

SECTION 5 A FRAGILE FUTURE



Photograph by George M. Aronson

“Our responsibility to the Nation is to be more than careful stewards of the land. We must be constant catalysts for positive change.”

Gifford Pinchot, Forester



SECTION 5 A FRAGILE FUTURE

This study is the second study conducted by the USDA Forest Service since 1990 to assess land use and natural resource changes in the New York – New Jersey Highlands. Each study has reported continuing degradation of natural resources that affect the quality of life for more than 20 million people. Since 1992, some steps have been taken to conserve this nationally significant resource; however, more effort is needed to ensure the long-term sustainability of natural resources in the Highlands.

Over 11 million people depend on water flowing from and through the Highlands. Analysis of watersheds in the Highlands revealed that only 52 percent of the critical areas needed to provide this water are currently protected. Further losses or degradation of these lands can significantly affect the future quality and quantity available to residents and visitors. Similarly, additional growth pressure will increase not only the use of a limited resource, but also the amount of impervious surface, which increases surface runoff and reduces ground water recharge. Analysis identified five watersheds that may not meet future ground water demand with predicted consumption.

Continuation of existing patterns of land use change will also degrade terrestrial resources. Analysis of possible land use change in the Highlands identified 11 areas with significant resources as examples of places needing protection. These areas could be adversely affected by land use change through habitat fragmentation and deforestation. Not only would such change affect wildlife habitat conditions and biodiversity, but it would also affect water resources and recreational opportunities.

The Highlands are home to communities and people with distinctive histories. Current patterns of growth and development threaten the traditional character of the Highlands. The qualities that make this region special could be lost as it becomes built up and its distinctive communities are transformed into more homogeneous suburban areas.



The Highlands region contains a complex ecological and social system with characteristic physical, biotic, and social components. To sustain these characteristics, a holistic approach that integrates these components is needed. Because ecosystem processes cross jurisdictional and political boundaries, conservation measures must be applied not only at the local level but also at the landscape and regional levels. Funding is necessary to support the purchase of development rights or fee acquisition of critical areas; to continue monitoring natural resources and cultural attributes; and to support planning and management. These actions will be achievable only through funding from local, State, and Federal entities.

Without additional conservation efforts, the Highlands will be permanently changed, and the economic cost of supplying the ecosystem services and benefits now provided by the region would be substantial. Included would be the increased measurable costs for water treatment, public services, and infrastructure construction and maintenance. Less measurable costs would include increased stress on wildlife populations, reduced quality of life and access to recreation, and increased human health risks.

This report has identified strategies to conserve and protect the Highlands region while allowing for economic growth. Public agencies can provide some of the knowledge and funding necessary, but the implementation of these strategies will depend in large part on the involvement and commitment of residents and communities of the Highlands and communities that receive benefits from this region. Their actions will ultimately determine the future landscape in which they will live, work, and play.



APPENDIXES



Photograph by George M. Aronson

“Natural resources awaken in us ideals,
to be good stewards and good neighbors;
nature, in its complexity and beauty, reminds us
of our own individual potential.”

Robert Stanton, Director, National Park Service



APPENDIX A

LEGISLATIVE LANGUAGE FOR THE NEW YORK – NEW JERSEY HIGHLANDS REGIONAL STUDY AND UPDATE

Fiscal Year 2002 Language in House Committee Report

The following language appears in House Report 107-103, to accompany H.R. 2217; in the Department of the Interior and Related Agencies Appropriations Bill, 2002; Title II—Related Agencies; Department of Agriculture, Forest Service, State and Private Forestry:

The Committee notes its substantial investment in the Highlands area in New Jersey. This area encompasses over two million acres of environmentally unique and economically important lands. This area is the major source of clean drinking water to the New Jersey and New York metropolitan region as well as a critical wildlife habitat and a recreational resource for millions of people. The U.S. Forest Service is currently conducting an updated study of the Highlands region to help determine what remaining open space areas in the Highlands must be preserved. The entire region, in the backyard of the Nation's largest and most densely populated metropolitan areas, is under serious threat of development.

The Committee requests the Secretary of the Interior to join the Secretary of Agriculture in reviewing the findings of this study and report to the Committee on ways the Federal government can partner with State, county, local and private efforts to preserve critical lands within this nationally significant area in the Northeast. In the past two years, \$62,000,000 has been provided by these non-Federal entities to purchase critical areas within in the Highlands. The Committee believes that the Federal government should be a major partner in this preservation effort and recommends that the Secretaries consider as a model, the Sterling Forest project in the same region which has been a big success.

Fiscal Year 2001 Appropriations Language in House Conference Report (page 97) (for update of New York – New Jersey Highlands Regional Study)

Congress provided funding for the update of the New York – New Jersey Highlands Regional Study authorized by section 1244(b) of the Food, Agriculture, Conservation, and Trade Act of 1990 (104 Stat. 3547) in House Report 106-914 to accompany P.L. 106-291.



Fiscal Year 2001 Appropriations Act Language

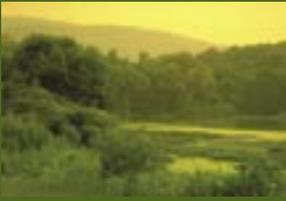
The following language appears in H.R. 4578 of the Department of the Interior and Related Agencies Appropriations Act, 2001 (Public Print); State and Private Forestry:

For necessary expenses of cooperating with and providing technical and financial assistance to States, territories, possessions, and others, and for forest health management, cooperative forestry, and education and land conservation activities, \$226,266,000, to remain available until expended, as authorized by law, of which not less than \$750,000 shall be available to complete an updated study of the New York – New Jersey Highlands under section 1244(b) of the Food, Agriculture, Conservation, and Trade Act of 1990 (104 Stat. 3547).

1990 Farm Bill Legislation (Sec. 1244 (b))

(b) NEW YORK – NEW JERSEY HIGHLANDS

- (1) IN GENERAL—The Secretary is authorized to conduct a study of the region known as the New York – New Jersey Highlands, located in the States of New York, New Jersey, and Pennsylvania, including the Sterling Forest in Orange County, New York.
- (2) SCOPE OF STUDY—The study authorized under this subsection (hereafter in this subsection referred to as the “study”) shall include an identification and assessment of--
 - (A) the physiographic boundaries of the region referred to in this subsection (hereafter in this subsection referred to as the “region”);
 - (B) forest resources of the region, including (but not limited to) timber and other forest products, fish and wildlife, lakes and rivers, and recreation;
 - (C) historical landownership patterns in the region and projected future landownership, management, and use, including future recreational demands and deficits and the potential economic benefits of recreation to the region;
 - (D) the likely impacts of changes in land and resource ownership, management, and use on traditional land use patterns in the region, including economic stability and employment, public use of private lands, natural integrity, and local culture and quality of life; and
 - (E) alternative conservation strategies to protect the long-term integrity and traditional uses of lands within the region.



