

STEVEN N. HANDEL

Degrees

B.A. Columbia College, Major in Biological Sciences, 1969.

M.S. Cornell University, Field of Ecology & Evolutionary Biology, 1974.

Ph.D. Cornell University, Field of Ecology & Evolutionary Biology, 1976.

Institutional Affiliations

2015 - present. Distinguished Professor of Ecology, Rutgers Univ., New Brunswick, NJ.

2016 - present. Visiting Professor of Ecology, Harvard University Graduate School of Design, Department of Landscape Architecture

1996 - 2015. Professor of Ecology; Director, Center for Urban Restoration Ecology; Director, Hutchison Memorial Forest Center. Rutgers University, New Brunswick, NJ.

1985 - 1996. Associate Professor of Biology, Rutgers University.

1979 - 1985. Assistant, then Associate Professor of Biology, Yale University. Director, Yale University Botanical Garden.

1976 -1979. Assistant Professor of Biology, University of South Carolina.

Additional Academic Positions

2006 - 2012. Adjunct Professor of Ecology, University of California, Irvine

2009 Visiting Professor of Ecology, Stockholm University, Sweden.

1989; 1993. Visiting Research Scholar, School of Biological Sciences, Macquarie University, Sydney, Australia

1987 Summer Faculty, Mountain Lake Biological Station, University of Virginia, Blacksburg, VA. Course: Plant-Animal Interactions.

1985 Summer Faculty, Rocky Mountain Biological Laboratory, Crested Butte, CO. Course: Plant-Animal Interactions

Additional Appointments:

2010 – present Editor, *ECOLOGICAL RESTORATION*

1983 - present. Certified Senior Ecologist, Ecological Society of America

2000 – 2012 “Distinguished Advisor,” Board of Trustees, Brooklyn Botanic Garden

2004 – 2010. Member, State of New Jersey Invasive Species Council.

2001 – 2008. Instructor, U. S. Environmental Protection Agency (EPA), Ecological Restoration Principles, annual meetings of Natl. Assoc. of Remedial Project Managers (RPM's), and of the On-Site Coordinators (OSC's)

2002 - 2006. Editor, *URBAN HABITATS*

1992 - 2004. Associate editor, *RESTORATION ECOLOGY*

1997 - 2001. Elected member, Board of Directors, Society for Ecological Restoration.

1987 - 1990. Associate Editor, *EVOLUTION*

Professional Organizations

Society for Ecological Restoration (Board of Directors, 1997-2000)

Ecological Society of America (Aldo Leopold Leadership Fellow; Chair, Plant Population Section, 1986)

British Ecological Society

Botanical Society of America (Chair, Genetics Section, 1984)

Torrey Botanical Society (President, 1995)
 American Association for the Advancement of Science (Fellow)
 Australian Institute of Biology (Fellow)
 American Society of Landscape Architects (Honorary Member)

Research Grants (Representative)

U.S. National Park Service. "Restoration of Jamaica Bay fringing habitats: post-Sandy status and new approaches for a resilient future." 2014-2016.

Duke Farms Foundation. Restoration ecology planning and environmental stewardship public outreach programming for the Duke Farms property. 2006-2013.

National Science Foundation, Restoration and Conservation Biology Competition. For studies on the ecology of woodland restoration on landfills. 1993-2003.

U.S. Environmental Protection Agency (EPA). "Terrestrial studies: vegetation dynamics on coal strip mines in West Virginia." 1999-2001.

Awards (Representative)

Society for Ecological Restoration, Board of Directors Service Award, 2000.

Ecological Society of America, Aldo Leopold Leadership Fellow, 2001.

American Society of Landscape Architects, National Award of Honor for Planning and Analysis, (Orange County Great Park Master Plan). 2008.

American Society of Landscape Architects, National Award of Honor for Research, (Ecological restoration processes to advance landscape design), 2009.

American Planning Association (APA). National Planning Excellence Award, for Innovation in Regional Planning, (Comprehensive Master Plan of the Orange County Great Park), 2009.

American Institute of Architects (AIA), International Institute Honor Award for Regional and Urban Design, (Orange County Great Park), 2009.

American Society of Landscape Architects, National Award of Honor for Analysis and Planning, (Brooklyn Bridge Park master plan team), 2009.

Rutgers University School of Environmental and Biological Sciences, Research Excellence Award for Sustained Research and Impact, 2010.

