

# NOTES

## OVERVIEW

- <sup>1</sup> Johannes Hamhaber, "New York Documentation," 2003, MegaCity TaskForce of the International Geographical Union, Cologne, Germany, <http://www.megacities.uni-koeln.de/index.htm>
- <sup>2</sup> Phil Stoffer and Paula Messina, "A Brief Geologic History of Raritan Bay," 1997, posted on their "Geology and Geography of New York Bight Beaches" Web site, <http://www.geology.hunter.cuny.edu/bight/index.html>
- <sup>3</sup> "The Ramble is a sanctuary for as many as 250 species of birds that find it a perfect transitory stopover in their yearly migrating pattern.... [It] has been voted one of the top 15 bird watching sites in the United States." "The RambleCW73-79," 2002, from "The Central Park Collection," posted on the New York Focus Web site, <http://www.central-park2000.com/database/ramble.html>. See also: Marcia T. Fowle and Paul Kerlinger, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, Cornell University Press, Ithaca, New York, page 60.
- <sup>4</sup> "Why is NJ important for migrating birds?" and "How are stopover sites identified?", 2003, both posted on the New Jersey Audubon Web site, <http://www.njaudubon.org/Education/Oases/Importance.html> and <http://www.njaudubon.org/Education/Oases/stopover.html#NJ>; Tim Connors, April 21, 1998, "Geology Fieldnotes: Gateway National Recreation Area, New York/New Jersey," posted at the Park Geology, National Park Service Web site, <http://www2.nature.nps.gov/geology//parks/gate/>; see also "Atlantic Flyway" map, N.D., United States Fish & Wildlife Service, available online at [http://library.fws.gov/Pubs/atlantic\\_flywaymap%20\\_bw.pdf](http://library.fws.gov/Pubs/atlantic_flywaymap%20_bw.pdf). See also: Marcia T. Fowle and Paul Kerlinger, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, page 81; "Snow Goose," Encyclopædia Britannica. Retrieved January 17, 2004, from Encyclopædia Britannica Premium Service, <http://www.britannica.com/eb/article?eu=70167>; Margaret Mittelbach and Michael Crewdson, 1997, *Wild New York*, Three Rivers Press, New York, page 115.
- <sup>5</sup> "Over the last two days, ... I've come across a total of three other people on the trail . . . . It gets awfully lonely out here, listening to nothing but the sound of my own footsteps." Brian Kladko, July 19, 2002, "In crowded N.J., sounds of solitude," *The Record*, Hackensack, New Jersey.
- <sup>6</sup> Erik Kiviat and Kristi MacDonald, August 8, 2002, "Hackensack Meadowlands, New Jersey Biodiversity: A Review and Synthesis," Hudsonia, Ltd., Annandale, New York. Prepared for the Hackensack Meadowlands Partnership, <http://www.meadowlands-partnership.org/images/hm%20alert%20-%kiviat%20report.pdf>

- <sup>7</sup> For detailed references on the Highlands, see *The Highlands, Black Bears, and Sprawl* sections of this Report.
- <sup>8</sup> “New York Harbor,” 2003, Riverkeeper Web Site, citing Robert H. Boyle, 1979, *The Hudson River: A Natural and Unnatural History*, W. W. Norton & Company, Inc., New York, [http://riverkeeper.org/resources\\_basic\\_nyharbor.php](http://riverkeeper.org/resources_basic_nyharbor.php)
- <sup>9</sup> John Waldman, 1999, *Heartbeats in the Muck: The History, Sea Life, and Environment of New York Harbor*, Lyons Press, New York, page 16.
- <sup>10</sup> Steinberg, Nancy, Juliette Way, Dennis J. Suszkowski, and Lori Clark, 2002, New York/ New Jersey Harbor Estuary Program, *Harbor Health/Human Health: An Analysis of Environmental Indicators for the NY/NJ Harbor*, Hudson River Foundation and US EPA Region II, [http://www.harborestuary.org/archive/Ind\\_rpt\\_02.pdf](http://www.harborestuary.org/archive/Ind_rpt_02.pdf); Margaret Mittelbach and Michael Crewdson, 1997, *Wild New York*, page 44.
- <sup>11</sup> Jennifer Micale, October 15, 2003, “Clams tied to bay’s health,” *The Home New Tribune*, East Brunswick, New Jersey, and Lisa Vernon-Sparks, October 15, 2003, “Raritan Bay is feeling the impact from overuse and abuse,” *The Home New Tribune*: both articles were part of “The Raritan River ... A Tarnished Treasure,” a week-long Special Series in *The Home New Tribune*.
- <sup>12</sup> Rick Malwitz, October 12, 2003, “River has flowing history,” *The Home New Tribune*, East Brunswick, New Jersey, and Tammy Paolino, October 14, 2003, “He speaks for the river,” *The Home News Tribune*, and Sharon Waters, October 14, 2003, “River serves as a gateway,” *The Home New Tribune*, and Rick Malwitz, October 18, 2003, “Raritan River at crossroads,” *The Home News Tribune*: all four articles were part of “The Raritan River ... A Tarnished Treasure,” a week-long Special Series in *The Home New Tribune*. According to a 1951 report to the Middlesex County Sewerage Authority quoted by Waters: “It is no secret that there is a stench from the Raritan River.... It’s an open sewer.”
- <sup>13</sup> J. P. White, October 17, 2003, “All along the river,” *The Home New Tribune*, East Brunswick, New Jersey, also an article from “The Raritan River ... A Tarnished Treasure,” a week-long Special Series in *The Home New Tribune*. Amy L. Shallcross and Tom J. Stanuikynas, writing on behalf of the Raritan Basin Watershed Management Project, August 2002, “Raritan Basin: Portrait of a Watershed,” New Jersey Water Supply Authority, Clinton, New Jersey, pages 1, 6, and 8, [http://www.raritanbasin.org/Documents/Summary\\_Report.pdf](http://www.raritanbasin.org/Documents/Summary_Report.pdf)
- <sup>14</sup> “Ben,” 2000, “Fishing the Passaic,” posted at [www.passaicriver.com](http://www.passaicriver.com) Web site; Passaic River Coalition, November 20, 2003, “Getting Up Front and Close to the Great Falls,” posted at the Coalition’s Web site, <http://www.passaicriver.org>
- <sup>15</sup> Andrew Jacobs, July 20, 2002, “Hoping Egrets Replace Pollutants as River Undergoes Intensive Care,” *The New York Times*, New York.

- <sup>16</sup> Great Swamp Watershed Association, 2003, “The Great Swamp Greenway and Open Space Plan,” Great Swamp Watershed Association, Madison, New Jersey; Great Swamp Watershed Association, 2003, “Natural History—Great Swamp and Its Surrounding Watershed,” Great Swamp Watershed Association, Madison, New Jersey; both articles are available at the Association’s Web site, <http://greatswamp.org>
- <sup>17</sup> New Jersey Chapter Sierra Club Conservation Committee, March 29, 2002, “Ancient Lake Passaic,” Photo Album posted on the Club’s Sierra Activist Web site, [http://sierraactivist.org/gallery/view\\_album.php?set\\_albumName=Passaic](http://sierraactivist.org/gallery/view_album.php?set_albumName=Passaic)
- <sup>18</sup> Ella Filippone, Executive Director, Passaic River Coalition, January 14, 2004, personal communication.
- <sup>19</sup> New Jersey Chapter Sierra Club Conservation Committee, op. cit.
- <sup>20</sup> Patrick L. Cooney, 2002, “Troy Meadows,” New York-New Jersey-Connecticut Botany Online, a homemade and richly rewarding Web site that posts hundreds and hundreds of careful field reports on natural areas in the H2O Region and beyond. Dr. Cooney is a former field chair of the Torrey Botanical Society. His Troy Meadows notes are available at: <http://nynjctbotany.org/njnbtoc/troymdws.html>
- <sup>21</sup> New Jersey Chapter Sierra Club Conservation Committee, op. cit.
- <sup>22</sup> Eric Stiles, June 2, 2002, “Conservation Report,” New Jersey Audubon Society, Bernardsville, New Jersey similarly presents the idea of creating an enlarged National Wildlife Refuge that would embrace all the Glacial Lake Passaic wetlands complexes. Stiles is the Society’s Vice President for Conservation and Stewardship. His full report is available at the Society’s Web site, <http://www.njaudubon.org/Conservation/consum02.html>
- <sup>23</sup> John R. Quinn, 1998, “The Fishes Swim Through It—Once Again,” posted on the Wild New Jersey Web site, <http://www.wildnj.com/gest2.htm>
- <sup>24</sup> Hackensack Riverkeeper, Fall 2003, “Record Numbers on the River in 2003,” posted on the Web site of the Hackensack Riverkeeper, [http://www.hackensackriverkeeper.org/newsletters/Fall2003/12\\_Fall\\_2003.htm](http://www.hackensackriverkeeper.org/newsletters/Fall2003/12_Fall_2003.htm)
- <sup>25</sup> Meadowlands Conservation Trust, December 10, 2003, “Meadowlands Conservation Trust Welcomes New Executive Director,” press release posted on the Trust’s Web page on the Web site of the New Jersey Meadowlands Commission, <http://www.meadowlands.state.nj.us/mct/mct-press.html>
- <sup>26</sup> Maria Newman, January 9, 2004, “Plan to Revive the Meadowlands Is Approved,” *The New York Times*, New York.
- <sup>27</sup> Anonymous, May 31, 1895, “Wiping Out the Palisades,” *The New York Times*, New York. This article is available at the New Jersey Section Web site of Palisades Interstate Park, <http://www.njpalisades.org>. See also: Patrick L. Cooney, 2002, “State Line Lookout,

Bergen County, NJ” and “Forest View, Palisades, Bergen County, NJ,” New York-New Jersey-Connecticut Botany Online Web site, <http://nynjctbotany.org/njnbtofc/statelin.html> and <http://nynjctbotany.org/njnbtofc/forestvw.html>; Raymond H. Torrey, Frank Place, Jr., and Robert L. Dickinson, 1951, *New York Walk Book*, Third Edition, The American Geographical Society, New York, page 26; Robert H. Boyle, 1969, *The Hudson River: A Natural and Unnatural History*, W. W. Norton & Co., Inc., New York, page 240. And see especially: Anonymous, 2003, “Abandoned Houses of NJ Palisades,” one of many fascinating and offbeat essays, appreciations and travel tips posted on “Lost in Jersey.com,” a Web site hosted, written, and illustrated by an unnamed H2O Region explorer who describes himself only as a happily married father in his early 30s who works for Verizon and is “not a freak”—his Palisades article is posted at: <http://www.lostinjersey.com/abandon/nongps.html>

<sup>28</sup> Friends of the Palisades, 2003, “History of the Palisades Interstate Park Commission,” posted on the Friends’ Web site, <http://www.friendsofpalisades.org/content.php?mode=about>; Raymond H. Torrey, Frank Place, Jr., and Robert L. Dickinson, 1951, *New York Walk Book*, page 26; Robert Boyle, 1969, *The Hudson River*, pages 241 and 242; Patrick L. Cooney, 2002, “Forest View,” op. cit.; Anonymous, 2003, “Abandoned Houses of NJ Palisades,” op. cit.