APPENDIX A LEGISLATIVE LANGUAGE

(3) ALTERNATIVE CONSERVATION STRATEGIES—The alternative conservation strategies referred to in paragraph (2)(E) shall include a consideration of

- (A) sustained flow of renewable resources in a combination that will meet the present and future needs of society;
- (B) public access for recreation;
- (C) protection of fish and wildlife habitat;
- (D) preservation of biological diversity and critical natural areas; and
- (E) new local, State, or Federal designations.

(4) PUBLIC PARTICIPATION—In conducting the study, the Secretary shall provide an opportunity for public participation.

(5) APPROPRIATIONS—There are hereby authorized to be appropriated \$250,000 to carry out this subsection.



APPENDIX B MUNICIPALITIES AND COUNTIES

APPENDIX B

MUNICIPALITIES AND COUNTIES IN THE HIGHLANDS STUDY AREA

MUNICIPALITIES

A municipality was included in the study area even if only a portion of it fell within the study area boundary.

Municipality Name	Type	County	State
1. Alexandria	Township	Hunterdon	New Jersey
2. Allamuchy	Township	Warren	New Jersey
3. Alpha	Borough	Warren	New Jersey
4. Beacon	City	Dutchess	New York
5. Beekman	Town	Dutchess	New York
6. Belvidere	Town	Warren	New Jersey
7. Bernardsville	Borough	Somerset	New Jersey
8. Bethlehem	Township	Hunterdon	New Jersey
9. Bloomingdale	Borough	Passaic	New Jersey
10. Bloomsbury	Borough	Hunterdon	New Jersey
11. Boonton	Town	Morris	New Jersey
12. Boonton	Township	Morris	New Jersey
13. Butler	Borough	Morris	New Jersey
14. Byram	Township	Sussex	New Jersey
15. Califon	Borough	Hunterdon	New Jersey
16. Carmel	Town	Putnam	New York
17. Chester	Borough	Morris	New Jersey
18. Chester	Township	Morris	New Jersey
19. Clarkstown	Town	Rockland	New York
20. Clinton	Town	Hunterdon	New Jersey
21. Clinton	Township	Hunterdon	New Jersey
22. Cornwall	Town	Orange	New York
23. Cortlandt*	Town	Westchester	New York
24. Denville	Township	Morris	New Jersey
25. Dover	Town	Morris	New Jersey
26. East Fishkill	Town	Dutchess	New York
27. Far Hills	Borough	Somerset	New Jersey
28. Fishkill	Town	Dutchess	New York
29. Franklin	Borough	Sussex	New Jersey
30. Franklin	Township	Warren	New Jersey
31. Glen Gardner	Borough	Hunterdon	New Jersey

*The villages of Buchanan and Croton on Hudson were included as part of Cortlandt for this study and not listed separately because the U.S. Census aggregated the information for ease of analysis.



APPENDIX B MUNICIPALITIES AND COUNTIES

Municipality Name	Type	County	State
32. Greenwich	Township	Warren	New Jersey
33. Hackettstown	Town	Warren	New Jersey
34. Hamburg	Borough	Sussex	New Jersey
35. Hampton	Borough	Hunterdon	New Jersey
36. Hanover	Township	Morris	New Jersey
37. Harding	Township	Morris	New Jersey
38. Hardyston	Township	Sussex	New Jersey
39. Harmony	Township	Warren	New Jersey
40. Haverstraw	Town	Rockland	New York
41. High Bridge	Borough	Hunterdon	New Jersey
42. Highlands	Town	Orange	New York
43. Holland	Township	Hunterdon	New Jersey
44. Hopatcong	Borough	Sussex	New Jersey
45. Independence	Township	Warren	New Jersey
46. Jefferson	Township	Morris	New Jersey
47. Kent	Town	Putnam	New York
48. Kinnelon	Borough	Morris	New Jersey
49. Lebanon	Borough	Hunterdon	New Jersey
50. Lebanon	Township	Hunterdon	New Jersey
51. Liberty	Township	Warren	New Jersey
52. Lopatcong	Township	Warren	New Jersey
53. Mahwah	Township	Bergen	New Jersey
54. Mansfield	Township	Warren	New Jersey
55. Mendham	Borough	Morris	New Jersey
56. Mendham	Township	Morris	New Jersey
57. Milford	Borough	Hunterdon	New Jersey
58. Mine Hill	Township	Morris	New Jersey
59. Monroe	Town	Orange	New York
60. Montville	Township	Morris	New Jersey
61. Morris	Township	Morris	New Jersey
62. Morris Plains	Borough	Morris	New Jersey
63. Morristown	Town	Morris	New Jersey
64. Mount Arlington	Borough	Morris	New Jersey
65. Mount Olive	Township	Morris	New Jersey
66. Mountain Lakes	Borough	Morris	New Jersey
67. Netcong	Borough	Morris	New Jersey
68. Oakland	Borough	Bergen	New Jersey
69. Ogdensburg	Borough	Sussex	New Jersey
70. Oxford	Township	Warren	New Jersey
71. Parsippany-Troy Hills	Township	Morris	New Jersey
72. Patterson	Town	Putnam	New York
73. Pawling	Town	Dutchess	New York



APPENDIX B MUNICIPALITIES AND COUNTIES

Municipality Name	Type	County	State
74. Peapack and Gladstone	Borough	Somerset	New Jersey
75. Peekskill	City	Westchester	New York
76. Pequannock	Township	Morris	New Jersey
77. Philipstown	Town	Putnam	New York
78. Phillipsburg	Town	Warren	New Jersey
79. Pohatcong	Township	Warren	New Jersey
80. Pompton Lakes	Borough	Passaic	New Jersey
81. Putnam Valley	Town	Putnam	New York
82. Ramapo	Town	Rockland	New York
83. Randolph	Township	Morris	New Jersey
84. Ringwood	Borough	Passaic	New Jersey
85. Riverdale	Borough	Morris	New Jersey
86. Rockaway	Borough	Morris	New Jersey
87. Rockaway	Township	Morris	New Jersey
88. Roxbury	Township	Morris	New Jersey
89. Somers	Town	Westchester	New York
90. Southeast	Town	Putnam	New York
91. Sparta	Township	Sussex	New Jersey
92. Stanhope	Borough	Sussex	New Jersey
93. Stony Point	Town	Rockland	New York
94. Tewksbury	Township	Hunterdon	New Jersey
95. Tuxedo	Town	Orange	New York
96. Union	Township	Hunterdon	New Jersey
97. Vernon	Township	Sussex	New Jersey
98. Victory Gardens	Borough	Morris	New Jersey
99. Wanaque	Borough	Passaic	New Jersey
100. Warwick	Town	Orange	New York
101. Washington	Borough	Warren	New Jersey
102. Washington	Township	Morris	New Jersey
103. Washington	Township	Warren	New Jersey
104. West Milford	Township	Passaic	New Jersey
105. Wharton	Borough	Morris	New Jersey
106. White	Township	Warren	New Jersey
107. Woodbury	Town	Orange	New York
108. Yorktown	Town	Westchester	New York

**COUNTIES**

County Name	State
Bergen	New Jersey
Dutchess	New York
Hunterdon	New Jersey
Morris	New Jersey
Orange	New York
Passaic	New Jersey
Putnam	New York
Rockland	New York
Somerset	New Jersey
Sussex	New Jersey
Warren	New Jersey
Westchester	New York



APPENDIX C

ECOSYSTEM-BASED MANAGEMENT AND ECOLOGICAL CLASSIFICATION

This appendix describes a land classification system that can be used by decisionmakers, planners, and researchers for a holistic approach to natural resource planning and management in the New York – New Jersey Highlands.