American Society of Landscape Architects, National Award of Honor for Communication, (member of Safari7 website team. SCAPE, lead), 2010.

Society for Ecological Restoration, Theodore M. Sperry Award ("for significant advancements to the science or techniques used in restoration practices"). Cited "...for pioneering work in the restoration of urban areas." 2011.

American Society of Landscape Architects, NJ chapter. Merit Award for Landscape Architectural Communication, 2014. (For development of the ecological landscape interpretive program for Duke Farms Foundation.)

American Society of Landscape Architects, National Award of Honor for Communication, (for editorial content of the journal, *Ecological Restoration*), 2015.

American Society of Landscape Architects, National Award of Honor for Research, (for management protocols in urban parks), 2015.

Scientific Papers (Representative)

Handel, S.N., G.R. Robinson, and A.J. Beattie. 1994. Biodiversity resources for restoration ecology. *Restoration Ecology* 2:230-241.

Handel, S. N. 1997. The role of plant-animal mutualisms in the design and restoration of natural communities. Pages 111-132 in: *Restoration Ecology and Sustainable Development*. K. M. Urbanska, N. R. Webb, and P. J. Edwards, editors. Cambridge University Press, Cambridge.

Robinson, G.R., and S. N. Handel. 2000. Directing spatial patterns of recruitment during an experimental urban woodland reclamation. *Ecological Applications* 10: 174-188.

Galbraith-Kent, S. L., and S. N. Handel. 2007. Lessons from an urban lakeshore restoration in New York City. *Ecological Restoration* 25: 123-128.

Galbraith-Kent, S. L., and S. N. Handel. 2008. Invasive *Acer platanoides* inhibits native sapling growth in forest understorey communities. *Journal of Ecology* 96:293-302.

Karpati, A. S., S. N. Handel, J. Dighton, and T. R. Horton. 2011. *Quercus rubra*-associated ectomycorrhizal fungal communities of disturbed urban sites and mature forests. *Mycorrhiza* 21:537-547.

Aronson, M. F. J., and S. N. Handel. 2011. Deer and invasive plant species suppress forest herbaceous communities and canopy tree regeneration. *Natural Areas Journal* 31:400-407.

Handel, S. N. 2013. Ecological restoration foundations to designing habitats in urban areas. Pages 169-186 in: *Designing Wildlife Habitats*. J. Beardsley, editor. Garden and Landscape Studies, Dumbarton Oaks Research Library, Washington, D.C.

Handel, S.N. 2014. Marriage therapy for ecologists and landscape architects. *Ecological Restoration* 32:343-344.

Handel, S. N., O. Saito, and K. Takeuchi. 2014. Restoration ecology in an urbanizing world. Pages 665-698 in: *Urbanization, Biodiversity and Ecosystem Services – Challenges and Opportunities, A Global Assessment*. T. Elmqvist, M. Fragkias, et al.,

editors. Springer Science, Dordrecht.

Corbin, J.D., G.R. Robinson, L.F. Hafkemeyer, and S.N. Handel. 2016. A long-term evaluation of applied nucleation as a strategy to facilitate forest restoration. *Ecological Applications* 26:104-114.

Johnson L. R. and S. N. Handel. 2016. Restoration treatments in urban park forests drive long-term changes in vegetation trajectories. *Ecological Applications* 26: 940-956.

Burger, J., K.M. O'Neill, S.N. Handel, B. Hensold, and G. Ford. 2017. The shore is wider than the beach: ecological planning solutions to sea level rise for the Jersey Shore, USA. *Landscape and Urban Planning* 157:512-522.

Media Publications (Representative)

Planning Magazine, April, 2009 issue, page 34. "A Truly Great Park in Orange County," by Marya Morris, AICP.

Christian Science Monitor Online, June 17, 2009 issue, Environment Section. "When nature gets a second chance," by Elizabeth Ginsburg. (csmonitor.com/environment)

Landscape Architecture, August 2009 issue, page 103. "Restoration ecology processes to advance natural landscape design," by S. Stubbs.

The Economist Magazine, January 3, 2008. "American pastoral."

Sierra Club Magazine, Nov./Dec. 2005. "Let a billion flowers bloom" by Heather Millar

The New York Times, November 10, 2002. "A Well-Traveled Ecologist" by Elisabeth Ginsburg

The Economist magazine, August 10, 2002. "Science and Technology: Restoration Drama" p.65-66.

