes in Texas. Environmental Institute of Houston. \$14,995.
- 2008 Geographic variation in top-down control of *Solidago sempervirens*, University of Houston Coastal Center. \$5,700.
- Tidal forcing and geographic variation in top-down and bottom-up control of a salt marsh food web. Environmental Institute of Houston. \$14,750.
- 2007: Collaborative proposal: Latitudinal variation in top-down and bottom-up control of salt marsh herbivores. National Science Foundation. Steven Pennings. \$267,743. 3 years.

Dissection of Platform Marshes by Ecophysical Processes in Response to Sea-Level Rise. Duncan FitzGerald et al. National Institute for Coastal Climate Research. \$56,000 subcontract to UH. 2007-2008.

Dissertation Research: Preference and performance in plant-herbivore interactions across latitude. National Science Foundation. Doctoral Dissertation Improvement Grant for Chuan-Kai Ho. 2007-2008.

Anthropogenic effects on top-down and bottom-up regulation of community structure: eutrophication and salinity stress. NOAA. National Estuarine Research Reserve fellowship for Juan Jimenez. \$40,000. 2007-2008.

Does overwintering success of a parasitic plant determine its host range? Houston Coastal Center, \$13,750. 1 year.

Plant species richness and productivity in Texas tidal marshes. Environmental Institute of Houston. \$14,990. 1 year.

2006: GCE II: Georgia coastal ecosystems. National Science Foundation. Tim Hollibaugh PI, Steve Pennings and Merryl Alber Co-PIs. \$4,920,000. 6 years.

Interactive effects of nutrients and habitat complexity on the structure and dynamics of arthropod communities in Texas salt marshes. Environmental Institute of Houston. \$15,000. 1 year.

Diet mixing in a parasitic plant: a choice or a constraint? Houston Coastal Center. \$14,875. 1 year.

2005: Effects of sea level rise and climate variability on ecosystem services of tidal marshes, south Atlantic Coast. USEPA. Craft, C. (PI), Joye, S. (Co-PI), Pennings, S. C. (Co-PI), Park, D. (Co-PI) and Ehman, J. (Co-PI). \$749,974. January 2005-December 2007.

Interactive effects of nutrients and stress on the strength of top-down and bottom-up forces in Texas salt marshes. Environmental Institute of Houston. \$14,940. 1 year.

Multiple symbionts: interactions between mycorrhizal fungi and parasitic plants colonizing the same host. Houston Coastal Center. \$14,500. 1 year.

2004: Constraints on host use by a parasitic plant. Houston Coastal Center. \$14,537. 1 year.

Diversity patterns in Texas salt marsh plant communities. Environmental Institute of Houston. \$14,880. 1 year.

- Using the NERR system to explore plant-herbivore interactions: latitudinal variation and impacts of climate change. NOAA. National Estuarine Research Reserve fellowship for Chuan-Kai Ho. \$60,000. 2004-2007.
- 2003: "Latitudinal differences in plant-herbivore interactions in Europe". National Geographic Society. \$16,500. 1 year.
- Do plant stress models predict foraging by parasitic plants? Houston Coastal Center. \$14,875. 1 year.
- Environmental variation and the diversity of Texas salt marsh plant communities. Environmental Institute of Houston. \$12,875. 1 year.
- 2002: "Latitudinal gradients in plant palatability in Atlantic coast salt marshes." National Science Foundation. \$314,125. 3 years.
- Human activities and the dynamics of coastal salt marsh vegetation. Houston Coastal Center. \$7,195. 1 year.
- Local and geographic variation in palatability of coastal salt marsh plants. Environmental Institute of Houston. \$9,950. 1 year.
- 2001: "A geographic comparison of ecosystem processes in salt marshes." Deutscher Akademischer Austauschdienst. D.M. 3700. 1 month. (Travel grant to fund collaborative research in Germany).
- 2000: "LTER--Georgia land/ocean margin ecosystem". National Science Foundation. Tim Hollibaugh PI, Steve Pennings Co-PI. \$4,200,000 plus supplements. 6 years.
- 1998: "Effects of eutrophication on marsh plant community structure in four sea grant states." National Oceanic and Atmospheric Administration, Georgia Sea Grant College Program, Project Development. Steven Pennings PI, J. Stephen Brewer and Steven Y. Newell Co-PIs. \$78,210. 4 years.
- 1997: "Latitudinal variation in plant-animal interactions: an experimental test of a biogeographic paradigm." National Geographic Society. 1 year.
- 1996: "Climate-driven process and pattern in coastal salt marsh plant communities". Steven Pennings and Mark Bertness Co-PIs. National Institute for Global Environmental Change, 3 years.
- 1996: "Health indicators for salt marsh estuaries of the South Atlantic Bight". J. Alberts PI, R. Kneib, S. Newell, S. Pennings Co-PIs. USEPA, 3 years.

1992: "Interspecific variation in chemical defenses of sea hares". Lerner Gray Fund for Marine Research, 1 year.