<sup>29</sup> Robert Boyle, 1969, *The Hudson River*, page 23.

<sup>30</sup> It had all of them until very recently, but it now appears that rainbow smelt, which, John Waldman reports, “ran in huge numbers into Hudson tribis into the 1970s” and then “faded from them while persisting in the mainstream,” have gone extinct within the Hudson system. Their disappearance is not thought to be linked to human actions—or at least not to local human actions. Rainbow smelt are a northern species, and with the advance of global warming (see the section on *Climate Change*), the H2O Region is now too far south to be part of their habitat area. John Waldman, February 9, 2004, personal communication.

<sup>31</sup> Historic Hudson River, 2003, “Environmental Institutions” and “Natural History of the Hudson River,” essays posted on the Historic Hudson River Web site (created by the Friends of the Desmond-Fish Library, Garrison, New York), <http://www.hhr.highlands.com/envir.html> and <http://www.hhr.highlands.com/nathist.htm>. See also the Web sites of Scenic Hudson (<http://www.scenichudson.org>); Hudson River Sloop Clearwater (<http://www.clearwater.org>); Riverkeeper (<http://www.riverkeeper.org>); Hudson River Foundation (<http://www.hudsonriver.org>); the Natural Resources Defense Council (<http://www.nrdc.org> and <http://www.nrdc.org/cities>) and Environmental Defense (<http://www.environmentaldefense.org>).

<sup>32</sup> See the Websites of the Hudson River Valley Greenway (<http://www.hudsongreenway.state.ny.us/heritage/Heritage.htm>); Historic Hudson Valley (<http://www.hudsonvalley.org>); and the Hudson River Estuary Program (<http://www.dec.state.ny.us/website/hudson/hrep.html>).

<sup>33</sup> Paul Moses, 1999, “Restoring Harmony,” *Newsday*, Melville, New York—part of the newspaper’s special pre-millennium coverage, “Countdown to 2000—Long Island/Queens: Our Future,” <http://future.newsday.com/4/fbay11.htm>

- <sup>34</sup> Margaret Mittelbach and Michael Crewdson, 1997, *Wild New York*, pages 115 and 144; Marcia T. Fowle and Paul Kerlinger, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, page 81.
- <sup>35</sup> Norval White and Elliot Willensky, 2000, *AIA Guide to New York City*, Fourth Edition, Three Rivers Press, New York, page 878; Paul Moses, 1999, "Restoring Harmony," *Newsday*, op. cit.; Bill and Phyllis Thomas, 1983, *Natural New York*, Holt Rinehart and Winston, New York, page 6.
- <sup>36</sup> Margaret Mittelbach and Michael Crewdson, 1997, *Wild New York*, page 155. See also: Peter P. Blanchard III and Joseph Roman, "Jamaica Bay Coastal Habitat Restoration Project at Bayswater Point State Park and Dubos Point Wetlands Sanctuary," New York City Audubon Society. Innovative public-private collaborations thrive in Jamaica Bay restoration projects; other government partners include the Port Authority of New York and New Jersey (operators of Kennedy Airport) and the U.S. Army Corps of Engineers. Among citizen groups, the New York City Audubon Society in the mid-1990s took over management of both a state park and a city wildlife sanctuary; other groups actively at work on Bay projects include the Jamaica Bay Guardian, funded out of a wetlands violation settlement (whose Web site is: <http://www.alsnyc.org/guardian.htm>), and the Jamaica Bay Ecowatchers, whose founder, Daniel Mundy, is a retired New York City fire captain (their Web page can be found at: <http://deepcreekyachtclub.com/WebPage/jamaicabayecowatchers.html>).
- <sup>37</sup> Anonymous, May-June 2003, "Marshes Vanishing at Jamaica Bay," *National Parks*, Washington, D.C., [http://www.npca.org/magazine/2003/may\\_june/news6.asp](http://www.npca.org/magazine/2003/may_june/news6.asp)
- <sup>38</sup> Ellen K. Hartig and Vivian Gornitz, December 2001, "The Vanishing Marshes of Jamaica Bay: Sea Level Rise or Environmental Degradation?," Goddard Institute for Space Studies, New York, [http://www.giss.nasa.gov/research/intro/hartig\\_01/](http://www.giss.nasa.gov/research/intro/hartig_01/). See also: Sam Williams, March 2004, "Taking Action On Jamaica Bay," *GothamGazette.com*, <http://www.gothamgazette.com/article/environment/20040311/7/911> "There's no single factor, and no single smoking gun," said one scientist in early 2004. At the same time, several salt marsh restoration pilot projects are under way—at Gerritsen Creek and at Great Egg Marsh.
- <sup>39</sup> Peter Blanchard III, Paul Kerlinger, and Mark J. Stein, 2001, *An Islanded Nature: Natural Area Conservation and Restoration in Western Staten Island, Including the Harbor Herons Region*, The Trust for Public Land and The New York City Audubon Society, New York.
- <sup>40</sup> Derry Bennett, January 20, 2004, personal communication.
- <sup>41</sup> New York-New Jersey Baykeeper, 2003, "Oyster Fest 2003" and "Oyster Gardening," articles posted on the Web site of the New York-New Jersey Baykeeper, [http://www.nynjbaykeeper.org/oyster\\_garden.htm](http://www.nynjbaykeeper.org/oyster_garden.htm); Debbie Dalton, January 23, 2004, Oyster Restoration Program Director, NY/NJ Baykeeper, personal communication.

- <sup>42</sup> Marcia T. Fowle and Paul Kerlinger, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, page 154—much of the description here of Sprain Ridge Park is drawn from this book. See also: Hagstrom Map Company, 1997, *Hagstrom Westchester County Atlas*, Hagstrom Map Company, Maspeth, New York, page 8.
- <sup>43</sup> “Turkey,” 2004, *Encyclopædia Britannica*. Retrieved January 22, 2004, from Encyclopædia Britannica Premium Service, <http://www.britannica.com/eb/article?eu=75775> Further information can be found at the Web site of the National Wild Turkey Foundation, <http://nwtf.org>; Marcia T. Fowle and Paul Kerlinger, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, pages 23 and 71. See also: Francis X. Clines, January 12, 2004, “The City Life: Rounding the Island, on Wheels,” Patrick Healy, November 24, 2003, “Upper West Side Journal: Hands Off That Bird and Don’t Mention Cranberries,” and Thomas J. Lueck, May 23, 2003, “A Feathered Stray, Far From Field and Stream: Can a Wild Turkey Find Success and Happiness in the Canyons of Manhattan?,” *The New York Times*, New York.
- <sup>44</sup> Amy L. Shallcross and Tom J. Stanuikynas, writing on behalf of the Raritan Basin Watershed Management Project, August 2002, “Raritan Basin: Portrait of a Watershed,” op. cit., pages 8, 22, and 23.
- <sup>45</sup> David Dankwa, July 18, 2000, “Growth threatening fragile Sourlands,” *Princeton Packet*, Princeton, New Jersey, available at Packet Online at: <http://www.pacpubserver.com/new/news/7-18-00/sourlands.html>; Hunterdon County Department of Parks and Recreation, 2004, “Sourland Mountain Nature Preserve,” <http://www.co.hunterdon.nj.us/depts/parks/guides/Sourland.htm>; the Sourland Planning Council, Neshanic, New Jersey maintains a Web site with a virtual tour of the mountains, <http://sourland.org/mp.html>; for an elegant evocation of the area and its history, see: T. J. Luce, 2001, *New Jersey’s Sourland Mountain*, Sourland Planning Council; the book includes six full-color reproductions of Sourland paintings by George Bellows. See also Charles E. Little, 1989, *The Sourland Legacy: A Report by the Sourland Regional Citizens Planning Council*, Sourland Regional Citizens Planning Council, Neshanic Station, New Jersey, one of the first modern, comprehensive, and poetic “declarations of place” ever created in the H2O Region—a landmark achievement.
- <sup>46</sup> Erik Kiviat and Kristi MacDonald, August 8, 2002, “Hackensack Meadowlands, New Jersey, Biodiversity: A Review and Synthesis,” Hudsonia, Ltd., Annandale, New York for the Hackensack Meadowlands Partnership, pages 51 and 52.
- <sup>47</sup> Don Riepe, Jamaica Bay Guardian, January 23, 2004, personal communication.
- <sup>48</sup> Adapted from a remark by Dave Peifer, executive director of the Upper Raritan Watershed Association, quoted by J. P. White, October 17, 2003, “All along the river,” *The Home New Tribune*, an article from “The Raritan River ... A Tarnished Treasure,” a week-long Special Series in *The Home New Tribune*.
- <sup>49</sup> Erik Kiviat and Kristi MacDonald, August 8, 2002, “Hackensack Meadowlands, New Jersey, Biodiversity: A Review and Synthesis,” pages 52 and 86.