ECOSYSTEM-BASED MANAGEMENT

People's actions affect ecosystems and vice versa. For example, people affect the amount of habitat for various plant and animal communities and chemical exposure. Importation of exotic pests is the result of international trade. Social and economic factors affect capital investments in environmentally friendly commerce, resource extraction, efficiency of resource utilization and the amount of resources directed to prevent or correct environmental problems.

Ecosystem-based management strives to maintain or restore the sustainability of ecosystems and to provide present and future generations a continuous flow of critical goods and services in a manner that is harmonious with ecosystem sustainability. This approach involves stepping back to provide a context for site-level planning and management. Ecosystem management harkens to the saying “an ounce of prevention is worth a pound of cure.” It means saving critical ecosystem components and functional linkages, and thinking about the social, economic, and ecological interactions that affect sustainability. For example, food and forest production are affected by such things as insects, disease, drought, erosion, nutrient availability, hail and wind damage, and viable populations of pollinator insects, which in turn can be affected by factors such as disease, predation, and toxic chemicals.

ECOLOGICAL CLASSIFICATION AND MAPPING

Scientists, natural resource managers, and concerned citizens are developing a better understanding of ecological processes and functions that are necessary to sustain ecosystems. A consistent land classification system is a valuable tool for integrating information needed to holistically manage important natural resources. Currently, different groups use systems designed for specific resources, such as forest cover types, soil types, and natural vegetation types. A classification that integrates aspects of these various systems provides a common frame of reference for the many people working on issues of land-use planning and management, and ecological sustainability. The USDA Forest Service's



APPENDIX C ECOLOGICAL CLASSIFICATION

National Hierarchical Framework of Ecological Units (Cleland and others 1997) provides such a land classification system.

The national hierarchy is a regionalization, classification, and mapping system for stratifying the earth into progressively smaller areas of more similar ecological potential. The national hierarchy consists of eight levels of nested map units identified according to a progressive left to right coding scheme. These multiple levels provide the flexibility to expand or contract to greater or lesser scales of complexity for ecosystem research, monitoring, environmental analysis, and planning. The entire Eastern United States has been mapped to the subsection level (Keys and others 1995). The levels as they apply in the Highlands, from largest to smallest, are as follows:

Humid Temperate Domain (200),
 Hot Continental Division (220),
 Eastern Broadleaf (Oceanic) Province (221),
 Lower New England Section (221A),
 NY-NJ Hudson Highlands Subsection (221Ae),
 Reading Prong Subsection (221Am),
 Land Type Association (LTA),
 Ecological Land Type (ELT), and
 Ecological Land Type Phase (ELTP).

Land type associations (LTAs) and ecological land types (ELTs) were developed concurrently with the Highlands study update. The New York – New Jersey Highlands Technical Report provides details on this component of the project. The USDA Forest Service, the New York State Department of Environmental Conservation and the New Jersey Division of Parks and Forestry plan to use ecological units to provide a permanent, electronic, spatially explicit framework to organize knowledge about the Highlands' ecosystems.

LTAs are landscape-scale units of similar ecological potential and response to disturbance and human activity. LTAs reflect land formations, soil processes, major forest types, successional trends, and forest productivity. To varying degrees, they incorporate differences in stream characteristics, wetlands, and features such as disturbance patterns. They also correspond to some groupings of natural communities that tend to reoccur together.

Nine LTAs were mapped within the bedrock-controlled landscape of the glaciated Hudson Highlands Subsection (221Ae) and the unglaciated Reading Prong Subsection (221Am) (Figure C-1). LTAs were not developed for those portions of the Highlands study in adjacent subsections. Some characteristics of the LTAs are displayed in Table C-1 and Table C-2. The New York – New Jersey Highlands Technical Report includes a more detailed characterization, but further study is needed to develop more specific prescription guidelines for various management activities, such as timber production, wildlife, intensive recreation, scenic views, and ecological reserves.