1991: "Mediation of algal-opisthobranch-predator interactions by algal secondary metabolites". V.J. Paul PI (as the postdoc, I wrote major parts of the grant). NSF OCE-9116307, 2 years.

1986-1990: Five small grants to support PhD research.

Editorial/Society/Panel Service

Editorial Board, Ecology and Ecological Monographs (2001-2005; 2014-present).

Publications Committee, Ecological Society of America (2009-2012, 2014-present).

Editorial Board (2008) and Senior Associate Editor (2009-2011), Wetlands.

Assistant editor, Proceedings, 7th International Coral Reef Symposium (1992).

Regular reviewer for NSF and multiple journals including Ecology, Ecological Monographs, Journal of Ecology, and Oecologia.

Served on three NSF panels (2000, 2007, 2011).

Peer-Reviewed Publications

(* indicates undergraduate coauthor)

1. He, Q., M. D. Bertness, J. F. Bruno, B. Li, G. Chen, T. C. Coverdale, A. H. Altieri, J. Bai, T. Sun, S. C. Pennings, J. Liu, P. R. Ehrlich, B. Cui. 2014. Economic development and coastal ecosystem change in China. *Scientific Reports* 4:5995, DOI: 10.1038/srep05995.
2. Pennings, S. C., B. D. McCall and L. Hooper-Bui. 2014. Effects of oil spills on terrestrial arthropods in coastal wetlands. *Bioscience* 64:789-795. DOI:10.1093/biosci/biu118.
3. Więski, K. and S. C. Pennings. 2014. Latitudinal variation in resistance and tolerance to herbivory of a salt marsh shrub. *Ecography* 37:763-769. DOI:10.1111/ecog.00498.
4. Sharitz, R. R., Batzer, D. P. and S. C. Pennings. 2014. Ecology of freshwater and estuarine wetlands: an introduction. In, D. P. Batzer and R. R. Sharitz, eds. *Ecology of Freshwater and Estuarine Wetlands*. Second edition. University of California Press. In press.

5. Sharitz, R. R. and S. C. Pennings. 2014. Development of wetland plant communities. In, D. P. Batzer and R. R. Sharitz, eds. *Ecology of Freshwater and Estuarine Wetlands*. Second edition. University of California Press. In press.
6. Guo, H., K. Więski, Z. Lan and S. C. Pennings. 2014. Relative influence of deterministic processes on structuring marsh plant communities varies across an abiotic gradient. *Oikos* 123:173-178. DOI: 10.1111/j.1600-0706.2013.00425.x.
7. Więski, K. and S. C. Pennings. 2014. Climate drivers of *Spartina alterniflora* saltmarsh production in Georgia, USA. *Ecosystems* 17: 473-484. DOI: 10.1007/s10021-013-9732-6.
8. Marczak, L. B., K. Więski, R. F. Denno and S. C. Pennings. 2013. Importance of local versus geographical variation in saltmarsh plant quality for arthropod herbivore communities. *Journal of Ecology* 101:1169-1182.
9. Schalles, J. F., C. M. Hladik, A. A. Lynes and S. C. Pennings. 2013. Landscape estimates of habitat types, plant biomass, and invertebrate densities in a Georgia salt marsh. *Oceanography* 26:88-97.
10. Guo, H., Y. Zhang, Z. Lan and S. C. Pennings. 2013. Biotic interactions mediate the expansion of black mangrove (*Avicennia germinans*) into salt marshes under climate change. *Global Change Biology* 19:2765-2774. DOI: 10.1111/gcb.12221.
11. Ho, C.-K. and S. C. Pennings. 2013. Preference and performance in plant-herbivore interactions across latitude—a study in U.S. Atlantic salt marshes. *PLOS One*. doi: 10.1371/journal.pone.0059829.
12. Pennings, S. C. 2013. Forging collaborations between ecology and historical ecology. In V. D. Thompson and J. C. Waggoner Jr. (eds.), *The archaeology and historical ecology of small scale economies*. The University Press of Florida, Gainesville.
13. Treplin, M., S. C. Pennings, and M. Zimmer. 2013. Decomposition of leaf litter in a U.S. saltmarsh is driven by dominant species, not species complementarity. *Wetlands*. 33:83-89. DOI 10.1007/s13157-012-0353-1.
14. Ewers, C., A. Beiersdorf, K. Wieski, S. C. Pennings, and M. Zimmer. 2012. Predator/prey-interactions promote decomposition of low-quality detritus. *Wetlands* 32: 931-938. DOI 10.1007/s13157-012-0326-4.
15. Guo, H. and S. C. Pennings. 2012. Post-mortem ecosystem engineering by oysters creates habitat for a rare marsh plant. *Oecologia* 170:789-798.
16. McCall, B. D. and S. C. Pennings. 2012. Geographic variation in salt marsh structure and function. *Oecologia* 170:777-787.