- <sup>50</sup> Robert Spiegel, executive director, Edison Wetlands Association, December 28, 2003, personal communication.
- <sup>51</sup> Joseph A. Mele, 2004, "Understanding the Value of Wetlands," an introductory essay, <http://www.users.nac.net/jmele/GSNWR.html>
- <sup>52</sup> New York-New Jersey Baykeeper, 2003, "Reclaiming the Bay an Inch at a Time," article posted on the New York-New Jersey Baykeeper Web site, <http://www.nynjbaykeeper.org/conserve.htm>
- <sup>53</sup> See Jennifer Cox, George Colbert, and Guenter Vollath, July 2002, "Nature's Estuary: The Historic Tidelands of the New York New Jersey Harbor Estuary," Regional Plan Association, New York—a beautiful and evocative map of the Harbor wetlands and tidal flats known to have existed in the 18th and 19th centuries; the map has been posted on the RPA Website, <http://www.rpa.org> under "Maps."
- <sup>54</sup> The most complete field guide to the Manhattan Waterfront Greenway and the island's shoreline is *Walking Manhattan's Rim: The Great Saunter* by Cy A. Adler (2003, Green Eagle Press, New York). See also: Water taxi schedules and information at "Water Taxi," the Web site of New York Water Taxi, <http://www.nywatertaxi.com/nywt/site/index.php>; *Waterwire News*, which properly styles itself "the region's most comprehensive source for waterfront-related news and events," and *Ferrywire*, two online newsletters from the Metropolitan Waterfront Alliance, a New York non-profit devoted to reclaiming, renewing, and celebrating the harbor estuary, <http://www.waterwire.net>
- <sup>55</sup> New York City Mayor's Office, September 29, 2003, "Mayor Michael R. Bloomberg Kicks Off the Transformation of Fresh Kills on Staten Island," press release posted on the New York City Web site ([www.nyc.gov](http://www.nyc.gov)), <http://www.nyc.gov/html/dcp/html/about/pr092903.html>; according to New York City Parks Commissioner Adrian Benepe, "The reclamation of Fresh Kills is the biggest expansion of the Parks system since the creation of the 5,000 Bronx parks network in the 1890's. It will set a new standard for the transformation of former landfills into beautifully landscaped public parks."
- <sup>56</sup> For more about the work of the Natural Resources Group, the re-wilders within the New York City Department of Parks and Recreation, see their Web site, [http://www.nycgov-parks.org/sub\\_about/parks\\_divisions/nrg/nrg\\_home.html](http://www.nycgov-parks.org/sub_about/parks_divisions/nrg/nrg_home.html); OASIS, the Open Accessible Space Information System for New York City, has posted an online map of all the remaining open space in the city at: <http://www.oasisnyc.net/>
- <sup>57</sup> New York-New Jersey Trail Conference, 1999, "Highlands Trail Description," a detailed description posted at the Trail Conference's Web site, <http://www.nynjtc.org/trails/highlands/hi-lands.html>
- <sup>58</sup> Brian Kladko's reports are available online at the Liberty-Water Gap Trail Web site, <http://www.libertygap.org/Kladko.html>

<sup>59</sup> As for statistics, the region is still working its way out of what might be called a “Goldilocks era”: for the most part, state governments are collecting facts that are “too large” (their survey area is an entire state), while local governments’ data is “too small” (each jurisdiction covers only a larger or smaller fraction of the H2O Area). In addition, some much-loved areas have been extensively researched, while other, equally deserving regional strong points are woefully “under-studied.” Over the next generation, we have a chance to get all of this “just right.” For more on this, see this Report’s *Second Appendix: A Concluding Note about the Preliminary Nature of Regional Data*.

<sup>60</sup> Editorial, January 18, 2004, “Highlands Protection Initiative,” *The Record*, Hackensack, New Jersey.

<sup>61</sup> Chicago Wilderness, 2002, “What is Chicago Wilderness?,” a definition posted on the Chicago Wilderness Web site, <http://www.chicagowilderness.org/wildchi/what/index.cfm>

<sup>62</sup> See, for instance, Michael C. Houck and M. J. Cody, 2000, *Wild in the City: A Guide to Portland’s Natural Areas*, Oregon Historical Society Press, Portland, Oregon; and the Web site of the Coalition for a Livable Future in Portland, <http://www.cfuture.org/>

<sup>63</sup> Robert J. Pirani, February 5, 2004, personal communication.

## **WATER**

<sup>1</sup> Robert H. Boyle, 1969, *The Hudson River*, page 27.

<sup>2</sup> Fossil remains of mastodons were found at Claverack in 1705 and Coxsackie in 1706, Boyle, 1969, page 27.

<sup>3</sup> Defined by the US EPA and located at the Surf Your Watershed Web site, <http://www.epa.gov/surf/>

<sup>4</sup> The Raritan Basin Watershed Management Project writes that “significant impairment to streams often occurs when more than 10 percent of the land within a watershed is covered with impervious surfaces.” At 25%, severe damage occurs to water quality and the ecosystem. Raritan Basin Watershed Management Project, Fact Sheet #3, page 1, [http://www.raritanbasin.org/Publications/FactSheets/Impervious\\_Cover\\_FS.pdf](http://www.raritanbasin.org/Publications/FactSheets/Impervious_Cover_FS.pdf)

<sup>5</sup> The water bodies of the region include: the Hudson River, the Hackensack River, the Passaic River, the Raritan River, and their connector rivers, the Harlem River, the East River, the Arthur Kill, and the Kill Van Kull; a portion of the Long Island Sound; the sequence of bays that link the Atlantic Ocean and the NY/NJ Harbor, including Lower New York Bay, Upper New York Bay, Sandy Hook Bay, Raritan Bay, and Newark Bay; and protected tidal bays linked to harbor waters, including Jamaica Bay, Rockaway Inlet, and Flushing Bay.

- <sup>6</sup> In an encouraging recent development, New York City has begun a large-scale land-acquisition and protection program in the Catskill/Delaware watershed (in New York) and the Croton watershed (in New York and Connecticut). Although these watersheds lie outside the H2O Region, they supply much of the area's drinking water, and the city is purchasing the land in order to protect it from development and thereby protect the purity of the region's drinking water. Currently, the city has bought 50,000 acres, and is planning to solicit 350,000 more. See Lisa W. Foderaro, December 20, 2003, "Buying Woodland and Meadow to Save the City's Water," *The New York Times*, New York.
- <sup>7</sup> New Jersey Future, 1999, *Living with the Future in Mind: Goals and Indicators for New Jersey's Quality of Life*, 1999 Sustainable State Project Report, New Jersey Future, Trenton, New Jersey; New Jersey Future, 2000, *Living with the Future in Mind: Goals and Indicators for New Jersey's Quality of Life*, First Annual Update to the Sustainable State Project Report, New Jersey Future, Trenton, New Jersey.
- <sup>8</sup> John Waldman, 1999, *Heartbeats in the Muck: The History, Sea Life and Environment of New York Harbor*, Lyons Press, New York, pages 86 and 87.
- <sup>9</sup> *Ibid*, page 87.
- <sup>10</sup> [http://www.harborestuary.org/archive/Ind\\_rpt\\_02.pdf](http://www.harborestuary.org/archive/Ind_rpt_02.pdf)
- <sup>11</sup> Natural Resources Defense Council, 2003, "Testing the Waters," <http://www.nrdc.org/water/oceans/ttw/titinx.asp>
- <sup>12</sup> This New York beach closing data is only partly applicable to the H2O Region since it amalgamates information from beaches in the five counties of New York City and from beaches in both Westchester and Nassau Counties.
- <sup>13</sup> The definition of wetlands according to the Clean Water Act is "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." US EPA, "Wetland Definitions," <http://www.epa.gov/owow/wetlands/what/definitions.html>
- <sup>14</sup> Union and Essex counties in New Jersey lost 100% of their tidal marshes between 1953 and 1973. Jamaica Bay in Brooklyn and Queens in New York City and the Hackensack Meadowlands in Hudson and Bergen counties New Jersey are under constant pressure and stress.
- <sup>15</sup> US EPA, "What are Wetlands?," <http://www.epa.gov/owow/wetlands/vital/what.html>
- <sup>16</sup> *Ibid*.
- <sup>17</sup> US EPA, 2002, "Water Quality and Hydrology," <http://www.epa.gov/owow/wetlands/wqhydrology.html>

- <sup>18</sup> US EPA, 2003, “Shoreline Erosion,” [http://www.epa.gov/owow/wetlands/shoreline\\_erosion.html](http://www.epa.gov/owow/wetlands/shoreline_erosion.html)
- <sup>19</sup> Wetlands are thus a protector against the further build-up of greenhouse gases in the atmosphere, which is an aspect of the global climate change now being brought on by human activity. Ironically, another aspect of global climate change, the predicted rise of sea levels, threatens to drown coastal (and some inland) wetlands; more frequent storms and changes in rainfall patterns—two more predicted consequences of human-induced climate change—could further threaten the stability of wetlands. (See the section on *Global Climate Change*.)
- <sup>20</sup> US EPA, March 2002, “Wetlands Overview,” <http://www.epa.gov/owow/wetlands/what/overview.pdf>
- <sup>21</sup> US EPA, Wetlands, “Status and Trends,” <http://www.epa.gov/OWOW/wetlands/vital/status.html>
- <sup>22</sup> John Waldman, 1999, *Heartbeats in the Muck: The History, Sea Life, and Environment of New York Harbor*, pages 125 to 127.
- <sup>23</sup> New Jersey Meadowlands Commission, January 8, 2004, “NJMC to Vote on Planning Documents, Setting the Stage for a New Meadowlands,” press advisory, available at the Meadowlands Commission’s Web site, <http://www.hmdc.state.nj.us/news/press/index.html>
- <sup>24</sup> Waldman, *Ibid*, page 130.
- <sup>25</sup> Waldman, *Ibid*, page 131.
- <sup>26</sup> MERI created the Digital Meadowlands site to help the public and all interested parties learn about the district, [www.digitalmeadowlands.org](http://www.digitalmeadowlands.org)
- <sup>27</sup> In 2001, NYSDEC enumerated some of the causes thought to be contributing to marshland loss: disruption of deposition of sediments, dredging, wave energy, stabilization of inlet shores, mussel dams of the marshes, and eutrophication. Adding to the threat in the century ahead is the predicted sea-level rise likely to result from human-induced global climate change. (See the section on *Global Climate Change*.)
- <sup>28</sup> Data for the Jamaica Bay area comes from the NYSDEC Web site which includes aerial photographs of several of the marsh islands, <http://www.dec.state.ny.us/website/dfwmt/marine/twloss.html#jamaica>
- <sup>29</sup> Dick Hughes, March 16, 2000, “A Day in the Life—Edison,” Special Section, introductory article, *The Home News Tribune*, East Brunswick, New Jersey.
- <sup>30</sup> Robert Spiegel, April 10, 2002, “Testimony Before the United States Senate Subcommittee on Superfund, Toxics, Risk and Waste Management: The Chemical Insecticide Corporation Superfund Site.” Available at the Edison Wetlands Association Web site, <http://www.edisonwetlands.org>