APPENDIX C ECOLOGICAL CLASSIFICATION

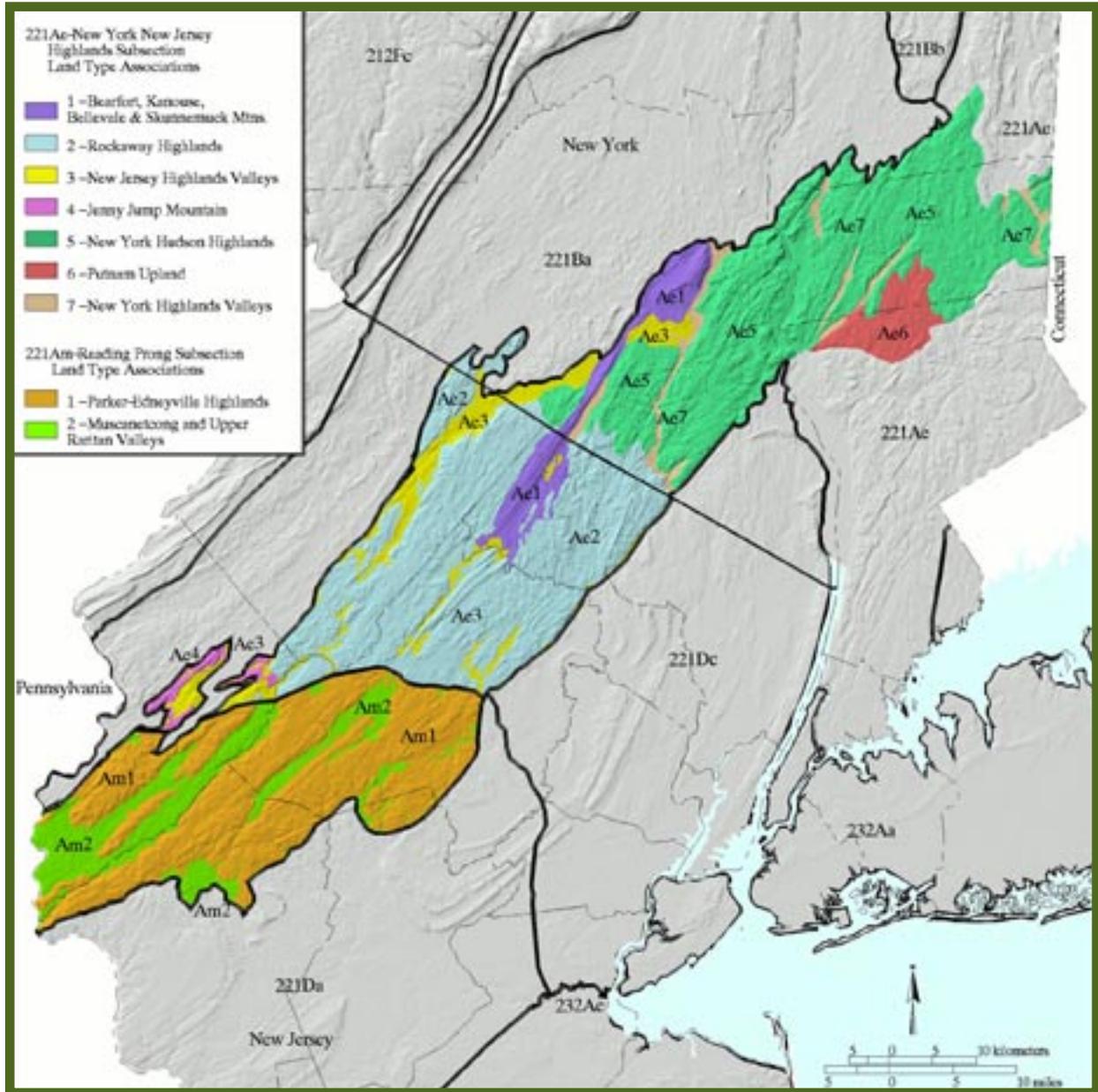


Figure C-1. Land Type Associations (LTAs) in the Highlands. LTAs were developed for the New York - New Jersey Highlands and the Reading Prong Subsections (Cleland and others 1997) during the study update, as a way to organize information about the Highlands. Subsections recognized on the map include these (Keys and others 1995):

- | | |
|---------------------------------------|---|
| 221Ae—New York - New Jersey Highlands | 221Bd—Kittatinny-Shawangunk Ridges |
| 221Am—Reading Prong | 221Da—Gettysburg Piedmont Lowland |
| 221Ba—Hudson Limestone Valley | 221Dc—Newark Piedmont |
| 221Bb—Taconic Foothills | 232Aa—Long Island Coastal Lowland and Moraine |

APPENDIX C ECOLOGICAL CLASSIFICATION

Table C-1. Land Type Associations (LTAs) in the New York – New Jersey Hudson Highlands Subsection (221Ae).

LTA	Name	General description*	Common tree species**
221Ae1	Bearfort, Kanouse, Bellevale and Skunnemunk Mountains.	400-1,600 ft in elevation, 44,890 acres. Current land use: 69% upland forest, 17% developed, 2% cultivated. Patterns of shallow, well and somewhat excessively drained soils and deep well-drained soils formed in glacial till and kame terraces. Bedrock outcrops are common. Bedrock includes conglomerate, gneiss, sandstone, shale, and granite.	Red oak, chestnut oak, scarlet oak, red maple, white oak, black birch, sugar maple, American beech, eastern hemlock, sassafras, black gum, white ash, pignut hickory, tulip tree.
221Ae2	Rockaway Highlands	500-1,200 ft in elevation, 280,290 acres. Current land use: 67% upland forest, 17% developed, 1% cultivated. Patterns of very deep well and moderately well-drained soils and shallow, well and somewhat excessively drained soils in uplands formed in glacial till and loamy calcareous till and rock outcrops. Bedrock includes gneiss, granite, and ultramafic rocks.	White oak, black oak, red oak, sugar maple, American beech, black birch, red maple, white ash, sassafras, tulip tree.
221Ae3	New Jersey Highlands Valleys	190-1,246 ft in elevation, 59,300 acres. Current land use: 31% upland forest, 29% developed, 13% cultivated. Patterns of deep and very deep, well and excessively drained soils formed in glacial and glaciofluvial deposits and alluvium. Bedrock includes dolostone, gneiss, granite and marble.	Red maple, tulip tree, red oak, sugar maple, American beech, black birch, red maple, white ash, sassafras, tulip tree.
221Ae4	Jenny Jump Mountain	360-1,144 ft in elevation, 9,325 acres. Current land use: 85% upland forest, 6% developed, 3% cultivated. Patterns of very deep, and somewhat excessively drained soils formed in, residuum, colluvium and glacial till and rock outcrops. Bedrock is granite and gneiss.	Chestnut oak, red maple, American beech, white oak, sugar maple, black oak, red oak, tulip tree, white ash, black birch, shagbark hickory, bitternut hickory, pignut hickory.
221Ae5	New York Hudson Highlands	0-1,400 ft in elevation, 285,010 acres. Current land use: 75% upland forest, 13% developed, 1% cultivated. Patterns of very deep, well-drained loamy soils to shallow soils formed in glacial till plains, kame deposits and bedrock outcrops. Bedrock includes gneiss, and amphibolite.	Red oak, chestnut oak, red maple, black birch, white oak, sugar maple, eastern hemlock, white ash, pignut hickory, black oak, tulip tree.
221Ae6	Putnam Deep Till Uplands	200-600 ft in elevation, 28,350 acres. Current land use: 33% upland forest, 49% developed, 3% cultivated. Patterns of very deep, well-drained loamy soils formed in glacial till, outwash sand and gravel and rock outcrops. Bedrock is predominately gneiss.	Red oak, sugar maple, red maple, white oak, white ash, black birch, American elm, black oak, tulip tree, chestnut oak, pignut hickory.
221Ae7	New York Highlands Outwash Valleys	300-700 ft in elevation and 50-300 ft in elevation by Hudson River, 22,155 acres. Current land use: 45% upland forest, 31% developed, 5% cultivated. Very deep, somewhat excessively and excessively drained soils formed in outwash sand and gravel, till, kame deposits, alluvium, and colluvium. Bedrock includes gneiss, dolostone, amphibolite.	Red maple, white ash, red oak, sugar maple, silver maple, tulip tree, black oak, green ash, American beech, cottonwood, sycamore.

*Most common components are listed first. Bedrock types are listed if they are more than 10 percent of the composition.

**Tree species were subjectively selected.



APPENDIX C ECOLOGICAL CLASSIFICATION

Table C-2. Land Type Associations (LTAs) in the Reading Prong Subsection (221Am).