The Wall Street Journal, January 23, 2002. "Where Trash Reigned, Trees Sprout" by Jim Carlton

Conferences/Symposia

Over 200 presentations at universities, science, and design conferences throughout the world, addressing modern aspects of restoration ecology and urban ecology.

Contact

Office 848-932-4516

Cell 908-881-0383

Email snhandel@gmail.com

Dept. of Ecology, Evolution, & Natural
Resources

Blake Hall, 93 Lipman Drive, Rutgers University
New Brunswick, NJ 08901-8524

Prof. Steven N. Handel

Center for Urban Restoration Ecology
Rutgers, The State University of New Jersey
Blake Hall, New Brunswick, NJ 08901
email: steven.handel@rutgers.edu

ARTICLES RELATED TO RESTORATION ECOLOGY

1. Handel, S.N. 1983. Pollination ecology, plant population structure, and gene flow. Pages 163-211 in Pollination Biology, L. Real, editor. Academic Press, NY.
2. Handel, S.N., and A.J. Beattie. 1990. Seed dispersal by ants. Scientific American: 263:76-83A.
3. Robinson, G.R., S.N. Handel, and V.R. Schmalhofer. 1992. Survival, reproduction, and recruitment of woody plants after 14 years on a reforested landfill. Environmental Management 16:265-271.
4. Robinson, G.R., and S.N. Handel. 1993. Forest restoration on a closed landfill: rapid addition of new species by bird dispersal. Conservation Biology 7:271-278.
5. Robinson, G.R., and S.N. Handel. 1993. Questionable assumptions. Restoration and Management Notes 11:99-100.
6. Robinson, G.R., M.E. Yurlina, and S.N. Handel. 1994. A century of change in the Staten Island flora: patterns of species loss and additions. Bulletin of the Torrey Botanical Club 121:119-129.
7. Handel, S.N., G.R. Robinson, and A.J. Beattie. 1994. Biodiversity resources for restoration ecology. Restoration Ecology 2:230-241.
8. Robinson, G.R., and S.N. Handel. 1995. Woody plants fail to penetrate a clay-lined landfill: management implications. Environmental Management 19:57-64.
9. Vivian-Smith, G., and S. N. Handel. 1996. Freshwater wetland restoration of an abandoned sand mine: seed bank recruitment dynamics and plant colonization. Wetlands 16:185-196.
10. Handel, S.N., G.R. Robinson, W.F.J. Parsons, and J.H. Mattei. 1997. Restoration of woody plants to capped landfills: root dynamics in an engineered soil. Restoration Ecology 5:178-186.
11. Montalvo, A.M., S.L. Williams, K.J. Rice, S.L. Buchmann, C. Cory, S.N. Handel, G.P. Nabhan, R. Primack, and R.H. Robichaux. 1997. Restoration biology: a population biology perspective. Restoration Ecology 5:277-290.

12. Handel, S. N. 1997. The role of plant-animal mutualisms in the design and restoration of natural communities. Pages 111-132 in: Restoration Ecology and Sustainable Development. K. M. Urbanska, N. R. Webb, and P. J. Edwards, editors. Cambridge University Press, Cambridge.
13. Parsons, W.F.J., J.G. Ehrenfeld, and S. N. Handel. 1998. Vertical growth and mycorrhizal infection of woody plant roots as potential limits to the restoration of woodlands on landfills. Restoration Ecology 6:280-289.
14. Handel, S.N. 1998. Reintroduction of species into urban natural areas: can we return to paradise? Metro Forest News 2(2):12, 7.
15. Handel, S. 1999. Future of region's biodiversity lies in small local forests. Metro Forest News 3(1):5, 10.
16. Robinson, G.R., and S. N. Handel. 2000. Directing spatial patterns of recruitment during an experimental urban woodland reclamation. Ecological Applications 10: 174-188.
17. Ruhren, S., and S. N. Handel. 2000. Considering herbivory, reproduction, and gender when monitoring plants: a case study of jack-in-the-pulpit (*Arisaema Triphyllum* [L.] Schott). Natural Areas Journal 20:261-266.
18. Meiners, S.J., S.T.A. Pickett, and S.N. Handel. 2002. Probability of tree seedling establishment changes across a forest - old field edge gradient. American Journal of Botany 89:466-471.
19. Ruhren, S., and S. N. Handel. 2003. Herbivory constrains survival, reproduction and mutualisms when restoring nine temperate forest herbs. Journal of the Torrey Botanical Society 130:34-42.
20. Robinson, G.R., S.N. Handel, and J. Mattei. 2002. Experimental techniques for evaluating the success of restoration projects. Korean Journal of Ecology 25(1):1-7.
21. Sasaki Associates. 2002. XPark. Praxis, Journal of Writing + Building 4:54-57. [S. Handel was one of the seven authors of this piece.]
22. Mattei, J.H., S. N. Handel, and G. R. Robinson. 2003. Lessons learned in restoring an urban forest on a closed landfill (New York). Ecological Restoration 21(1):62-63.
24. Handel, S. N. 2004. Restoration ecology. Page 690 in: Encyclopedia of New Jersey. M. N. Lurie and M. Mappen, editors. Rutgers University Press, New Brunswick.
25. DiCicco, J. M., and S. N. Handel. 2003. Special web review section: invasive plant web sites. Ecological Restoration 21:341-343.
26. Clemants, S. E., and S. N. Handel. 2006. Restoring urban ecology: the New York – New Jersey metropolitan area experience. Pages 127-140 in: The humane