- <sup>31</sup> Frederick Kaimann, March 16, 2000, “And a (Raritan) river runs through it,” in “A Day in the Life—Edison,” Special Section, *The Home News Tribune*, East Brunswick, New Jersey.
- <sup>32</sup> Robert Spiegel, April 10, 2002, op. cit.
- <sup>33</sup> Lou Dubose, “Hellraiser: Superfund Man,” *Mother Jones Magazine*, January/February 2003 issue, San Francisco.
- <sup>34</sup> Rick Mallwitz, December 18, 2003, “The strip mall is all Asian, all the time,” in “A Day in the Life—Edison,” Special Section, *The Home New Tribune*, East Brunswick, New Jersey. Total town population as well as the Asian-American share of that population are thought to have increased since the 2000 Census, which showed that 28,634 of 97,687 Edisonians were Asian-Americans.
- <sup>35</sup> David C. Sheehan, 1997, “Eventful Past Makes for Bustling Present,” The Edison Township Web site, <http://www.edisonnj.org>
- <sup>36</sup> “New Owners to Turn Former Magic Fountain Site into Local Destination Point,” Mayor Spadaro’s 2003 press releases, Edison Township Web site, op. cit.
- <sup>37</sup> “About the Triple C Ranch,” 2003, Edison Wetlands Association Web site, <http://www.edisonwetlands.org>
- <sup>38</sup> For more about the portions of this necklace that drain into the Rahway River and the Arthur Kill, see Greiling, Dunrie A., “Greenways to the Arthur Kill: A Greenway Plan for the Arthur Kill Tributaries,” 1993, New Jersey Conservation Foundation, Morristown, New Jersey.
- <sup>39</sup> Robinson, David A., January 10, 2004, “From Drought to Deluge,” Rutgers University, <http://climate.rutgers.edu/stateclim/docs/01122004davedrought.doc>.
- <sup>40</sup> Ibid.
- <sup>41</sup> Normal is derived from averaging rainfalls over some long-term period; it is typically a 30-year mean. For a drought index based on precipitation, this would mean a change in precipitation levels over some period of time—usually at least a season—compared against the previously determined precipitation levels for a “normal” season.
- <sup>42</sup> New York City analyzes the probability that the reservoirs of its two largest reservoir systems—Delaware and Catskills—will fill by the start of the next water year, which always commences June 1st. New York City’s drought calls, therefore, take the form of predictions. If New York determines that there is a less than 50% probability that the reservoirs will fill, a Drought Watch is declared; if the probability falls to less than 33%, the watch becomes a Drought Warning. Declaration of a Drought Emergency means that, assuming a current dry spell continues, the reservoirs could be exhausted by the next June 1st unless reductions in water consumption—as mandated by regulations—begin immediately. Department of Environmental Protection, NYC, 1998, “Drought Management Plan and Rules,” <http://www.nyc.gov/html/dep/pdf/droughtp.pdf>

- <sup>43</sup> National Drought Mitigation Center, 1995, "Understanding and Defining Drought," <http://enso.unl.edu/ndmc/enigma/def2.htm>
- <sup>44</sup> The Web site graphs depict five-year intervals around seven major 20th-century drought periods: 1908-1912, 1916-1920, 1923-1927, 1929-1933, 1964-1968, 1980-1984, 1999-August 2003. In general, the first three years are the severe years of the drought, while the final two are recovery years.
- <sup>45</sup> According to National Climatic Data Center statistics released in September 2002, North Carolina and Virginia experienced the worst droughts on record in 2002. See Randy Fabi, September 13, 2002, "Summer of 2002 Is Hottest Since 1930s Dust Bowl," Reuters, New York.
- <sup>46</sup> Robert Boyle, 1969, *The Hudson River*, page 21.
- <sup>47</sup> Randy Fabi, September 13, 2002, op. cit.
- <sup>48</sup> Summer, William M., July 15, 2002, "Passaic Flood Warning System," United States Geological Survey, <http://nj.usgs.gov/publications/FS/fs-092-98/>
- <sup>49</sup> This innovative rule—no other state calls for such large buffers around so much water—is part of New Jersey's policy for "no net loss of recharge into underground aquifers." When the landscape is covered over, it loses the ability to "recharge"—absorb and filter surface water—into aquifers, underground reservoirs of water. Not only does this loss lead to flooding (because of excess, unabsorbed water) and increased pollution (because of unfiltered water), but also the potential for drought is exacerbated, due to the reduction in surface water flowing into the earth. See: Environment News Service, January 6, 2004, "New Jersey Moves to Fight Sprawl, Protect Water Quality," <http://www.ens-newswire.com/ens/jan2004/2004-01-06-09.asp>; Maria Newman, January 6, 2004, "New Jersey Moves to Restrict Building Near Waterways," *The New York Times*, page B5.
- <sup>50</sup> The last decade has seen a number of new extremes. While we know that 2003 was the fifth wettest calendar year and 2001 was the fourth driest in New Jersey, 1996 was the wettest year (with 59.98 inches of precipitation) since 1895, when New Jersey began tracking the data.
- <sup>51</sup> NYS Department of Environmental Conservation, "Atlantic Sturgeon—Estuary Logo," <http://www.dec.state.ny.us/website/Hudson/logo.html>
- <sup>52</sup> NYS Department of Environmental Conservation, "New York's Sturgeon," <http://www.dec.state.ny.us/website/dfwmt/fish/fishspecs/sturtext.html#Atlanticsturgeon>
- <sup>53</sup> Individual sturgeon in New Brunswick, Canada have been recorded at 14 feet in length and weighing 800 pounds.
- <sup>54</sup> Some researchers clarify shortnose sturgeon as "amphidromous" as their life in salt water is limited to the salt-water habitat near the river of their birth. See Mark B. Bain, 1997, "Atlantic and shortnose sturgeons of the Hudson River: common and divergent life

history attributes,” *Environmental Biology of Fishes*, 48: pages 347 to 358, Kluwer Academic Publishers, Netherlands.

- <sup>55</sup> Age at first spawning varies by species—and within species also varies by latitude. More northerly locations seem to delay the onset of spawning. In the Hudson, Atlantic sturgeon are 18 to 19 years old when they first spawn; shortnose sturgeon are six to seven years old. NatureServe Explorer, October 2002, “Acipenser oxyrinchus—Atlantic Sturgeon,” [http://www.natureserve.org/explorer/servlet/NatureServe?menuselect=none&sourceTemplate=tabular\\_report.wmt&loadTemplate=species\\_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular\\_report.wmt&celKey=AFCAA01040&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=AFCAA01040&offPageSelectedElType=species&offPageYesNo=true&post\\_processes=&radiobutton=radiobutton&selectedIndexes=AFCAA01040&selectedIndexes=AFCAA01042&menuselectfooter=none](http://www.natureserve.org/explorer/servlet/NatureServe?menuselect=none&sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&celKey=AFCAA01040&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=AFCAA01040&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=AFCAA01040&selectedIndexes=AFCAA01042&menuselectfooter=none); NatureServe Explorer, October 2002, “Acipenser brevirostrum—Shortnose Sturgeon,” <http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Acipenser+brevirostrum>
- <sup>56</sup> Stephen P. Stanne, Roger G. Panetta, and Brian E. Forist, 1996, *The Hudson: An Illustrated Guide to the Living River*, Rutgers University Press, New Brunswick, page 67.
- <sup>57</sup> NYS Department of Environmental Conservation, “New York’s Sturgeon,” op. cit.
- <sup>58</sup> Ibid.
- <sup>59</sup> Ibid.
- <sup>60</sup> “The Hudson River supports one of the largest remaining populations of Atlantic sturgeon; however, recent evidence of major declines in recruitment during the past decade suggest the population may be in jeopardy.” Douglas L. Peterson, Mark Bain, and Nancy Haley, 2000, “Evidence of Declining Recruitment of Atlantic Sturgeon in the Hudson River,” *North American Journal of Fisheries Management*, American Fisheries Society, page 231.
- <sup>61</sup> The standard error for this study was 10,436. “Population Status of Shortnose Sturgeon in the Hudson” a study sponsored by the National Marine Fisheries Service and the U.S. Army Corps of Engineers, 1995-1997, <http://www.dnr.cornell.edu/hydro2/sturgeon/stdshor.htm>
- <sup>62</sup> Douglas L. Peterson et al., 2000, op cit., page 237.
- <sup>63</sup> Atlantic States Marine Fisheries Commission, January 2004, “Atlantic Sturgeon,” bulletin posted on the Commission Web site, <http://www.asafc.org/atlanticSturgeon.htm>
- <sup>64</sup> John Waldman, 1999, *Heartbeats in the Muck: The History, Sea Life, and Environment of New York Harbor*, Lyons Press, New York, page 43.
- <sup>65</sup> Ibid, page 42.

- <sup>66</sup> John Waldman, February 26, 2004, personal communication. See also: NYS Department of Environmental Conservation, updated 1999, “The True Bass of New York,” <http://www.dec.state.ny.us/website/dfwmr/fish/fishspecs/trbastxt.html#Striped%20Bass>
- <sup>67</sup> Harvesting of striped bass was completely suspended in the Chesapeake area in the 1970s. By the 1980s, fishing was once again allowed. This exemplifies the need for interstate cooperation, as well as the success that can be derived from coordinated efforts.
- <sup>68</sup> NYS Department of Environmental Conservation, updated 1999, “The True Bass of New York.”
- <sup>69</sup> NYSDEC, Hudson River Fisheries Unit, 2002, <http://www.dec.state.ny.us/website/dfwmr/marine/hudson/index.html>
- <sup>70</sup> See: Hudson River Sloop Clearwater, 1997, “Hudson River PCB Pollution Timeline,” <http://www.clearwater.org/news/timeline.html>
- <sup>71</sup> PCBs contaminate the whole food chain, not just fish. The 2003 update to the Hudson River Natural Resource Damage Assessment, jointly prepared by the New York State Department of Environmental Conservation, the National Oceanic and Atmospheric Administration, and the U.S. Department of the Interior (the three government agencies that have been designated the public “trustees” of the river’s natural elements damaged by PCBs), summarizes what is known about PCBs this way: “PCBs are a major concern because they last in the environment for many decades, low concentrations pose health hazards to humans, birds, fish, and mammals, and they accumulate in living creatures over time.” Hudson River Natural Resource Trustees, 2003, “Hudson River Natural Resource Damage Assessment Fact Sheet—2003 Update,” posted on the NYSDEC Web site, <http://www.dec.state.ny.us/website/dfwmr/nrd/03factsheetupdate.pdf>
- <sup>72</sup> Andrew Jacobs, July 22, 2002, “Hoping Egrets Replace Pollutants as River Undergoes Intensive Care,” *The New York Times*, New York.
- <sup>73</sup> John Waldman, 1999, *Heartbeats in the Muck*, pages 131 to 143.
- <sup>74</sup> *Ibid.*
- <sup>75</sup> U.S. Fish and Wildlife Service, July 27, 1998, Letter to U.S. Army Corps of Engineers; National Marine Fisheries Service, July 27, 1998, Letter to U.S. Army Corps of Engineers.
- <sup>76</sup> Marcy Benstock, March 10, 2004, personal communication.
- <sup>77</sup> John Waldman, February 3, 2004, personal communication.
- <sup>78</sup> Robert H. Boyle, 1969, *The Hudson River: A Natural and Unnatural History*, W. W. Norton & Co., Inc., New York, page 40.