LTA	Name	General description*	Common tree species**
221Am1	Parker-Edneyville Highlands	120-1,300 ft in elevation, 217,695 acres. Current land use: 54% upland forest, 24% developed, 13% cultivated. Very deep, somewhat excessively drained soils formed in residuum and colluvium. Bedrock includes granite, gneiss and ultramafic rocks.	White oak, black oak, northern red oak, sugar maple, American beech, black birch, red maple, white ash, tulip tree.
221Am2	Musconetcong and Upper Raritan Valleys	120-1,100 ft in elevation, 80,570 acres. Current land use: 16% upland forest, 29% developed, 38% cultivated. Patterns of deep, well-drained soils formed in old glacial drift, residuum and colluvium. Bedrock includes dolostone and shale.	Tulip tree, white ash, red maple, sugar maple, black birch, American beech, white oak, yellow birch, American elm, shagbark hickory.

*Most common components are listed first. Bedrock types are listed if they are more than 10 percent of the composition.

**Tree species were subjectively selected.

LTAs could be used as a framework for cooperation in the implementation of conservation measures to address concerns identified in the Highlands study update. LTAs can be used as an analysis framework to identify the impacts of varying distributions of land uses. An increasing number of State and private management and research organizations are using the National Hierarchy as a framework for study and as a tool to assist in adapting regional management guidelines to local and regional management conditions. Examples of uses of the smaller, more detailed Ecological Land Types and Ecological Land Type Phases include the application of silvicultural systems, and calibrating and applying timber growth and wildlife habitat models.

APPENDIX C REFERENCES

- Cleland, David T.; Avers, Peter E.; McNab, W. Henry; Jensen, Mark E.; Bailey, Robert G.; King, Thomas; Russell, Walter E. 1997. National hierarchical framework of ecological units. In: Boyce, Mark S.; Haney, Alan, eds. *Ecosystem management: applications for sustainable forest and wildlife resources*. New Haven, CT: Yale University Press; 200 p.
- Keys, James E., Jr.; Carpenter, Constance A.; Hooks, Susan L.; Koenig, Frank G.; McNab, W.; Henry, Russell; Walter, E.; Smith, Marie-Louise. 1995. *Ecological units of the eastern United States—first approximation (map and booklet of map unit tables)*. Atlanta, GA: U.S. Department of Agriculture, Forest Service. (Available on CD-ROM consisting of GIS coverage in ARCINFO format and map unit descriptions of subsection and sections.)



APPENDIX D

WORK PLAN AND BUDGET FOR THE STUDY UPDATE

A work plan was developed to complete the study update. This plan included a listing of the major steps in the process, a timeline, and budget for the use of Federal funds.

SUMMARY OF WORK PLAN

Major steps	Completion date
Complete study logistics	January 2001
Identify issues and study questions	March 2001
Initiate conservation projects*	June 2001
Data collection/assessment	September 2001
Analysis of data	November 2001
Identify conservation areas	January 2002
Draft study report	April 2002
Public comment period	April – May 2002
Final study report	December 2002

*The Land Conservation Project Program was initiated by the U.S. Department of Agriculture, Forest Service, to provide matching funds for pilot initiatives in New Jersey and New York Highlands communities that demonstrated the use of comprehensive resource information and involved collaborative land-use decisionmaking. See Appendix K for more information.

BUDGET

Expense	Amount
Salary	\$175,000
Operations	30,000
Assessment and analysis	425,000
Land conservation projects	100,000
Study report	20,000
Total	\$750,000



APPENDIX E

STUDY TEAM MEMBERS

The study team guided the process and provided the technical services and skills needed to conduct the study and prepare the report. Team members are listed in alphabetical order under their organization.

U.S. Department of Agriculture, Forest Service:

Mark Buccowich, landowner assistance program specialist
Connie Carpenter, sustainability coordinator
Martina Hoppe, regional planner
Marcus Phelps, study coordinator and forester
Wayne Zipperer, research forester

New York State Department of Environmental Conservation:

Stephanie Diamond, research assistant

Rutgers University, Grant F. Walton Center for Remote Sensing and Spatial Analysis:

Colleen Hatfield, assistant professor
Richard Lathrop, director
David Tulloch, assistant professor

U.S. Department of the Interior, Geological Survey:

Vince dePaul, hydrologist
Don Rice, hydrologist
Otto Zapecza, chief hydrologist

Regional Plan Association:

Robert Pirani, director of environmental programs

New Jersey Department of Environmental Protection:

Wayne Martin, regional forester

APPENDIX F

WORK GROUP MEMBERS

The work group members ensured a regional perspective, guided the study process, and commented on draft material as potential consumers of the study report and results.

- Mr. Roger Akeley, Planning Commissioner, Dutchess County (New York)
- Ms. Carol Ash, Executive Director, Palisades Interstate Park Commission
- Mr. James Barresi, State Forester, New Jersey Department of Environmental Protection
- Ms. Susan Bates, Executive Director, Hudson Highlands Land Trust
- Mr. Thomas Baxter, Executive Director, New Jersey Water Supply Authority
- Mr. Jim Beil, Assistant Director of Lands and Forests, New York State Department of Environmental Conservation
- Mr. Robert Bondi, County Executive, Putnam County (New York)
- Mr. Andrew Borisuk, private citizen
- Mr. William Borra, Chairman of Board of Directors, Builders Association of Northern New Jersey
- Mr. William Bzik, Director of Planning, Somerset County (New Jersey)
- Mr. Bradley Campbell, Commissioner, New Jersey Department of Environmental Protection
- Mr. John Capozucca, Chairman, Bloomingdale Environmental Commission (New Jersey)
- Ms. Bernadette Castro, Commissioner, New York State Office of Parks, Recreation, and Historic Preservation
- Mr. Michael Catania, State Director, Nature Conservancy of New Jersey
- Ms. Tracy Cates, private citizen
- The Honorable Hillary Rodham Clinton, United States Senate (New York)
- The Honorable Jon Corzine, United States Senate (New Jersey)
- Ms. Erin Crotty, Commissioner, New York State Department of Environmental Conservation
- Mr. Clifford Day, New Jersey Field Office Supervisor, United States Fish and Wildlife Service
- Mr. David Dech, Director of Planning, Warren County (New Jersey)
- Mr. Mario DelVicario, Chief of Community and Ecosystem Protection Branch, Environmental Protection Agency (New York)
- Mr. John Di Maio, Director, Board of Freeholders, Warren County (New Jersey)
- Mr. Tim Dillingham, private citizen
- Ms. Kathleen Donovan, County Clerk, Bergen County (New Jersey)
- Ms. Donna Drewes, Director, North Jersey Resource Conservation and Development