metropolis: people and nature in the 21st-century city. R. H. Platt, Editor.
University of Massachusetts Press, Amherst.

27. Handel, S. N., and J. McLaughlin. 2006. Reclamation strategy for capped landfill aims towards woodland restoration. *Technology News and Trends*. 26:4-5.
28. Aronson, M. F. J., S. N. Handel, and S. E. Clemants. 2007. Fruit type, life form and origin determine the success of woody plant invaders in an urban landscape. *Biological Invasions* 9:465-475.
29. Clemants, S., and S. N. Handel. 2006. Restoring natural habitats in cities. *Public Garden* 21(3):10-13.
30. Galbraith-Kent, S. L., and S. N. Handel. 2007. Lessons from an urban lakeshore restoration in New York City. *Ecological Restoration* 25: 123-128.
31. Galbraith-Kent, S. L., and S. N. Handel. 2008. Invasive *Acer platanoides* inhibits native sapling growth in forest understorey communities. *Journal of Ecology* 96:293-302.
32. Handel, S. N., M. J. Mitrovich, E. Hook, and R. Aicher. 2009. Ecological Guidelines - Park Ecology and Natural Habitats. Orange County Great Park Corporation, Irvine, CA. 322 pages.
33. Maslo, B., S. N. Handel, and T. Pover. 2011. Restoring beaches for Atlantic Coast piping plovers (*Charadrius melodus*): a classification and regression tree analysis of nest-site selection. *Restoration Ecology* 19(201):194-203.
34. Handel, S.N. 2011. A seed op-ed. *Ecological Restoration* 29:320-321.
35. Karpati, A. S., S. N. Handel, J. Dighton, and T. R. Horton. 2011. *Quercus rubra*-associated ectomycorrhizal fungal communities of disturbed urban sites and mature forests. *Mycorrhiza* 21:537-547.
36. Aronson, M. F. J., and S. N. Handel. 2011. Deer and invasive plant species suppress forest herbaceous communities and canopy tree regeneration. *Natural Areas Journal* 31:400-407.
37. Handel, S. N. 2011. Past, present, future. *Ecological Restoration* 29:203-205.
39. Galbraith-Kent, S. L., and S. N. Handel. 2012. *Acer rubrum* (red maple) growth is negatively affected by soil from forest stands dominated by its invasive congener (*Acer platanoides*, Norway maple). *Plant Ecology* 213:77-88.
40. Maslo, B., J. Burger, and S. N. Handel. 2012. Modeling foraging behavior of piping plovers to evaluate habitat restoration success. *Journal of Wildlife Management* 76:181-188.
41. Handel, S.N. 2012. The Red Queens of restoration. *Ecological Restoration* 30(1):

3-4.