<sup>79</sup> Quoted in John Waldman, 1999, *Heartbeats in the Muck*, page 37.

<sup>80</sup> Ibid, page 38.

<sup>81</sup> Robert H. Boyle, 1969, *The Hudson River*, page 39.

<sup>82</sup> John Waldman, 1999, *Heartbeats in the Muck*, pages 38 and 39.

## FLYOVER

<sup>1</sup> From a letter sent by E. J. McAdams, executive director of the New York City Audubon Society to the Lower Manhattan Development Corporation, <http://www.birdbash.org/NYCASBirdWatch/TabWTC.asp>

<sup>2</sup> “Over 7,500 sites in nearly 170 countries have been identified as important bird areas.” This is a finding from “State of the World’s Birds—2004: Indicators for our changing world,” 2004, BirdLife International, Cambridge, Great Britain, cited in Ed Stoddard, March 7, 2004, “Study Highlights Global Threats to Bird Populations,” Reuters, [http://story.news.yahoo.com/news?tmpl=story&cid=585&ncid=585&e=5&u=/nm/20040308/sc\\_nm/environment\\_birds\\_dc\\_4](http://story.news.yahoo.com/news?tmpl=story&cid=585&ncid=585&e=5&u=/nm/20040308/sc_nm/environment_birds_dc_4) See also the Web sites of the National Audubon Society of New York State at: <http://www.audubon.org/chapter/ny/ny/iba/index.html>; and of the New York State Department of Environmental Conservation, New York State Bird Conservation Area Program, <http://www.dec.state.ny.us/website/dfwmr/wildlife/bca/>; see also: Marcia T. Fowle, and Kerlinger, Paul, 2001, *The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area*, pages xi and 2.

<sup>3</sup> Joann Loviglio, February 3, 2004, “Expert Says Glass Is Major Threat to Birds,” Associated Press, [http://story.news.yahoo.com/news?tmpl=story&cid=624&ncid=624&e=7&u=/ap/20040201/ap\\_on\\_sc/birds\\_clear\\_danger\\_1](http://story.news.yahoo.com/news?tmpl=story&cid=624&ncid=624&e=7&u=/ap/20040201/ap_on_sc/birds_clear_danger_1)

<sup>4</sup> Pam Belluck, May 16, 2001, “City Lights, a Siren Song for Birds, Are Dimmed,” *The New York Times*, New York. For more about Project Safe Flight, <http://www.bird-bash.org/NYCASBirdWatch/TabOverview.asp>

<sup>5</sup> This tally comes from the Harbor Heron Project’s Nesting Survey for 2001, which was prepared for the New York City Audubon Society (NYCAS): Paul Kerlinger, 2001, *New York City Audubon Society’s Harbor Herons Project: Nesting Survey—2001*.

<sup>6</sup> The islands included are: Goose Island and Huckleberry Island in Long Island Sound; North Brother, South Brother (data for this island comes from 2000 survey as it could not be counted in 2001), Mill Rock, and U Thant Island in the East River; Canarsie Pol and Ruffle Bar in Jamaica Bay; Hoffman Island and Swinburne Island near South Staten Island; and Shooter’s Island, Prall’s Island, and Isle of Meadows in the Arthur Kill-Kill van Kull area off Staten Island. Data from Table 1, Paul Kerlinger, 2001, *New York City Audubon Society’s Harbor Herons Project: Nesting Survey—2001*.

- <sup>7</sup> Peter P. Blanchard III, Kerlinger, Paul, and Stein, Mark J., 2001, *An Islanded Nature: Natural Area Conservation and Restoration in Western Staten Island, including the Harbor Herons Region*, page 36.
- <sup>8</sup> Ibid, pg. 37 The populations of several harbor heron species appear stable. Others—including glossy ibis, snowy egret, and cattle egret—seem more variable and more vulnerable, pages 195 and 196.
- <sup>9</sup> In 1996. Ibid, page 40.
- <sup>10</sup> Waldman, John, 1999, *Heartbeats in the Muck: The History, Sea Life, and Environment of New York Harbor*, page 68.
- <sup>11</sup> The data from the two studies is not strictly comparable, given the difference in sample size (the 1986 study looked at less than half the number of islands studied later).
- <sup>12</sup> New Jersey Future, 2000, *Living with the Future in Mind*, page 52.
- <sup>13</sup> Dichloro-diphenyl-trichloroethane.
- <sup>14</sup> Natural Resources Defense Council, February 2004, “Peregrine Falcon,” available at NRDC’s Web site, <http://www.nrdc.org/features/featcrea/pereprin.html>
- <sup>15</sup> One study has clocked a Peregrine reaching a speed of 273 miles per hour.
- <sup>16</sup> US EPA, 1972, “DDT Ban Takes Effect,” press release, <http://www.epa.gov/history/topics/ddt/01.htm>
- <sup>17</sup> Ibid.
- <sup>18</sup> Ruth Rudner, January 5, 2000, “A Coming-Out Party for Nature’s Speed Merchants,” *The Wall Street Journal*, Dow Jones & Company, Inc., New York.
- <sup>19</sup> The Peregrine Fund, 2002, press release, “Peregrine Fund Celebrates Anniversary of DDT Ban,” <http://www.peregrinefund.org/press/ddt.html>
- <sup>20</sup> James H. Enderson, William Heinrich, Lloyd Kiff, and Clayton M. White, 1995, “Population Changes in North American Peregrines,” Trans. 60th North American Wildlife & Natural Resource Conference.
- <sup>21</sup> New Jersey Division of Fish & Wildlife, current, and NYSDEC, 2003.
- <sup>22</sup> The Peregrine Fund, 1999, “Working to Conserve Birds of Prey in Nature,” Newsletter no. 30, Summer/Fall.
- <sup>23</sup> This is another finding from “State of the World’s Birds—2004: Indicators for our changing world,” 2004, BirdLife International, Cambridge, Great Britain, cited in

Ed Stoddard, March 7, 2004, "Study Highlights Global Threats to Bird Populations." See also the prediction noted in Howard Youth, 2002, "The Plight of Birds," *World Watch*, May/June Issue, page 20.

<sup>24</sup> Bob Sallinger, 2003, personal communication. According to a national Peregrine population estimate from the U.S. Fish and Wildlife Service in 2003, the country has about 2,000 nesting pairs; New York State has 49; and New York City has "at least 15 pairs." See: Trudy Tynan, December 29, 2003, "Peregrine Falcons Soar Again in Northeast," Associated Press, <http://www.nrdc.org/news/newsDetails.asp?nID=1214>

<sup>25</sup> On-line, one can see cameras pointed at Peregrine nesting boxes in Jersey City; <http://www.state.nj.us/dep/fgw/peregrinecam/>

## LAND

<sup>1</sup> Aubrey L. Haines, 1974, *Yellowstone National Park: Its Exploration and Establishment*, Introduction, U. S. Department of the Interior, National Park Service, Washington, D.C., [http://www.cr.nps.gov/history/online\\_books/haines1/index.htm](http://www.cr.nps.gov/history/online_books/haines1/index.htm). See also: Smithsonian Institution, 2002, "George Catlin and His Indian Gallery," an online guide, <http://www.nmaa.si.edu/collections/exhibits/catlin/>

<sup>2</sup> Aubrey L. Haines, 1974, *Yellowstone National Park: Its Exploration and Establishment*, Introduction.

<sup>3</sup> Barbara L. Lawrence, February 15, 2004, "How Does the Garden State Grow?," *Hartford Courant*, Hartford, Connecticut.

<sup>4</sup> Information for this paragraph comes from the Web site of the New Jersey Conservation Foundation, <http://www.njconservation.org/> and from the USDA Forest Service, "New York-New Jersey Highlands Regional Study: 2002 Update," <http://www.fs.fed.us/na/highlands/highlands/>, "Draft New York/New Jersey Highlands Regional Study—March 2002," [http://www.fs.fed.us/na/highlands/draft\\_report/](http://www.fs.fed.us/na/highlands/draft_report/), and the Study Briefing paper, <http://www.fs.fed.us/na/highlands/study/study.html#geo.20>

<sup>5</sup> USDA Forest Service, "New York-New Jersey Highlands Regional Study: 2002 Update," <http://www.fs.fed.us/na/highlands/highlands/>

<sup>6</sup> See the Web site set up by the New Jersey Highlands Task Force, <http://www.savethehighlands.org/protect.htm>

<sup>7</sup> "Approximately 88 percent (379Mgal/d) of the 431 million gallons per day of surface water withdrawn for public supply is transferred out of the Highlands region to supply parts of New York City and 98 New Jersey municipalities," USDA Forest Service, "New York-New Jersey Highlands Regional Study: 2002 Update," page 30. See also: *The Record* Editorial Board, January 18, 2004, "Governor McGreevey's Highlands Protection Initiative," *The Record*, Hackensack, New Jersey.

<sup>8</sup> It is also worth noting that there are some concerns about complex stresses on the total Highlands water supply, including ground water as well as surface water. In 1995, 145 gallons of water were withdrawn each day from underground aquifers in the Highlands. The result for the Whippany River Basin's glacial-aquifer system, for example, has been a decline of the underground water table by 25 to 30 feet since 1965. USDA Forest Service, "New York-New Jersey Highlands Regional Study: 2002 Update," page 24.