APPENDIX F WORK GROUP MEMBERS

- Ms. Sally Dudley, Executive Director, Association of New Jersey Environmental Commissions
- Mr. Frank Dunstan, Director, Division of Lands and Forests, New York State Department of Environmental Conservation
- Mr. Peter Eagler, Director, Board of Freeholders, Passaic County (New Jersey)
- Mr. Paul Elconin, Mid-Hudson Land Steward, Open Space Institute
- Ms. Ada Erik, member, Skylands Citizens for the Land, Environment, and Neighborhoods (CLEAN)
- Mr. Christopher Falcon, Vice Chair, Morris 2000
- Mr. Ronald Farr, Environmental Scientist, North Jersey District Water Supply Commission
- Ms. Ella Filippone, Executive Administrator, Passaic River Coalition
- Mr. Michael Flynn, Director of Intergovernmental Affairs, Senator Robert Torricelli's Office (New Jersey)
- The Honorable Rodney P. Frelinghuysen, United States House of Representatives (New Jersey)
- Mr. James Gaffney, Director, Watershed Division, Northeast Bureau, New Jersey Department of Environmental Protection
- Mr. Peter Garrison, Planning Commissioner, Orange County (New York)
- Mr. John Gebhards, Executive Director, Sterling Forest Partnership
- Ms. Sybill Gilbert, private citizen
- Mr. Thomas Gilbert, Executive Director, Highlands Coalition
- The Honorable Benjamin Gilman, United States House of Representatives (New York)
- Mr. Tom Gilmore, President, New Jersey Audubon Society
- Mr. Thomas Gissen, Executive Vice President, Ginsburg Development Corporation
- Mr. Edward Goodell, Executive Director, New York-New Jersey Trail Conference
- Ms. Erma Gormley, County Clerk, Sussex County (New Jersey)
- Ms. Joanne Harkins, Director of Land Use and Planning, New Jersey Builders Association
- The Honorable Maria Harley, Mayor, West Milford Township (New Jersey)
- Ms. Rose Harvey, Vice President, Trust For Public Land
- Ms. Helen Heinrich, Research Associate, New Jersey Farm Bureau
- Ms. Carmen Heitzman, President, Orange County Federation of Sportsmen's Clubs
- Ms. Elizabeth Herland, Refuge Manager, Wallkill River National Wildlife Refuge
- The Honorable Maurice Hinchey, United States House of Representatives (New York)
- The Honorable Rush Holt, United States House of Representatives (New Jersey)
- Mr. Howard Horowitz, Associate Professor, Ramapo College
- Mr. Anthony Houston, Town Supervisor, Town of Warwick (New York)
- Mr. George Howard, Executive Director, New Jersey State Federation of Sportsmen Clubs



APPENDIX F WORK GROUP MEMBERS

- Ms. Valerie Jewett, District Representative, Congressman Rodney Frelinghuysen's Office (New Jersey)
- Mr. Richard Jones, Planner, Department of Planning, Orange County (New York)
- Ms. Kim Kaiser, Highlands/GIS Project Director, Association of New Jersey Environmental Commissions
- Mr. Richard Kane, Consultant to the President, New Jersey Audubon Society
- Colonel Michael D. Kelley, Department of Geography and Environmental Engineering, United States Military Academy
- Mr. John Kellogg, Director of Planning, Hunterdon County (New Jersey)
- The Honorable Sue Kelly, United States House of Representatives (New York)
- Ms. Jane Kenny, Administrator, Region II, Environmental Protection Agency
- Mr. Ted Kerpez, Wildlife Manager, New York State Department of Environmental Conservation
- Mr. Walter P. Krich, Jr., Director of Planning and Development, Morris County (New Jersey)
- The Honorable John Krickus, Mayor, Washington Township (New Jersey)
- Ms. Joyce M. Lannert, Commissioner, Department of Planning, Westchester County (New York)
- Ms. Barbara Lawrence, Executive Director, New Jersey Future
- Ms. Mada Liebman, Senior Adviser, Senator Jon Corzine's Office (New Jersey)
- Mr. John J. Lynch, Director, Planning and Development, Putnam County (New York)
- Mr. Joseph Martens, President, Open Space Institute
- Mr. William Mazzuca, Town Supervisor, Philipstown (New York)
- Mr. Seth McKee, Executive Director, Scenic Hudson
- Ms. Kathy Moser, Executive Director, The Nature Conservancy
- Mr. George D. Muller, Director, Board of Freeholders, Hunterdon County (New Jersey)
- Ms. Barbara Murray, Senior Planner, Somerset County Planning Board (New Jersey)
- Ms. Diane Nelson, Trustee, Upper Rockaway River Watershed Association
- Ms. Margaret Nordstrom, Member, New Jersey State Planning Commission
- Mr. Jerry Notte, Principal, MWH – Montgomery, Watson, Harza
- The Honorable Craig A. Ollenschleger, Mayor, Bloomingdale Borough (New Jersey)
- Mr. Richard Osborn, Team Leader, Northwest Bureau, Green Acres
- Ms. Diane M. Paganelli, Executive Director, Morris 2000
- Mr. Jason Patrick, Scientist, Project Coordinator, Environmental Defense
- Ms. Michelle Powers, Principal Planner, Putnam County Planning Department (New York)
- Ms. Norma Ramos, Regional Representative, Sierra Club
- Mr. Joseph G. Rampe, County Executive, Orange County (New York)
- Mr. John L. Rigolizzo, Jr., President, New Jersey Farm Bureau
- Mr. James Rogers, Director of Planning, Passaic County (New Jersey)



APPENDIX F WORK GROUP MEMBERS

The Honorable Marge Roukema, United States House of Representatives
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Mr. J. Eric Scherer, River Navigator, American Heritage Rivers Initiative –
Hudson River

The Honorable Charles E. Schumer, United States Senate (New York)

Dr. William Schuster, Executive Director, The Black Rock Forest Consortium

Mr. Matthew Schwab, New York City Department of Environmental Protection

Mr. Herbert Simmons, Department of Community Affairs, New Jersey Office
of State Planning

Mr. Joseph Simoes, Planner, Rockland County Planning Department (New York)

Ms. Kathy Baker Skafidas, Executive Director, Skylands CLEAN

Mr. Zinneford Smith, Executive Director, Newark Watershed Corporation

Mr. Andrew J. Spano, County Executive, Westchester County (New York)

The Honorable Benjamin L. Spinelli, Mayor, Chester Township (New Jersey)

Ms. Barbara Spinweber, Environmental Scientist, United States Environmental
Protection Agency, Region II

Mr. Matt Sprung, Land Surveyor, Millennium Homes

Mr. William Steinhaus, County Executive, Dutchess County (New York)

Mr. Ira Stern, Director of Watershed Planning and Community Affairs, New York
City Department of Environmental Protection

Ms. Lisa Stern, Team Leader, Northeast Bureau, Green Acres

Mr. Eric Stiles, Vice President for Conservation and Stewardship, New Jersey
Audubon Society

Mr. Fred Suljic, Director of Planning, Sussex County (New Jersey)

Mr. James Tanner, Town Supervisor, Pawling (New York)

Mr. Jeffrey Tittel, Director, New Jersey Sierra Club

The Honorable Robert Torricelli, United States Senate (New Jersey)