42. Aronson, M. F. J., and S. N. Handel. 2015. The challenge of conserving an old-growth suburban forest: stress and vegetation change over 53 years. In revision.
43. Handel, S. N. 2012. Urban green spaces: restoring plant population dynamics to new urban habitats. Pages 33-44 in: International Congress on Urban Green Spaces Proceedings (volume 1), CUGS, New Delhi, India.
44. Handel, S. N. 2012. Ecological beauty, in the eye of the beholder. *Ecological Restoration* 30(2): 91-92.
45. Handel, S. N. 2012. Little things mean a lot. *Ecological Restoration* 30(3): 155-156.
46. Handel, S. N. 2013. Ecological restoration foundations to designing habitats in urban areas. Pages 169-186 in: *Designing Wildlife Habitats*. J. Beardsley, ed., Garden and Landscape Studies, Dumbarton Oaks Research Library, Harvard University Press, Cambridge.
47. Handel, S. N. 2013. Links and winks – the design of ecological corridors. *Ecological Restoration* 30(4): 264-266.
48. Handel, S. N. 2013. I want your vote: the real campaign continues. *Ecological Restoration* 31(1): 1-3.
49. Handel, S. N., with O. Saito, and K. Takeuchi. 2013. Restoration ecology in an urbanizing world. Pages 665-698 in: *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities, A Global Assessment*. T. Elmqvist, M. Fragkias, et al., editors. Springer, Dordrecht.
50. Aronson, M.F.J., and S. N. Handel. 2013. Designing a grassland estate, cultivating biodiversity. *Ecological Restoration* 31:212-216.
51. Handel, S. N. 2013. Was van Gogh a plant ecologist? *Ecological Restoration* 31:117-118.
52. Handel, S.N. 2013. Giant clam shells, the intermediate disturbance hypothesis, and a big box of markers. *Ecological Restoration* 31(3):235-236.
53. Handel, S.N. 2013. Shelter from the storm. *Ecological Restoration* 31(4):345-346.
54. Tartaglia, E.S., and S. N. Handel. 2014. Nectar plant preferences of *Hemaris* (Sphingidae: Lepidoptera) on co-occurring native *Cirsium* and non-native *Centaurea* (Asteraceae) inflorescences. *Journal of Pollination Ecology* 13:184-187.

55. Handel, S.N. 2014. Good fences make good neighbors? *Ecological Restoration* 32(1): 1-2.
56. Handel, S. N. 2014. Singles ad: Short 6-legged go-getter seeks 2-legged restoration partner for long-term relationship. *Ecological Restoration* 32:111-112.
57. Handel, S.N. 2014. The changing pursuit of happiness. *Ecological Restoration* 32:219-220.
58. Aronson, M. F. J., S. N. Handel, I. P. La Puma, and S. E. Clemants. 2015. Urbanization promotes non-native woody species and diverse plant assemblages in the New York metropolitan region. *Urban Ecosystems* 18:31-45.
59. Handel, S.N. 2014. Marriage therapy for ecologists and landscape architects. *Ecological Restoration* 32:343-344.
60. Handel, S.N. 2015. Not so novel ecosystems. *Ecological Restoration* 33:235-236.
61. Elmqvist, T., Setälä, H., Handel, S.N., van der Ploeg, S., Aronson, J., Blignaut, J.N., Gómez-Baggethun, E., Nowak, D.J., Kronenberg, J., and de Groot, R. 2015. Benefits of restoring ecosystem services in urban areas. *Current Opinion in Environmental Sustainability* 14:101-108.
62. Handel, S.N. 2015. Jump starting the Habitat Engine. *Ecological Restoration* 33:1-2.
63. Handel, S.N. 2015. Velocity of climate change and of restoration action: collision course? *Ecological Restoration* 33:125-126.
64. Sasaki Associates, Rutgers University, and ARUP. 2015. Resilience + The Beach. Pages 162-177 in *Rebuild By Design*. J. Bisker, A. Chester, and T. Eisenberg, editors. *Rebuild By Design*, NY. [J. Burger, S.N. Handel, and K. O'Neill were the Rutgers authors].
65. Handel, S.N. 2015. On a woodland sedge. *Ecological Restoration* 33:339-340.
66. Johnson L. R. and S. N. Handel. 2016. Restoration treatments in urban park forests drive long-term changes in vegetation trajectories. *Ecological Applications* 26: 940-956.
67. Burger, J., K.M. O'Neill, S.N. Handel, B. Hensold, and G. Ford. 2017. The shore is wider than the beach: ecological planning solutions to sea level rise for the Jersey Shore, USA. *Landscape and Urban Planning* 157:512-522.
68. Corbin, J.D., G.R. Robinson, L.F. Hafkemeyer, and S.N. Handel. 2016. A long-term evaluation of applied nucleation as a strategy to facilitate forest restoration. *Ecological Applications* 26:104-114.