17. Gough, L., K. L. Gross, Cleland, E. E., C. M. Clark, S. L. Collins, J. E. Fargione, S. C. Pennings and K. N. Suding. 2012. Incorporating clonal growth form clarifies the role of plant height in response to nitrogen addition. *Oecologia* 169:1053-1062.
18. Pennings, S. C., M. Alber, C. R. Alexander, M. Booth, A. Burd, W.-J. Cai, C. Craft, C. B. DePratter, D. Di Iorio, C. Hopkinson, S. B. Joye, C. D. Meile, W. S. Moore, B. Silliman, V. Thompson, J. P. Wares. 2012. South Atlantic Tidal Wetlands. Pages 45-61 in A. Baldwin and D. Batzer (eds.), *Wetland Habitats of North America: Ecology and Conservation Concerns*. University of California Press.
19. Guo, H. and S. C. Pennings. 2012. Mechanisms mediating plant distributions across estuarine landscapes in a low-latitude tidal estuary. *Ecology* 93(1):90-100.
20. McCall, B. D., S. C. Pennings. 2012. Disturbance and recovery of salt marsh arthropod communities following BP Deepwater Horizon oil spill. *PLoS ONE* 7 (3) e32735. DOI. 10.1371/journal.pone.0032735.
21. Jimenez, J. M., K. Wieski, L. B. Marczak, C.-K. Ho, S. C. Pennings. 2012. Effects of an omnivorous katydid, salinity, and nutrients on a planthopper-*Spartina* food web. *Estuaries and Coasts* 35:475-485.
22. Cleland, E. E., C. M. Clark, S. L. Collins, J. E. Fargione, L. Gough, K. L. Gross, S. C. Pennings and K. N. Suding. 2011. Patterns of trait convergence and divergence among native and exotic species in herbaceous plant communities are not modified by nitrogen enrichment. *Journal of Ecology* 99:1327-1338.
23. Marczak, L. B, C.-K. Ho, K. Wieski, H. Vu, R. F. Denno and S. C. Pennings. 2011. Latitudinal variation in top-down and bottom-up control of a salt marsh food web. *Ecology* 92:276-281.
24. Marquardt, E. S. and S. C. Pennings. 2011. Diet mixing in a parasitic plant: adaptation or constraint? *Plant Ecology* 212:69-77.
25. Pennings, S. C. 2010. Local and geographic variation in *Spartina*-herbivore interactions. In Ayres, D. R., D. W. Kerr, S. D. Ericson and P. R. Olofson (eds.) *Proceedings of the Third International Conference on Invasive *Spartina*, 2004* Nov 8-10, San Francisco, CA, USA. San Francisco Estuary Invasive *Spartina* Project of the California State Coastal Conservancy: Oakland, CA.
26. Ho, C.-K., S. C. Pennings and T. H. Carefoot. 2010. Is diet quality an overlooked mechanism for Bergmann's rule? *American Naturalist* 175:269-276.

27. Więski, K., H. Guo, C. B. Craft and S. C. Pennings. 2010. Ecosystem functions of tidal fresh, brackish, and salt marshes on the Georgia Coast. *Estuaries and Coasts* 33:161-169.
28. Marquardt, E. S. and S. C. Pennings. 2010. Constraints on host use by a parasitic plant. *Oecologia* 164:177-184.
29. Robinson, J. D., E. Diaz-Ferguson, M. F. Poelchau, S. Pennings, T. D. Bishop, J. Wares. 2010. Multiscale diversity in the marshes of the Georgia Coastal Ecosystems LTER. *Estuaries and Coasts* 33:865-877.
30. Hughes, Z. J., D. M. FitzGerald, C. A. Wilson, S. C. Pennings, K. Więski and A. Mahadevan. 2009. Rapid headward erosion of marsh creeks in response to relative sea level rise. *Geophysical Research Letters* 36, L03602, doi:10.1029/2008GL036000.
31. Pennings, S. C., C.-K. Ho, C. S. Salgado, K. Więski, N. Davé*, A. E. Kunza, E. L. Wason*. 2009. Latitudinal variation in herbivore pressure in Atlantic Coast salt marshes. *Ecology* 90:183-195.
32. Craft, C., J. Clough, J. Ehman, S. Joye, R. Park, S. Pennings, H. Guo, M. Machmuller. 2009. Forecasting the effects of accelerated sea level rise on tidal marsh ecosystem services. *Frontiers in Ecology and the Environment* 7:73-78.
33. Craft, C., S. Pennings, J. Clough, R. Park and J. Ehman. 2009. SLR and ecosystem services: a response to Kirwan and Guntenspergen. *Frontiers in Ecology and the Environment* 7:127-128.
34. Collins, S. L., K. N. Suding, E. E. Cleland, M. Batty, S. C. Pennings, K. L. Gross, J. B. Grace, L. Gough, J. E. Fargione and C. M. Clark. 2008. Rank clocks and plant community dynamics. *Ecology* 89:3534-3541.
35. Kunza, A. E. and S. C. Pennings. 2008. Patterns of plant diversity in Georgia and Texas salt marshes. *Estuaries and Coasts* 31:673-681.
36. Ho, CK and SC Pennings. 2008. Consequences of omnivory for trophic interactions on a salt-marsh shrub. *Ecology* 89:1714-1722.
37. Cleland, E. E., C. M. Clark, S. L. Collins, J. E. Fargione, L. Gough, K. L. Gross, D. G. Milchunas, S. C. Pennings, W. D. Bowman, I. C. Burke, W. K. Lauenroth, G. P. Robertson, J. C. Simpson, D. Tilman, K. N. Suding. 2008. Species responses to nitrogen fertilization in herbaceous plant communities, and associated species traits. *Ecology* 89:1175.