<sup>9</sup> *Ibid.* These conclusions are integrated throughout the report.

<sup>10</sup> And where development does take place, under the new regulations there must now be "no net loss" of the amount of rainwater and melt water seeping through the ground to recharge underground aquifers. Maria Newman, January 6, 2004, "New Jersey Moves to Restrict Building Near Waterways," *The New York Times*, New York; Environment News Service, January 6, 2004, "New Jersey Moves to Fight Sprawl, Protect Water Quality," Environment New Service Web site, <http://www.ens-newswire.com/ens/han2004/2004-01-06-09.asp>

<sup>11</sup> Despite the size of this unbroken landscape, its potential vulnerability is underscored by the fact that only 11 remaining parcels are larger than 5,000 acres. USDA Forest Service, "New York-New Jersey Highlands Regional Study: 2002 Update," page 59.

<sup>12</sup> *Ibid.*

<sup>13</sup> *The Record* Editorial Board, January 18, 2004, "Governor McGreevey's Highlands Protection Initiative."

<sup>14</sup> A recent issue of *High Ground*, the newsletter of the Highlands Coalition, a consortium of environmental and activist groups, reports that Congress may soon pass the Highlands Conservation Act, a bill which "authorizes \$100 million in federal matching funds over ten years to assist the states of CT, NJ, NY, and PA in conserving priority open spaces in the Highlands." Tom Gilbert, Winter 2003/2004, "Highlands Initiatives Advance in Congress," *High Ground*, The Highlands Coalition, Titusville, New Jersey, <http://www.highlandcoalition.org/Newsletters/hgwi03.htm>

<sup>15</sup> Michele S. Byers, March 17, 2004, "The State We're In," New Jersey Conservation Foundation, Volume XXXIV, Number 11.

<sup>16</sup> New Jersey State Legislature, March 29, 2004, "Draft 'Highlands Water Protection and Planning Act,'" S-1/A-2635, New Jersey State Legislature, Trenton, New Jersey. This language was later withdrawn from the bill proper so it could be sent around the state as an "Op-Ed" piece.

<sup>17</sup> Winnie Hu, August 21, 2002, "A Recipe for a Run-In: More Bears, and More People in Their Path," *The New York Times*, New York.

<sup>18</sup> *Ibid.*

- <sup>19</sup> *The New York Times* Editorial Board, August 21, 2002, “Killed by a Bear,” *The New York Times*, New York.
- <sup>20</sup> Winnie Hu, op. cit.
- <sup>21</sup> Museum of Zoology, University of Michigan, Animal Diversity Web, [http://animaldiversity.ummz.umich.edu/accounts/ursus/u.\\_americanus\\$narrative.html#geographic\\_range](http://animaldiversity.ummz.umich.edu/accounts/ursus/u._americanus$narrative.html#geographic_range)
- <sup>22</sup> New Jersey Division of Fish and Wildlife, 2001, “Questions and Answers About NJ’s Black Bears,” <http://www.state.nj.us/dep/fgw/bearq&a.htm>
- <sup>23</sup> Winnie Hu, op. cit.
- <sup>24</sup> *The Record* Editorial Board, December 21, 2003, “Bear Hunt Postmortem,” *The Record*, Hackensack, New Jersey.
- <sup>25</sup> *Herald News* Editorial Board, December 10, 2003, “New Jersey hunters, unlock and unload,” *Herald News*, West Paterson, New Jersey.
- <sup>26</sup> Robert Hanley, March 10, 2004, “Proposed Bear Hunt for 2004 Pits Council Against Governor,” *The New York Times*, New York. “A new analysis Mr. Campbell released on Friday put the estimated population at 1,490 on the eve of the 2003 hunt, the state’s first since 1970.... Last December, hunters killed 328 bears.” Commissioner Campbell had previously estimated that 600 bear cubs would be born in New Jersey in the spring of 2004 (see page 77 of this Report). Although no one has before now done all the math, it comes out this way: 1,490 bears—328 bears + 600 bears = 1,762 bears.
- <sup>27</sup> Winnie Hu, op. cit. “In 1997,” Hu notes, “a 195-pound black bear even prowled the strip malls along Central Avenue in Westchester County for a time.”
- <sup>28</sup> *The New York Times* Editorial Board, August 21, 2002, “Killed by a Bear.”
- <sup>29</sup> Ibid.
- <sup>30</sup> Richard Cowen, December 14, 2003, “Controversial bear hunt ends, protests go on,” *The Record*, Hackensack, New Jersey.
- <sup>31</sup> Ibid.
- <sup>32</sup> *The New York Times* Editorial Board, August 21, 2002, “Killed by a Bear.”
- <sup>33</sup> *The Record* Editorial Board, December 21, 2003, “Bear Hunt Postmortem.”
- <sup>34</sup> Two hundred and nine, or more than 60%, of the bears killed were female. This was unexpected: Females normally account for slightly less than half of bears taken in a hunt. Robert Hanley, December 15, 2003, “New Jersey Hunt Took Lopsided Toll on Female Bears,” *The New York Times*, New York.

- <sup>35</sup> *Herald News* Editorial Board, December 10, 2003, “New Jersey hunters, unlock and unload.”
- <sup>36</sup> *The New York Times* Editorial Board, December 10, 2003, “Bad News for New Jersey Bears,” *The New York Times*, New York.
- <sup>37</sup> *Herald News* Editorial Board, December 10, 2003, “New Jersey hunters, unlock and unload.”
- <sup>38</sup> *The Record* Editorial Board, December 21, 2003, “Bear Hunt Postmortem.”
- <sup>39</sup> Richard Cowen, December 27, 2003, “Animal activists risk charges for helping bear hurt in hunt,” *The Record*, Hackensack, New Jersey.
- <sup>40</sup> Winnie Hu, August 21, 2002, “A Recipe for a Run-In: More Bears, and More People in Their Path.”
- <sup>41</sup> *Ibid.*
- <sup>42</sup> *Ibid.*
- <sup>43</sup> Charles Siebert, December 9, 2003, “The New Bear in Town,” *The New York Times*, New York.
- <sup>44</sup> *Ibid.*
- <sup>45</sup> One of the major threats to bog turtles’ habitat is from invasive plants, both native and non-native. The New Jersey Division of Fish and Wildlife has a program to restore and manage the bog turtles’ habitat. A charming and informative bog turtle slide show can be seen at: <http://www.state.nj.us/dep/fgw/slideshows/bogturtle/bogtrrintro.htm>
- <sup>46</sup> For more on the Metropolitan Conservation Alliance, see the section on *Sprawl*.
- <sup>47</sup> Kenneth Friedman, December 11, 1998, “Wildlife News,” <http://www.suite101.com/article.cfm/127/12804>
- <sup>48</sup> New Jersey Division of Fish and Wildlife, 2002, *New Jersey Bog Turtle Project*, <http://www.state.nj.us/dep/fgw/bogturt.htm>
- <sup>49</sup> A separate survey examined 473 wetlands in four New Jersey counties. Only 16% of the wetlands in this survey were thought to have characteristics that might attract bog turtles. See U.S. Department of Interior, January 17, 1997.
- <sup>50</sup> New Jersey also has an atlas project. Only general data is currently available and can be found at: <http://www.state.nj.us/dep/fgw/herpatl.htm>
- <sup>51</sup> New Jersey Division of Fish and Wildlife, 2003, *New Jersey Bog Turtle Project*, <http://www.nj.gov/dep/fgw/bogturt.htm>

- <sup>52</sup> This figure comes from “Getting on Message: Making the Biodiversity-Sprawl Connection,” an information kit assembled in 2000 by the Biodiversity Project, a partnership of non-profit groups in Madison, WI, <http://www.biodiversityproject.org>
- <sup>53</sup> The Sierra Club’s “Stop Sprawl” Web page can be found at [www.sierraclub.org/sprawl/](http://www.sierraclub.org/sprawl/)
- <sup>54</sup> James M. Taylor, September 2002, “Opposing ‘urban sprawl’ . . . or opposing people?,” *Environment & Climate News*, The Heartland Institute, Chicago. The Heartland Institute, [www.heartland.org](http://www.heartland.org)
- <sup>55</sup> United Nations, 2001, “World Population Prospects: The 2000 Revision—Highlights,” Draft, Population Division, Department of Economic and Social Affairs, United Nations, New York.
- <sup>56</sup> So do non-citizens, for that matter.
- <sup>57</sup> Robert W. Burchell, William R. Dolphin, and Catherine C. Galley, 2000, “The Costs and Benefits of Alternate Growth Patterns: The Impact Assessment of the New Jersey State Plan,” Rutgers University Center for Urban Policy Research, New Brunswick.
- <sup>58</sup> See, for instance, the Biodiversity Project kit previously cited, “Getting on Message: Making the Biodiversity-Sprawl Connection,” <http://www.biodiversityproject.org>
- <sup>59</sup> William H. Whyte, 2002, *The Last Landscape*, Foreword by Tony Hiss, University of Pennsylvania Press, Philadelphia, page 273.
- <sup>60</sup> *Ibid.*, pages 273 and 274.
- <sup>61</sup> *Ibid.*, page 274.
- <sup>62</sup> *The New York Times* Editorial Board, June 5, 1994, “Down by the Riverside,” *The New York Times*, New York.
- <sup>63</sup> *Ibid.*
- <sup>64</sup> William H. Whyte, 2002, *The Last Landscape*, Foreword by Tony Hiss, page x.
- <sup>65</sup> See Paul E. Cohen and Robert T. Augustyn, 1997, “Manhattan in Maps, 1527—1995,” Rizzoli, New York, pages 100 to 109.
- <sup>66</sup> This estimate of Manhattan’s population, as of 1984, is found in Elliot Willensky and Norval White, 1988, *AIA Guide to New York City*, Third Edition, Harcourt, Brace, Jovanovich, San Diego, page 896. Manhattan’s population actually occupies *less* than 14,478 acres, since well over 1,000 acres of the island have been permanently dedicated as parkland; Central Park alone has 840 acres. The 1984 figure also represents a *decrease* from Manhattan’s even denser peak population: According to John Waldman, “The census of 1656 revealed 120 houses and one thousand occupants, by 1698 the number of people was only five times greater, and in 1790 it numbered thirty-three thousand. But about one hundred years later, in 1900, there

were more than two million residents of Manhattan. . . .” John Waldman, 1999, *Heartbeats in the Muck :The History, Sea Life, and Environment of New York Harbor*, page 84.