Mr. James Tripp, General Counsel, Environmental Defense

Mr. Daniel Van Abs, Manager, Watershed Protection, New Jersey Water Supply
Authority

Mr. Michael Van Clef, Director of Science and Stewardship, Nature Conservancy
of New Jersey

Mr. C. Scott Vanderhoef, County Executive, Rockland County (New York)

Mr. Theodore Vandervleit, Director, Planning and Economic Development,
Bergen County (New Jersey)

Ms. Lisa Voyce, Water Supply Project Director, Association of New Jersey
Environmental Commissions

Ms. Barbara Walsh, Manager, Local Planning Assistance, New Jersey Office of
State Planning

Mr. Brian Walsh, Press Secretary and Legislative Assistant, Congressman
Benjamin Gilman's Office (New York)

Dr. James J. Yarmus, Commissioner of Planning, Rockland County (New York)

Mr. Robert Zaborowski, Director of Board of Freeholders, Somerset County
(New Jersey)

The Honorable Robert L. Zelle, Mayor, Greenwich Township (New Jersey)



APPENDIX G

PUBLIC COMMENTS ON THE DRAFT REPORT

PERSONS AND ORGANIZATIONS THAT SUBMITTED DETAILED COMMENTS

Names are listed in the order in which comments were received during the public comment period. The date corresponds to the date on the letter.

1. Senator Robert Torricelli, United States Senate, 4/22/02
2. Joseph Maraziti, New Jersey State Planning Commission, 4/18/02
3. Jane Geisler, Mid-Hudson Adirondack Mountain Club, 4/19/02
4. James Darrar, 4/19/02
5. Patti Lynch, 4/22/02
6. Robert Cherdack, 4/22/02
7. JoAnn Bowman, 4/23/02
8. Judy Strachan, 4/23/02
9. Tina Schvejda, New Jersey Sierra Club, 4/18/02
10. Janet Burnet, Town of Ramapo (NY) Parks and Recreation Foundation, 4/23/02
11. Seth McKee, Scenic Hudson, 4/23/02
12. Geoff Welch and Dorice Madronero, Rockland County (NY) Conservation Association, 4/23/02
13. Dave Colavito, 4/23/02
14. Debra Corr, Mid-Hudson Horse Trails Association, 4/23/02
15. Debra Corr, Town of Goshen (NY), 4/23/02
16. Thomas Gilbert, Highlands Coalition, 4/23/02
17. Diane Nelson, Upper Rockaway River Watershed Association, 4/22/02
18. Lorraine Caruso, League to Save Open Space, 4/22/02
19. James Daley, Eastern Forest Partnership, 4/22/02
20. Russell Felter, Pyramid Mountain Committee, 4/22/02
21. Jason Patrick, Environmental Defense, 4/22/02
22. Thomas Dallesio, Regional Plan Association, 4/22/02
23. Barbara Murray, Somerset County (NJ), 4/24/02
24. Joanne Harkins, New Jersey Builders Association, 4/25/02
25. Ross Kushner, Pequannock River Coalition, 4/24/02
26. John Arbo, 4/25/02
27. Anthony Rego, 4/23/02
28. J. Thomas White, 4/24/02
29. Fred Akers, 4/24/02
30. Mary Kuhner, 4/26/02
31. N. McLaughlin, 4/25/02
32. Dan Van Abs, New Jersey Water Supply Authority, 4/25/02



APPENDIX G PUBLIC COMMENTS ON THE DRAFT REPORT

33. Thomas Baptist, Audubon Connecticut, 4/26/02
34. Barbara Snyder, 4/29/02
35. Nancy Critchley, 4/26/02
36. Robert A. Kelly, 5/1/02
37. Lisa Voyce, ANJEC, 5/2/02
38. Lawrence Wolfson, 4/29/02
39. Carl Pauli, 4/28/02
40. Philip Smith, Schoor DePalma, 4/23/02
41. Jane Tousman, 4/26/02
42. Barbara Walsh, New Jersey Office of State Planning, 5/2/02
43. Eric Antebi, Appalachian Mountain Club, 4/23/02
44. Matt Sprung, New Jersey Builders Association, 5/2/02
45. Sibyll Gilbert, Oblong Land Conservancy, 4/30/02
46. Lucy Meyer, Pyramid Mountain Committee, 5/2/02
47. Faith Teeple, 4/30/02
48. Lorraine Stephens, 4/26/02
49. Erna Masone, 5/2/02
50. Lucy Thomson, 4/28/02
51. Mary McGiller, 4/28/02
52. Clare Wharton, 4/29/02
53. M.N., 4/29/02
54. Robert Bzik, Somerset County (NJ) Planning Board, 5/2/02
55. Jim DeStephano, 5/1/02
56. George Krevet, 4/29/02
57. Patricia Rogers, 4/30/02
58. Josephine Heimers, 5/2/02
59. Gayle Hendrix, 5/2/02
60. Edward Heimers, 4/30/02
61. Robbie Oxnand, 4/29/02
62. Mimi Starrett, 4/29/02
63. Bradley Campbell, New Jersey Department of Environmental Protection, 5/3/02
64. John Rigolizzo, New Jersey Farm Bureau, 5/2/02
65. Fred Suljic, Sussex County (NJ) Department of Engineering and Planning, 5/3/02
66. David Dech, Warren County (NJ) Planning Department, 5/1/02
67. Kathy Baker Skafidas, Skylands Citizens for the Land, Environment and Neighborhoods (CLEAN), 5/2/02
68. Richard Whiteford, 5/1/02
69. Paul Elconin, Open Space Institute, 5/3/02
70. Cathy McCartney, Mountain Preservation Society, 4/27/02
71. Carol Spencer, 5/3/02
72. Maureen Ogden, 5/2/02
73. Pieter Prall, 5/2/02



APPENDIX G PUBLIC COMMENTS ON THE DRAFT REPORT

74. Charles Kopp, 5/2/02
75. Darlene Warga, 4/30/02
76. Dalous LaRusso, 5/1/02
77. Michele S. Byers, New Jersey Conservation Foundation, 5/3/02
78. Ella Filippone, Passaic River Coalition, 5/3/02
79. Robert Herberger, New York State Department of Environmental Conservation, 5/1/02
80. Neil Woodworth, Adirondack Mountain Club, 5/3/02
81. Laurie Wallace, Friends of the Great Swamp, 5/2/02
82. Martin Treat, Friends of the Sparta Mountain, 5/3/02
83. Craig Ollenschleger, Borough of Bloomingdale (NJ), 5/7/02
84. Judy Hoyer, 5/3/02
85. Warren Marshall, 4/30/02
86. Eric Stiles, New Jersey Audubon Society, 5/3/02
87. Justin Bloom, Riverkeeper, 5/3/02
88. George Horzepa, New Jersey Department of Agriculture, 5/3/02
89. Tom Gilbert, Highlands Coalition, 5/3/02
90. Raymond Zabihach, Morris County (NJ) Planning Board, 5/6/02
91. Joe Simoes, Rockland County (NY) Planning Board, 5/3/02
92. Clifford Day, US Fish and Wildlife Service, 5/8/02
93. Sandra Cohen, NJ Department of Environmental Protection, Division of Watershed Management, 5/8/02
94. Public Listening Session transcript from April 22 and 23, 2002, 5/10/02

SUMMARY OF PUBLIC COMMENTS

Comments that emerged were categorized into the following sections: land resources, water resources, future change scenarios, conservation values assessment, conservation “gap” analysis (resources at risk), conservation strategies, and general comments.