38. McFarlin, C. R. J. S. Brewer, T. L. Buck and S. C. Pennings. 2008. Impact of fertilization on a salt marsh food web in Georgia. *Estuaries and Coasts* 31:313-325.
39. Wason, E. L.* and S. C. Pennings. 2008. Grasshopper (Orthoptera: Tettigoniidae) species composition and size across latitude in Atlantic Coast salt marshes. *Estuaries and Coasts* 31:335-343.
40. Pennings, S. C., Simpson, J. C. 2008. Like herbivores, parasitic plants are limited by host nitrogen content. *Plant Ecology* 196:245-250.
41. Clark, C. M., Cleland, E. E., Collins, S. L., Fargione, J. E., Gough L., Gross, K. L., Pennings, S. C., Suding, K. N., Grace, J. B. 2007. Environmental and plant community determinants of species loss following nitrogen enrichment. *Ecology Letters* 10:596-607.
42. Pennings, S. C., M. Zimmer, N. Dias, M. Sprung, N. Davé*, C.-K. Ho, A. Kunza, C. McFarlin, M. Mews, A. Pfaunder, C. Salgado. 2007. Latitudinal variation in plant-herbivore interactions in European salt marshes. *Oikos* 116:543-549.
43. Sharitz, R. R., Pennings, S. C. 2006. Development of wetland plant communities. In, *Ecology of freshwater and estuarine wetlands*, D. P. Batzer and R. R. Sharitz (eds.), University of California Press.
44. Donovan, D. A., Pennings, S. C., Carefoot, T. H. 2006. Swimming in the sea hare *Aplysia brasiliiana*: cost of transport, parapodial morphometry, and swimming behavior. *Journal of Experimental Marine Biology and Ecology* 328:76-86.
45. Pennings, S. C., Silliman, B. R. 2005. Linking biogeography and community ecology: latitudinal variation in plant-herbivore interaction strength. *Ecology* 86:2310-2319.
46. Pennings, S. C., Clark, C. M., Cleland. E. E., Collins, S. L., Gough L., Gross, K. L., Milchunas, D. G., Suding, K. N. 2005. Do individual plant species show predictable responses to nitrogen addition across multiple experiments? *Oikos* 110:547-555.
47. Salgado, C. S., Pennings, S. C. 2005. Latitudinal variation in palatability of salt-marsh plants: are differences constitutive? *Ecology* 86:1571-1579.
48. Richards, C. L., Pennings, S. C., Donovan, L. A. 2005. Habitat range and phenotypic variation in salt marsh plants. *Plant Ecology* 176:263-273.
49. Suding, K. N., Collins, S. L., Gough L., Clark, C., Cleland, E. E., Gross, K. L., Milchunas, D. G., Pennings, S. 2005. Functional- and abundance-based

mechanisms explain diversity loss due to N fertilization. Proceedings of the National Academy of Sciences, U.S.A. 102:4387-4392.

50. Pennings, S. C., M. B. Grant*, M. D. Bertness. 2005. Plant zonation in low-latitude salt marshes: disentangling the roles of flooding, salinity and competition. *Journal of Ecology* 93: 159-167.
51. Zimmer, M., S. C. Pennings, T. L. Buck, T. H. Carefoot. 2004. Salt marsh litter and detritivores: a closer look at redundancy. *Estuaries* 27:753-769.
52. Goranson, C. E.*, C.-K. Ho, S. C. Pennings. 2004. Environmental gradients and herbivore feeding preferences in coastal salt marshes. *Oecologia* 140:591-600.
53. Pennings, S. C., E. R. Selig*, L. T. Houser*, M. D. Bertness. 2003. Geographic variation in positive and negative interactions among salt marsh plants. *Ecology* 84:1527-1538.
54. Callaway, R. M., S. C. Pennings, C. L. Richards. 2003. Phenotypic plasticity and interactions among plants. *Ecology* 84:1115-1128.
55. Carefoot, T. H., S. C. Pennings. 2003. Influence of proximal stimuli on swimming in the sea hare *Aplysia brasiliiana*. *Journal of Experimental Marine Biology and Ecology* 288:223-237.
56. Buck, T. L., G. A. Breed, S. C. Pennings, M. E. Chase, M. Zimmer, T. H. Carefoot. 2003. Diet choice in an omnivorous salt-marsh crab: different food types, body size and habitat complexity. *Journal of Experimental Marine Biology and Ecology* 292:103-116.
57. Pennings, S. C., L. E. Stanton, J. S. Brewer. 2002. Nutrient effects on the composition of salt marsh plant communities along the Atlantic and Gulf coasts of the United States. *Estuaries* 25:1164-1173.
58. Siska, E. L., S. C. Pennings, T. L. Buck and M. D. Hanisak. 2002. Latitudinal variation in palatability of saltmarsh plants: which traits are responsible? *Ecology* 83:3369-3381.
59. Callaway, R. M., K. O. Reinhart, G. W. Moore, D. J. Moore and S. C. Pennings. 2002. Epiphyte host preferences and host traits: mechanisms for species-specific interactions. *Oecologia* 132:221-230.
60. Pennings, S. C. and R. M. Callaway. 2002. Parasitic plants: parallels and contrasts with herbivores. *Oecologia* 131:479-489.