<sup>67</sup> Dennis Hevesi, August 11, 2002, “Keeping Wide Open Spaces Wide Open,” *The New York Times*, New York.

<sup>68</sup> Both quotes from Biodiversity Project, 2000, “Getting on Message: Making the Biodiversity-Sprawl Connection,” op. cit.

<sup>69</sup> Eric Stiles, Summer 2003, personal communication.

<sup>70</sup> There is a “range of imperviousness” in sprawl development: Homes built on one- and two-acres lots cover 14% of a given piece of land with impervious surfaces, according to a study done for the U.S. EPA; commercial buildings create 35% impervious surfaces, and the imperviousness of an average light industrial building is 47%. See: American Rivers, the Natural Resources Defense Council, and Smart Growth America, 2002, “Paving our Way to Water Shortages: How Sprawl Aggravates Water Shortages,” American Rivers, Washington, D.C., Executive Summary. Between 1986 and 1995 New Jersey added about 4,200 acres of impervious surface per year; see Hasse and Lathrop, 2001, “Measuring Urban Growth in New Jersey.”

<sup>71</sup> Tom Doggett, August 28, 2002, “Suburban Sprawl Blocks Water, Worsens U.S. Drought,” Reuters, Washington, D.C.

<sup>72</sup> Ibid. See also: Cat Lazaroff, August 28, 2002, “City Sprawl Worsens Water Shortages,” Environment News Service, <http://ens-news.com/ens/aug2002/2002-08-28-06.asp> The full report, “Paving our Way to Water Shortages: How Sprawl Aggravates Water Shortages,” is available at <http://www.americanrivers.org/docs/PavingOurWay1.pdf>

<sup>73</sup> Biodiversity Project, 2000, “Getting on Message: Making the Biodiversity-Sprawl Connection,” op. cit.

<sup>74</sup> Ibid.

<sup>75</sup> Ibid.

<sup>76</sup> See RPA’s Web site at: <http://www.rpa.org/aboutrpa.html>

<sup>77</sup> Regional Plan Association, 2001, “A Scan of Smart-Growth Issues in the New York-New Jersey-Connecticut Metropolitan Area,” Draft, Regional Plan Association, New York, page 1.

<sup>78</sup> The boundaries of the 31-county, tri-state RPA region are co-terminous with the boundaries of the region surveyed by Dr. Cynthia Rosenzweig and her colleagues in their assessment of local Global Climate Change trends. See the section on *Global Climate Change*.

<sup>79</sup> First place goes to Atlanta, Georgia, and second to Houston, Texas, <http://www.sprawlcity.org/charts/topten.html>

- <sup>80</sup> Christopher Jones, 2002, Regional Plan Association, personal communication.
- <sup>81</sup> Harry Dodson, a Massachusetts landscape architect, is a highly regarded pioneer of environmental simulation who specializes in what he calls “trptychs”—three views of the same site: a “today” picture, and two alternate future visions: one showing the area as it will look after sprawl development, the other showing how the same level of growth can be accommodated in a way that respects what was there before, such as natural areas, farmland, or older villages. Some of Dodson’s work is posted at the Web site of his firm, Dodson Associates, <http://www.dodsonassociates.com>. Images Dodson created in the 1980s about how change would affect the Connecticut River Valley in western Massachusetts are posted on the Web site of the Center for Rural Massachusetts, <http://www-unix.oit.umass.edu/~ruralma/>—click on “Drawings illustrating conventional compared with creative development.” More recent work that Dodson did about the growth that the Chicago area will see in the first 20 years of the 21st century have been put online by Sustain, an environmental group, and can be seen at <http://www.sustainusa.org/landuseguide/visions.html>
- <sup>82</sup> Robert W. Burchell et al., 2000, op. cit., Executive Summary.
- <sup>83</sup> Joe Malinconico, September 17, 2002, “Critics fear road projects can only hurt,” *The Star-Ledger*, Newark.
- <sup>84</sup> For a comprehensive look at the McGreevey administration’s smart-growth thinking, see the New Jersey Department of Environmental Protection Web site “Anti-Sprawl Agenda” page, <http://www.state.nj.us/dep/antisprawl/> The proposals at first included a new map called the BIG (Blueprint for Intelligent Growth) map, which was met with considerable skepticism from both local officials and the development community. Its future is currently unclear.
- <sup>85</sup> Laura Mansnerus, March 23, 2004, “Trenton Eases Local Efforts To Preserve Open Space,” *The New York Times*, New York.
- <sup>86</sup> The Trust for Public Land and the Land Trust Alliance, 2004, “LandVote 2003: Americans Invest in Parks & Open Space,” The Trust for Public Land Conservation Finance Program, Boston, Massachusetts.
- <sup>87</sup> USDA Forest Service, 2002, “New York-New Jersey Highlands Regional Study: 2002 Update,” <http://www.fs.fed.us/na/highlands/highlands>
- <sup>88</sup> Governor James E. McGreevey, Executive Order Number 70.
- <sup>89</sup> For more about the Highlands Task Force’s recommendations, see the section on *The Highlands*.

- <sup>90</sup> Maria Newman, January 9, 2004, "Plan to Revive the Meadowlands Is Approved," *The New York Times*, New York.
- <sup>91</sup> See a press release from the New Jersey Meadowlands Commission, <http://www.meadowlands.state.nj.us/mct/mct-press.html>
- <sup>92</sup> Metropolitan Conservation Alliance Web site, <http://wcs.org/home/wild/northamerica/973/>
- <sup>93</sup> Winnie Hu, September 25, 2003, "City Unveils Plans to Turn Old Rail Line Into a Park," *The New York Times*, New York. Friends of the High Line can be found at <http://www.thehighline.org/>
- <sup>94</sup> Environmental News Service, August 6, 2002, "Mayor's Plan Safeguards London's Wild Sites," <http://ens-news.com/ens/aug2002/2002-08-06-19.asp>
- <sup>95</sup> James Gorman, September 24, 2002, "A Wild, Fearsome World Under Each Fallen Leaf," *The New York Times*, New York.

## AIR

- <sup>1</sup> Quotes in this paragraph are found in Robert H. Boyle, 1969, *The Hudson River: A Natural and Unnatural History*, page 34.
- <sup>2</sup> The entire region is out of compliance with stricter federal standards adopted in April 2004 for ground-level ozone, a major component of smog: "Most of the people who live in New York State and all the residents of New Jersey and Connecticut are breathing air that does not meet new federal health standards for smog." Anthony DePalma, April 16, 2004, "Region's Air Doesn't Meet New Standards," *The New York Times*.
- <sup>3</sup> Eric Mann and the WATCHDOG Organizing Committee, 1991, *L.A.'s Lethal Air: New Strategies for Policy, Organizing, and Action*, Labor/Community Strategy Center, Los Angeles, pages 12 and 13.
- <sup>4</sup> *Ibid.*, page 10.
- <sup>5</sup> *Ibid.*, page 22.
- <sup>6</sup> Maggie Fox, July 29, 2002, "Finnish Study Links Pollution with Heart Disease," Reuters, New York.
- <sup>7</sup> Environmental News Service, November 10, 2003.
- <sup>8</sup> Eric Mann et al., 1991, op. cit., pg. 13. The *Journal of the American Medical Association* in early 2002 published research linking particulate matter in diesel exhaust to lung cancer; a similar finding was endorsed by the U.S. EPA later the same year. Tri-State

Transportation Campaign, September 9, 2002, “EPA Study Supports Diesel-Lung Cancer Link,” *Mobilizing the Region*, New York.

<sup>9</sup> Eric Mann et al., *op. cit.*, page 14.

<sup>10</sup> This is a federal standard, part of the National Ambient Air Quality Standard (NAAQS) set by the U.S. Environmental Protection Administration. In 1997, the U.S. EPA changed the standard to an eight-hour ozone concentration of 0.08 ppm, but this newer standard has yet to be implemented, pending the final resolution of a Federal Court injunction against it.

<sup>11</sup> At a glance, Table 1 in the New York State Department of Environmental Conservation’s 1999 report on Statewide Air Quality Trends, <http://www.dec.state.ny.us/website/dar/reports/99annrpt/99statewide.html>, shows that the number of days of smog violations is directly correlated to the number of days when the temperature is over 90 degrees. This could pose a new problem as global—and regional—temperatures continue to rise. See the section on *Global Climate Change*.

<sup>12</sup> The greater Los Angeles Area has more accurate knowledge about its air-quality issues than the H2O Region, in part because the boundaries of the South Coast Air Quality Management District (SCAQMD), the government body that monitors and regulates Los Angeles’ air pollution, coincide with the actual outline of greater Los Angeles. See Eric Mann, et al., 1991, *op. cit.*

<sup>13</sup> Megan D. Nordgren, Eric A. Goldstein, Mark A. Izeman, 2002, *The Environmental Impacts of the World Trade Center Attacks: A Preliminary Assessment*, Natural Resources Defense Council, New York, page iv.

<sup>14</sup> *Ibid.*

<sup>15</sup> Denise Grady and Andrew C. Revkin, September 10, 2002, “Lung Ailments May Force 500 Fighters Off Job,” *The New York Times*, New York. The final total of premature retirees may actually turn out to be substantially higher. See: Michael Clancy, March 10, 2004, “WTC Cough,” *amNewYork*, New York.

<sup>16</sup> *Ibid.*

<sup>17</sup> *Ibid.*

<sup>18</sup> Laurie Garrett, August 22, 2003, “Report: White House Misled City on Post-9/11 Health Issues,” *New York Newsday*, Melville, New York.