69. Handel, S. N., J. Marra, C.M.K. Kaunzinger, et al. 2016. Ecology of Jamaica Bay: history, status, and resilience. Pages 91-116 in: Prospects for Resilience: Insights from New York City's Jamaica Bay. E. W. Sanderson, W.D. Solecki, J.R. Waldman, and A.S. Parris, editors. Island Press, Washington, D.C.
70. Handel, S.N., and C.M.K. Kaunzinger. 2016. Case study: Jamaica Bay fringing vegetation: Restoring upland habitats at an urban shoreline. Pages 105-130 in: Coastal change: ocean conservation and resilient communities. A. Bayley and M. Johnson, editors. Springer, Berlin.
71. Handel, S.N. 2016. Greens and Greening: agriculture and restoration ecology in the City. *Ecological Restoration* 34(1):1-2.
72. Handel, S.N. 2016. The Ecology of Human Beings (*Homo sapiens*) and Habitat Design. *Ecological Restoration* 34(2): 83-86.
73. Handel, S.N. 2016. The Seven Habits of highly successful people who want to do ecological restoration. *Ecological Restoration* 34(3):171-172.
74. Handel, S.N. 2016. Push back: Ecological Disservices and the fear of restoration. *Ecological Restoration* 34(4):271-272.
75. Handel, S.N. 2017. "In the eye of a hurricane there is quiet." *Ecological Restoration* 35(1):2-3.
76. Handel, S.N. 2017. "What is a goldenrod?" she asked. *Ecological Restoration* 35(2): 83-84.
77. Handel, S.N. 2017. Island Life: Urban Habitats as Theaters for the Evolution of Biodiversity. *Ecological Restoration* 35(3): 203-204.
78. Handel, S.N. 2017. Migrations in Our Habitats, Scaling From the Clone to the Continent. *Scenario Journal* 06: Migration.
<https://scenariojournal.com/article/migrations-in-our-habitats/>
79. Handel, S.N., G. Ford, and B. Hensold. 2018. Resilience + coastal ecosystems: 3 typologies, 3 design approaches. In press in: *Rethinking Coastal Design*. E. Mossop, editor. Taylor and Francis, Abingdon, UK. (in press).
80. Handel, S.N. 2017. Growing pains: hopes and heartaches at native plant nurseries. *Ecological Restoration* 35(4): 279-280.
81. Handel, S.N. 2018. Ecological footprints. *Ecological Restoration* 36(1): 1-2.
82. Johnson, L.R., and S.N. Handel. 2017. In urban woodlands, management intensity and disturbance steer the long-term fate of ecological restoration. In revision for

Restoration Ecology.

83. Handel, S.N. 2018. One thing every ecologist should know about urban ecology. www.thenatureofcities.com. Posted January 31, 2018.
84. Handel, S.N. 2018. And the envelope please... *Ecological Restoration* 36(2):95-96.
85. Elmqvist, T., J. Siri, E. Andersson, P. Anderson, X. Bai, P.K. Das, T. Gatere, A. Gonzalez, J. Goodness, S.N. Handel, E.H. Török, J. Kavonic, J. Kronenberg, E. Lindgren, D. Maddox, R. Maher, C. Mbow, T. McPhearson, J. Mulligan, G. Nordenson, M. Spires, U. Stenkula, K. Takeuchi, C. Vogel. 2018. Urban Tinkering. *Sustainability Science*. <https://doi.org/10.1007/s11625-018-0611-0>
86. Handel S.N. 2018. The digital and the organic. *Ecological Restoration* 36(3):167-168.
87. Handel, S.N. 2018. The Cedars of Lebanon, the limits of restoration, and cultural loss. *Ecological restoration* 36(4): in press.
88. Kleinbeck, A., M.F.J. Aronson, and S.N. Handel. 2018. Assisted migration of salt marsh plants in response to sea level rise. Submitted to: *Restoration Ecology*.
89. Handel, S. N., J. M. Mattei, and G. R. Robinson. Limitations of introducing woody plants by direct seeding to landfill restoration sites. In prep for *Restoration Ecology*.