61. Zimmer, M., S. C. Pennings, T. L. Buck, T. H. Carefoot. 2002. Species-specific patterns of litter processing by terrestrial isopods (Isopoda: Oniscidea) in high intertidal salt marshes and coastal forests. *Functional Ecology* 16:596-607.
62. Zimmer, M., J. P. Danko, S. C. Pennings, A. R. Danford, T. H. Carefoot, A. Ziegler, R. F. Uglow. 2002. Cellulose digestion and phenol oxidation in coastal isopods (Crustacea: Isopoda). *Marine Biology* 140:1207-1213.
63. Pennings, S. C., V. D. Wall, D. J. Moore, M. Pattanayek, T. L. Buck and J. J. Alberts. 2002. Assessing salt marsh health: a test of the utility of five potential indicators. *Wetlands* 22:405-414.
64. Pennings, S. C., E. L. Siska and M. D. Bertness. 2001. Latitudinal differences in plant palatability in Atlantic coast salt marshes. *Ecology* 82:1344-1359.
65. Pennings, S. C. and M. D. Bertness. 2001. Salt marsh communities. In, M. D. Bertness, S. D. Gaines and M. E. Hay (editors), *Marine Community Ecology*, Sinauer Associates. Pages 289-316.
66. Pennings, S. C. and D. J. Moore. 2001. Zonation of shrubs in western Atlantic salt marshes. *Oecologia* 126:587-594.
67. Pennings, S. C., S. Nastisch* and V. J. Paul. 2001. Vulnerability of sea hares to fish predators: importance of diet and fish species. *Coral Reefs* 20:320-324.
68. Callaway, R. M., K. O. Reinhart, S. C. Tucker and S. C. Pennings. 2001. Effects of epiphytic lichens on host preferences of the vascular epiphyte *Tillandsia usneoides*. *Oikos* 94:433-441.
69. Zimmer, M., J. P. Danko, S. C. Pennings, A. R. Danford, A. Ziegler, R. F. Uglow and T. H. Carefoot. 2001. Hepatopancreatic endosymbionts in coastal isopods (Crustacea: Isopoda), and their contribution to digestion. *Marine Biology* 138: 955-963.
70. Wall, V. D., J. J. Alberts, D. J. Moore, S. Y. Newell, M. Pattanayek and S. C. Pennings. 2001. The effect of mercury and PCBs on organisms from lower trophic levels of a Georgia saltmarsh. *Arch. Env. Cont. Toxicol.* 40:10-17.
71. Bertness, M. D. and S. C. Pennings. 2000. Spatial variation in process and pattern in salt marsh plant communities in eastern North America. In Weinstein, M. P., Kreeger, D. A. (eds) *Concepts and controversies in tidal marsh ecology*. Kluwer Academic Publishers, Dordrecht.

72. Callaway, R. M. and S. C. Pennings. 2000. Facilitation may buffer competitive effects: indirect and diffuse interactions among salt marsh plants. *American Naturalist* 156:416-424.
73. Pennings, S. C. and R. M. Callaway. 2000. The advantages of clonal integration under different ecological conditions: a community-wide test. *Ecology* 81: 709-716.
74. Pennings, S. C., T. H. Carefoot, M. Zimmer, J. P. Danko and A. Ziegler. 2000. Feeding preferences of supralittoral isopods and amphipods. *Can. J. Zool.* 78:1918-1929.
75. Ziegler, A., T. Grospietsch, T. H. Carefoot, J-P. Danko, M. Zimmer, I. Zerbst-Boroffka and S. C. Pennings. 2000. Hemolymph ion composition and volume changes in the supralittoral isopod *Ligia pallasii* Brandt, during molt. *J. Comp. Physiol. B* 170: 329-336.
76. Carefoot, T. H., J. Wright, S. C. Pennings, A. Ziegler, M. Zimmer, R. F. Uglow, A. Danford and J. P. Danko. 2000. Hemolymph homeostasis in relation to diel feeding activity in the prototypal land isopod, *Ligia pallasii*. *Can. J. Zool.* 78: 588-595.
77. Carefoot, T. H., D. Karentz, S. C. Pennings and C. L. Young. 2000. Distribution of mycosporine-like amino acids in the sea hare *Aplysia dactylomela*: effect of diet on amounts and types sequestered over time in tissues and spawn. *Comp. Biochem. Physiol.* 126C: 91-104.
78. Pennings, S. C. and M. D. Bertness. 1999. Using latitudinal variation to examine effects of climate on coastal salt marsh pattern and process. *Current Topics in Wetland Biogeochemistry* 3: 100-111.
79. Pennings, S. C., V. J. Paul, D. C. Dunbar, M. T. Hamann, W. A. Lumbang, B. Novack and R. S. Jacobs. 1999. Unpalatable compounds in the marine gastropod *Dolabella auricularia*: distribution and effect of diet. *J. Chem. Ecol.* 25: 735-755.
80. Carefoot, T. H., S. C. Pennings and J. P. Danko. 1999. A test of novel function(s) for the ink of sea hares. *J. Exp. Mar. Biol. Ecol.* 234: 185-197.
81. Pennings, S. C. and C. L. Richards. 1998. Effects of wrack burial in salt-stressed habitats: *Batis maritima* in a Southwest Atlantic salt marsh. *Ecography* 21:630-638.