<sup>19</sup> *Ibid.*

<sup>20</sup> Megan D. Nordgren et al., *op. cit.*

<sup>21</sup> Denise Grady and Andrew C. Revkin, *op. cit.*

- <sup>22</sup> Amanda Gardner, September 11, 2003, “Debate Lingers on Air Quality After 9/11,” HealthDay Reporter, Yahoo! News.
- <sup>23</sup> Laurie Garrett, op. cit.
- <sup>24</sup> Megan D. Nordgren et al., op. cit.
- <sup>25</sup> Centers for Disease Control and Prevention, “Surveillance for Asthma—United States, 1980-1999,” *Morbidity and Mortality Weekly Report*, March 29, 2002, vol. 51, no. ss-1, <http://www.cdc.gov/mmwr/PDF/ss/ss5101.pdf>
- <sup>26</sup> One study published February 2002 in *The Lancet*, a British medical journal, has found that high concentrations of one-hour ground-level ozone leads to the development of asthma in children. But in order to be considered conclusive proof, this study needs to be replicated.
- <sup>27</sup> Global Initiative for Asthma, January, 1995, update from “NHLBI/WHO Workshop Report: Global Strategy for Asthma Management and Prevention,” page 36, <http://www.ginasthma.com/>
- <sup>28</sup> New Jersey Future, 2000, “Living with the Future in Mind: Goals and Indicators for New Jersey’s Quality of Life,” First Annual Update to the Sustainable State Project Report, page 43.
- <sup>29</sup> Ibid.
- <sup>30</sup> New York City Department of Health, *Asthma Facts*, a report of Community Healthworks, 1999, <http://www.nyc.gov/html/doh/pdf/asthma/facts.pdf>
- <sup>31</sup> New York City Department of Health, August 2001, <http://www.nyc.gov/html/doh/html/public/press01/pr53-806.html>; the Asthma Initiative can be found at: <http://www.nyc.gov/html/doh/html/asthma/asthma.html> A drawback to indicators that rely on hospitalization rates is that they record only the most severe manifestations of the disorder. Asthma comes in many forms, including “Mild Intermittent,” “Mild Persistent,” “Moderate Persistent,” and “Severe Persistent.” With the exception of self-reporting surveys, good data on asthma sufferers does not yet exist. Even more frustratingly, researchers still do not understand why some children in a given population contract asthma while others do not.
- <sup>32</sup> New York City Department of Health, *Asthma Facts*, op. cit.

## GLOBAL CLIMATE CHANGE

- <sup>1</sup> Greenhouse Gases take effect slowly—and also leave slowly, lingering in the atmosphere for up to 200 years. In terms of existing Greenhouse Gas accumulation, we are actually (and paradoxically) still living in the 1950s, or even the 1920s: “The radiative thermodynamic physics of the greenhouse effect are such to cause a long delay between the emission of carbon dioxide into the atmosphere and the time when the effects on the climate actual-

ly manifest themselves. Hence, the CO<sub>2</sub> that we emit and accumulate in the atmosphere now will only act on the climate 50 to 80 years in the future. Conversely, climatic changes, such as temperature increase, extreme weather events, and damage to crop yields that we are experiencing today, are occurring in response to the CO<sub>2</sub> that we emitted half-a-century or more ago—when atmospheric concentrations were much lower than they currently are. It therefore follows that in 50 to 80 years from now, we will experience incomparably more damage than today.” Simon Retallack and Peter Bunyard, March/April 1999, “We’re Changing Our Climate! Who Can Doubt It?”, *The Ecologist*, Volume 29, Number 2, London.

<sup>2</sup> This quote comes from “Wild Changes to Climate,” a good introductory Web site created and hosted by the National Wildlife Federation, <http://www.nwf.org/climate>

<sup>3</sup> There would be an intermediate climate change, as well: “By the 2050s, New York’s temperature regime will be similar to Washington, D.C.,” Cynthia Rosenzweig, 2002, personal correspondence. See also, Cynthia Rosenzweig, and William D. Solecki (Editors), 2001, *Climate Change and a Global City: The Potential Consequences of Climate Variability and Change—Metro East Coast*, Report for the US Global Change Research Program, National Assessment of the Potential Consequences of Climate Variability and Change for the United States, Columbia Earth Institute, New York.

<sup>4</sup> More recently, Dr. Rosenzweig has begun working with another group of scientists, the New York Climate and Health Project, whose goal is to focus attention on the smaller-scale impacts of Global Climate Change. To this end, they have begun orienting their intricate climate prediction models towards sections of the larger region no bigger than four square kilometers apiece. Results will be forthcoming, and bear notice. See Kirk Johnson, December 9, 2003, “So, How’s the Weather? Futuristic,” *The New York Times*, New York.

<sup>5</sup> Cynthia Rosenzweig and William D. Solecki (Editors), op. cit.

<sup>6</sup> Ibid., Executive Summary, page 3. The report, the work of a group of researchers, was prepared for the U.S. Global Change Research Program as part of the U.S. National Assessment of the Potential Consequences of Climate Variability and Change.

<sup>7</sup> Ibid., page 10.

<sup>8</sup> Ibid. See the section on *Drought* for current and historical information about droughts in the H<sub>2</sub>O Region. Tropical Storm Floyd (it was no longer a hurricane by the time it hit our area) caused \$1 billion in damage within the region.

<sup>9</sup> The organization Greening Gotham is preparing “How to” guides and case studies for would-be rooftop gardeners on their Web site, [www.GreeningGotham.org](http://www.GreeningGotham.org).

<sup>10</sup> Kirk Johnson, December 9, 2003, “So, How’s the Weather? Futuristic,” *The New York Times*, New York.

<sup>11</sup> Ibid.

- <sup>12</sup> Cynthia Rosenzweig and William D. Solecki (Editors), op. cit., page 3. The projections come from the United Kingdom's Hadley Centre and the Canadian Centre for Climate Modeling and Analysis.
- <sup>13</sup> Andrew Bridges, December 13, 2003, "Heat, Pollution Changing Precipitation," *Associated Press*; Environment News Service, December 12, 2003, "Cities Change Local Climates, May Affect Global Climate," San Francisco.
- <sup>14</sup> Cynthia Rosenzweig and William D. Solecki (Editors.), op. cit., page 4.
- <sup>15</sup> *Climate Change and the Global City*, Cynthia Rosenzweig and William D. Solecki (Editors), also takes a close look at Infrastructure, Wetlands, Water Supply, Public Health, and Institutional Decision-Making.
- <sup>16</sup> *Ibid.*, page xi.
- <sup>17</sup> *Ibid.*, page xi.
- <sup>18</sup> *Ibid.*, Executive Summary, page 4.
- <sup>19</sup> *Ibid.*, Executive Summary, pages 4 and 5.
- <sup>20</sup> *Ibid.*, Executive Summary, page 5.
- <sup>21</sup> *Ibid.*, pages xii.
- <sup>22</sup> E. Robert Thieler, et al., USGS, *National Assessment of Coastal Vulnerability to Sea-Level Rise*, <http://woodshole.er.usgs.gov/project-pages/cvi/> The criteria include tidal range, wave height, coastal slope, shoreline change, geomorphology, and the historical rate of relative sea-level rise.
- <sup>23</sup> Cynthia Rosenzweig and William D. Solecki (Editors), 2001, *Climate Change and a Global City: The Potential Consequences of Climate Variability and Change—Metro East Coast*, Executive Summary, page 6.
- <sup>24</sup> *Ibid.*
- <sup>25</sup> "Climate-change scenarios and an energy forecasting model project that daily peak load increases will range from seven to 12% in the 2020s, eight to 15% in the 2050s, and 11 to 17% in the 2080s." *Ibid.*
- <sup>26</sup> The quote and data in this paragraph is from New Jersey Future, 2000, *Living with the Future in Mind: Goals and Indicators for New Jersey's Quality of Life*, First Annual Update to the Sustainable State Project Report.
- <sup>27</sup> The indicator is an estimate of Greenhouse Gas emissions as no direct measure is available. The variable is constructed with fuel-use survey data for New Jersey obtained from the US

Department of Energy, Energy Information Agency. Data on solid waste from NJDEP rounds out the data for this indicator.

<sup>28</sup> New Jersey Department of Environmental Protection Administrative Order 1998-09, 1998, *New Jersey Department of Environmental Protection Strategic Plan*, NEPPS FY 99/00 Performance Partnership Agreement, “New Jersey Sustainability Greenhouse Gas Action Plan.”

<sup>29</sup> Cynthia Rosenzweig and William D. Solecki (Editors), 2001, *Climate Change and a Global City: The Potential Consequences of Climate Variability and Change—Metro East Coast*, Executive Summary, page 6.

<sup>30</sup> Andrew C. Revkin, September 15, 2002, “With White House Approval, E.P.A. Pollution Report Omits Global Warming Section,” *The New York Times*, New York.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

<sup>33</sup> Mark Jerome Walters, 2003, *Six Modern Plagues and How We Are Causing Them*, Shearwater Books, Island Press, Washington, D.C., page 4.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid., pages 7 and 8.

<sup>36</sup> Anthony J. McMichael et al, Editors, 2003, *Climate Change and Human Health—Risks and Responses*, World Health Organization, Geneva, Switzerland, in association with the World Meteorological Organization and the United Nations Environment Program.

<sup>37</sup> The story is adapted from Mark Jerome Walters, 2003, *Six Modern Plagues and How We Are Causing Them*, pages 127 through 146.

<sup>38</sup> Ibid., page 140.

<sup>39</sup> Quoted in *ibid.*, pages 145 and 146.

<sup>40</sup> The story is adapted from *ibid.*, pages 89 through 112.

<sup>41</sup> Ibid., page 97.

<sup>42</sup> Ibid., pages 98 to 99.

## CONCLUSION

<sup>1</sup> Joseph Berger, January 31, 2004, “O.K., What Flies Over Grant’s Tomb?,” *The New York Times*, New York.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Associated Press, March 5, 2004, “Road Closed So Salamanders Can Mate,” Associated Press, New York.

## APPENDICES

<sup>1</sup> Intergovernmental Panel on Climate Change (IPCC, 2001), “Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change,” <http://www.ipcc.ch/pub/spm22-01.pdf>

<sup>2</sup> Ibid.

<sup>3</sup> The report, *Climate Change and a Global City*, published in July 2001, was compiled by a group of researchers at the Columbia Earth Institute, as part of the U.S. Global Change Research Program. Its study area, the Metro East Coast Area, is larger than, but includes all of, the H2O Region; it contains 31 counties in three states—New Jersey, New York, and Connecticut.

<sup>4</sup> The full list of IPCC “level of confidence” terms is: “virtually certain” (a greater than 99% chance); “very likely” (a 90 to 99% chance); “likely” (a 66 to 90% chance); “medium likelihood” (a 33 to 66% chance); “unlikely” (a 10 to 33% chance); “very unlikely” (a one to 10% chance); “exceptionally unlikely” (a less than one percent chance).

<sup>5</sup> IPCC, 2001, “Summary for Policy Maker,” op. cit.

<sup>6</sup> IPCC, 2001, “Summary for Policy Makers,” page 7.