82. Pennings, S. C., T. H. Carefoot, E. L. Siska, M. E. Chase and T. A. Page*. 1998. Feeding preferences of a generalist salt marsh crab: relative importance of multiple plant traits. *Ecology* 79:1968-1979.
83. Nomann, B.* and S. C. Pennings. 1998. Fiddler crab-vegetation interactions in hypersaline habitats. *J. Exp. Mar. Biol. Ecol.* 225:53-68.
84. Callaway, R. M. and S. C. Pennings. 1998. Impact of a parasitic plant on the zonation of two salt marsh perennials. *Oecologia* 114:100-105.
85. Pennings, S. C., S. R. Pablo* and V. J. Paul. 1997. Chemical defenses of the tropical, benthic marine cyanobacterium *Hormothamnion enteromorphoides*: diverse consumers and synergisms. *Limnology and Oceanography* 42:911-917.
86. Pennings, S.C. 1997. Indirect effects on coral reefs. In, C. Birkeland, editor, *Life and death of coral reefs*. Chapman and Hall.
87. Pennings, S. C. and R. M. Callaway. 1996. Impact of a parasitic plant on the structure and dynamics of salt marsh vegetation. *Ecology* 77:1410-1419.
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92. Pennings, S. C., S. R. Pablo*, V. J. Paul and J. Emmett Duffy. 1994. Effects of sponge secondary metabolites in different diets on feeding by three groups of consumers. *J. Exp. Mar. Biol. Ecol.* 180:137-149.
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94. Pennings, S.C., M.T. Nadeau*, and V.J. Paul. 1993. Selectivity and Growth of the generalist herbivore *Dolabella auricularia* feeding upon complementary resources. *Ecology* 74:879-890.

95. Pennings, S.C., and V.J. Paul. 1993. Sequestration of algal secondary metabolites by sea hares: location, specificity and dynamics. *Marine Biology* 117:535-546.
96. Pennings, S.C., and V.J. Paul. 1993. Secondary chemistry does not limit dietary range of the specialist sea hare *Stylocheilus longicauda* (Quoy et Gaimard 1824). *J. Exp. Mar. Biol. Ecol.* 174:97-113.
97. Pennings, S.C., and J.M. Svedberg. 1993. Does CaCO₃ in food deter feeding by sea urchins? *Mar. Ecol. Prog. Ser.* 101:163-167.
98. Pennings, S.C. 1993. Temporal and spatial variation in the recruitment of the sea hare, *Aplysia californica*, at Santa Catalina Island, CA. In, F. G. Hochberg (ed.) *Third California Islands Symposium: Recent Advances in Research on the California Islands*. Santa Barbara Museum of Natural History, Santa Barbara CA.
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100. Pennings, S.C., and R.M. Callaway. 1992. Salt marsh plant zonation: the relative importance of competition and physical factors. *Ecology* 73:681-690.
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102. Pennings, S.C. 1991. Reproductive behavior of *Aplysia californica* Cooper: diel patterns, sexual roles and mating aggregations. *J. Exp. Mar. Biol. Ecol.* 149:249-266.
103. Pennings, S.C. 1991. Spatial and temporal variation in recruitment of *Aplysia californica* Cooper: patterns, mechanisms and consequences. *J. Exp. Mar. Biol. Ecol.* 146:253-274.
104. Pennings, S.C. 1990. Multiple factors promoting narrow host range in the sea hare, *Aplysia californica*. *Oecologia* 82:192-200.
105. Pennings, S.C. 1990. Size-related shifts in herbivory: specialization in the sea hare, *Aplysia californica* Cooper. *J. Exp. Mar. Biol. Ecol.* 142:43-61.
106. Pennings, S.C. 1990. Predator-prey interactions in opisthobranch gastropods: effects of prey body size and habitat complexity. *Mar. Ecol. Prog. Ser.* 62:95-101.

Other Publications

1. Pennings, S.C. 2012. The big picture of marsh loss. *Nature (News & Views)* 490:352-353.
2. Pennings, S.C., and V. J. Paul. 1993. Within-individual distribution of sequestered secondary metabolites in sea hares. Abstract. *Proc. 7th Int. Coral Reef Symp., Guam, 1992. Vol. 2, p. 876.*

Postdoctoral Associates and Visiting Scientists Sponsored

Kazimerz Więski, Postdoctoral Associate, 2005-present
 Zoe Hughes, Visiting Scientist, Research Scientist, 2010-present
 Chelse Prather, Postdoctoral Associate, 2011-present
 Hongyu Guo, Postdoctoral Associate, 2011-present
 Christopher Gabler, Postdoctoral Associate, Visiting Scientist, 2012-present
 Nat Holland, Research Faculty, 2011-present
 Yihui Zhang, Visiting Scientist, 2009-2010
 Laurie Marczak, Postdoctoral Associate, 2008-2010

Graduate Students Sponsored

Fan Li, PhD, current
 Wei-Ting Lu, PhD, current
 Sayatane Dastidar, PhD, current
 Huy Vu, PhD, current
 Hongyu Guo, PhD, 2011
 Brittany McCall, MS, 2011
 Emily Marquardt, PhD, 2009
 Alana Lynes, MS, 2008
 Juan Jimenez, PhD, 2008
 Chuan-Kai Ho, PhD, 2008
 Lisa Iwahara, MS, 2006
 Amy Kunza, MS, 2006
 Cristiano Salgado, MS, 2004
 Caroline McFarlin, MS, 2004
 Erin Siska, MS, 1998

Recent Invited Talks

- 2014 Pennings, S. C., Reciprocal feedbacks between crabs and creek growth in coastal salt marshes. Biology Department, University of Texas Arlington, April 17, 2014.
 Pennings, S. C. Reciprocal feedbacks between crabs and creek growth in coastal salt marshes. Department of Earth and Atmospheric Sciences, University of Houston, September 12, 2014.
- 2013 Pennings, S. C. Interdisciplinary long-term research programs: Lessons from the Georgia Coastal Ecosystems Long-Term Ecological Research program.

College of the Environment and Ecology, Xiamen University, Xiamen, China.
July 9, 2013.

Pennings, S. C., H. Guo, A. Armitage, S. Dastidar, C. Weaver, A. Whitt, Z. Hughes. Mangroves invading Texas salt marshes: does it matter? Invited speaker, Texas Bays and Estuaries Meeting, April 25-26, 2013, Port Aransas, TX.

Pennings, S. C., H. Guo, A. Armitage, Z. Hughes, C. Weaver, S. Dastidar. Ecological implications of black mangrove expansion in the Gulf of Mexico: insights from a large-scale mangrove removal experiment. Texas Mangrove Research Symposium, Mission-Aransas National Estuarine Research Reserve, Port Aransas TX, February 28, 2013.

2011 Pennings, S. C. Using a network of research sites to address new scientific questions: examples from the US LTER network. Plenary presentation, French Long-Term Ecological Research network meeting, Rennes University, Rennes, France. October 4-6, 2011.

Pennings, S. C. Geographic variation in plant-herbivore interactions in salt marshes. Xiamen University, Xiamen, China. August 15, 2011.

Pennings, S. C. Geographic variation in plant-herbivore interactions in salt marshes. Beijing Normal University, Beijing, China. August 22, 2011.

Pennings, S. C. Geographic variation in plant-herbivore interactions in salt marshes. East China Normal University, Shanghai, China. August 26, 2011.

Pennings, S. C. Biotic and abiotic drivers of creek growth in sinking salt marshes. Department of Natural Sciences, Sam Houston State University. April 21, 2011.

2010 Pennings, S. C. Crabs dig creeks in salt marshes as sea level rises. Department of Natural Sciences, University of Houston Downtown. November 12, 2010.

Pennings, S. C. Biotic and abiotic drivers of creek growth in coastal salt marshes. Department of Ecosystem Science and Management. Texas A&M. Sept 28, 2010.

Pennings, S. C. Latitudinal variation in factors structuring salt marsh communities. Department of Integrative Biology, University of South Florida, Tampa FL. Dec 2, 2010.

2009 Pennings, S. C. Latitudinal variation in plant-herbivore interactions. Entomology Department, Texas A&M, Galveston, TX. March 5, 2009.

Publically-available data sets

I am the primary contributor of multiple publically-available data sets with well-documented metadata that have been assigned unique DOI identifiers. These can be located at several data portals including http://gce-liter.marsci.uga.edu/public/app/data_search.asp. A partial list follows.

1. Steven C. Pennings. Fall 2000 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at GCE LTER sampling sites 1, 3, 4, 5, and 6. doi:10.6073/pasta/50d1778288bd73a789a28c66ffe68a53.
2. Steven C. Pennings. Fall 2000 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/644c526e33481b84d8e8bdbb6e981310.
3. Steven C. Pennings. Fall 2000 soil organic content survey -- ash-free dry weight analysis for soil samples from 10 GCE LTER sampling sites. doi:10.6073/pasta/7278953fa7668592551b2026caf15339.
4. Steven C. Pennings. Fall 2001 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites. doi:10.6073/pasta/f2f2d17c62bb7ecf0d0054a2c10869fc.
5. Steven C. Pennings. Fall 2001 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/f077b7685f15be152a4ddfa66b24b9e9.
6. Steven C. Pennings. Fall 2002 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites. doi:10.6073/pasta/a192ce885a7aaa0809e83a7948ac5081.
7. Steven C. Pennings. Fall 2002 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/37ecd3b7c8a39161a0260305eb5e5646.
8. Steven C. Pennings. Plant allometry at GCE sampling sites 1-10 in October, 2002. doi:10.6073/pasta/3b653c8661f191e8f094f250b82a6bca.
9. Steven C. Pennings. Fall 2000 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/e2216eb0e38daa5609e029b437c48919.
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11. Steven C. Pennings. Fall 2002 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/745d95cb78e12893f1907ce0fb3009cc

12. Steven C. Pennings. Fall 2003 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/e1dfc132b6a72bf00ff717c71ac70d97
13. Steven C. Pennings. Fall 2003 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
doi:10.6073/pasta/a12f7eadf424b73fa3f39c6a75e74c9e.
14. Steven C. Pennings. Fall 2003 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/41bc23792cf5b1c1e1437aa1915f05d7.
15. Steven C. Pennings. Plant community response to fertilization at Sapelo Island, Georgia. doi:10.6073/pasta/22670ff6a7de129ea2f25fa0b4e0d970.
16. Steven C. Pennings. Fall 2004 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/56dc7dc2b3523c0488398afb1884503f.
17. Steven C. Pennings. Fall 2004 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
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19. Steven C. Pennings. Fall 2005 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
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20. Steven C. Pennings. Fall 2005 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/f5d114a899f3684c938ec1706534d198.
21. Steven C. Pennings. Fall 2005 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/0453c217f2c4d3ab19ffb239dea6c01a.
22. Steven C. Pennings. Fall 2006 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/e00b1278ffb8ae6e08741f1df0a389dc.
23. Steven C. Pennings. Fall 2006 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
doi:10.6073/pasta/3df6e329b657e92858be252133d651e6.
24. Steven C. Pennings. Fall 2006 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/7ae76bb367bc24b2e45ebba6b62fad37.
25. Steven C. Pennings. Plant allometry at GCE sampling site 8 in October, 2007.
doi:10.6073/pasta/84fb17ed6e70300a05c2e5cbbfb001b5.

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27. Steven C. Pennings. Fall 2007 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/bdd546d1b4398ede4e3fd3023b8847fd.
28. Steven C. Pennings. Fall 2007 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
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29. Steven C. Pennings. Fall 2008 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/03e14029611be5b830b3ff15475aff10.
30. Steven C. Pennings. Vegetation and invertebrate communities in 500 plots in the Duplin and Dean Creek watersheds: ground truth data for matching hyperspectral imagery. doi:10.6073/pasta/61f7cd2ca70e2d93514a63298d3dfe26.
31. Steven C. Pennings. Fall 2008 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
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37. Steven C. Pennings. Fall 2009 crab population monitoring: mid-marsh and creek bank abundance based on crab hole counts at GCE marsh, monitoring sites 1-10.
doi:10.6073/pasta/74bccca2c328f34af1d9fb4fc2ab92761.
38. Steven C. Pennings. Fall 2010 crab population monitoring: mid-marsh and creek bank abundance based on crab hole counts at GCE marsh, monitoring sites 1-10.
doi:10.6073/pasta/f41fddca251bcb3225dc1829e74f088d.

39. Steven C. Pennings. Fall 2010 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
doi:10.6073/pasta/ac7b41458130948cdb3fb0279ce32703.
40. Steven C. Pennings. Fall 2010 plant monitoring survey -- biomass calculated from shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10. doi:10.6073/pasta/a4df0cdd9103373f6ec41bb360a36fe5.
41. Steven C. Pennings. Soil salinity and organic content at GCE-LTER vegetation monitoring plots in October 2009.
doi:10.6073/pasta/f1bd7c19b8a52142b10713a5fcec77eb.
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43. Steven C. Pennings. Fall 2011 plant monitoring survey -- shoot height and flowering status of plants in permanent plots at GCE sampling sites 1-10.
doi:10.6073/pasta/147114e676583e15ad7aaf6e929bdf2d.
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doi:10.6073/pasta/64d1aeb3c33b32625a7b03a61b2515b0.
46. Steven C. Pennings. Fall 2011 crab population monitoring: mid-marsh and creek bank abundance based on crab hole counts at GCE marsh, monitoring sites 1-10.
doi:10.6073/pasta/554c2c3bd140b74fa89fefe1a138d999.
47. Steven C. Pennings. Soil salinity and organic content at GCE-LTER vegetation monitoring plots in October 2011.
doi:10.6073/pasta/4374f6d7f3f4252a6fa02807c00cfd27.
48. Steven C. Pennings. Fall 2012 grasshopper monitoring -- mid-marsh grasshopper abundance and species diversity at eight GCE LTER sampling sites.
doi:10.6073/pasta/7d576c730204a804dd7bbc3f32a9f580.