Land Resources

- Focus more on farm assessment portion of study.
- Focus more on importance of wildlife and biodiversity.
- Emphasize importance of forest protection.
- Explain extent and impacts of acid rain and nitrogen deposition on forest health.
- Explain cumulative impact of pests, deer, and pollution on forest health.
- Provide workable solutions for management of invasive and exotic species.
- Show specific core areas of forest habitat loss.
- Show extent of large contiguous tracts of unprotected forest habitat.



Water Resources

- Estimate water demand and supply for persons outside the Highlands relying on Highlands water.
- Estimate number of people who depend on Highlands aquifers and reservoirs to include water that flows through the Croton watershed, and an estimate of the Highlands' contribution to the Raritan and Delaware systems.
- Manage drought and flood conditions in the region.
- Measure status of water resources.
- Include information on the importance of enhancing recharge, not just minimizing impervious surface.
- Revise regional water budget to give credit for discharges back into Highlands streams if this water is from outside the Highlands study area.
- Emphasize negative impact of impervious surfaces.
- Consider economics of providing water services and replacing natural water resources.

Future Change Scenarios

- Identify locations within the region that should be designated to provide housing and jobs.

Conservation “Gap” Analysis (retitled Resources at Risk in the final report)

- Provide greater detail on Conservation Values Assessment (CVA).
- Protect areas designated as high priority for water, forestry, biodiversity, agriculture, and recreation.
- Approximate costs of acquiring major gap areas (“gap” areas retitled “conservation focal areas” in the final report).
- Examine priority areas to avoid overlap with existing State and Federal transportation and infrastructure investments.
- Include New York’s Great Swamp as a major gap area (“gap” areas retitled “conservation focal areas” in the final report).
- Include acreage amounts in addition to percentages for gap figures (“gap” areas retitled “conservation focal areas” in the final report).

Conservation Strategies

- Strengthen the Forest Service’s role in planning, land acquisition, and stewardship.
- Designate remaining acres in the Highlands as a National Forest.
- Establish predictable funding sources from Federal, State, county, and local government levels for land acquisition.
- Help local communities and farm landowners balance growth and economic viability with environmental protection.

**APPENDIX G PUBLIC COMMENTS ON THE DRAFT REPORT**

- Develop strong recommendations and tie them to the assessment findings.
- Create new planning paradigms such as regional compacts and regional planning organizations.
- Coordinate land use planning in Highlands through cooperation of regional, State, county and local entities.
- Promote smart growth principles on the local level with Federal assistance for economic development, affordable housing and open space preservation.
- Emphasize the national significance of the Highlands.
- Measure how open space and land use elements in municipal and county master plans are consistent with Highlands study.
- Develop a Highlands report card with input from stakeholders to ensure success.
- Set specific targets with benchmarks for measuring success in the Highlands.
- Emphasize water protection strategies.
- Emphasize the impact of the drought on water resources.

General Comments

- Provide more technical data and critical review of representations and recommendations.
- Describe data sources, analysis and methodology more fully.
- Explain what the report does not assess.



APPENDIX H

TOPICS IN THE NEW YORK – NEW JERSEY HIGHLANDS TECHNICAL REPORT

The New York – New Jersey Highlands Technical Report supplements the New York – New Jersey Highlands Regional Study: 2002 Update. The technical report provides greater detail on the data sources, methodology, and results of the resource assessment and on analyses conducted as part of the study process. The technical report enables readers to access and view the scientific information and files used to prepare this study update. Information about how to obtain a copy of the technical report is on the Highlands Web site at www.fs.fed.us/na/highlands. Interested persons may also contact the USDA Forest Service at 610-557-4124.

The Technical Report includes the following topics:

Resource Assessment

Water

Ground Water

Aquifer information including ground water use data, domestic water use, trends in ground water levels, and data availability from Web sites.

Surface Water

Streamflow information from gauging stations, surface water use data, and data availability from Web sites.

Water Budget

Watershed analysis by Hydrologic Unit Codes 11 and 14, explanation of the watershed model, and watershed budget calculations and related effects of land use change scenarios.

Water Quality

Background water quality information, water quality trends, and data availability from Web sites.

Forest and Timber

Status of forests and timber resources including USDA Forest Service Forest Inventory and Analysis data on forest types, timber volumes, and growth and removals.

Forest Health

Information on forest pests, stresses on forest condition, and current trends in forest health.



APPENDIX H TOPICS IN THE TECHNICAL REPORT

Forest Land Ownership

Forest landowner survey data, trends in forest land ownership, and the availability of National Woodland Owner Survey information on the internet.

Biodiversity

Status of biodiversity including animal and plant species, spatial distribution of habitats, and community diversity analysis.

Recreation and Open Space

Documentation of recreational resources of regional importance, database of publicly and privately owned open space, recreational use data, and viewshed analysis.

Farmland

Status and trends of agriculture and farmland, spatial distribution of farmland and prime farm soil, and acreage estimates.

Ecosystem-Based Management and Ecological Classification

Explanation and application of the ecological classification system, results of the ecological unit mapping process in the Highlands, and ecological unit descriptions.

Conservation Values Assessment

Explanation of the methodology used for the Conservation Values Assessment, discussion of resource values, and tabular and map display of analysis results.

Potential Changes and Resources at Risk

Population

Population and selected demographic information on the Highlands using 1990 and 2000 data, summary statistics, tabular results, and maps for display.

Build-out Analysis

Explanation of methodology used to analyze land use and population change for future land use scenarios, description of high and low constraint scenarios, and associated maps.

Likelihood of Land-Use Change: Econometric Modeling

Explanation of the methodology used to identify areas of likely future change based on an econometric model, description of the variables used for the analysis, and tabular and map displays of the likelihood of change.

Changes in Land Use and Land Cover



Description of method used for land cover mapping, comparison of 1972, 1984, 1995 and 2000 land cover, and tabular and map display of analysis results.

Landscape Indicators of Forest and Watershed Integrity

Description of indicators, analysis of build-out scenarios by Hydrologic Unit Code for selected time periods, and maps of predicted change.

Resources at Risk

Explanation of methodology for comparing existing protected resources with assessed need, tabular results, and maps showing the spatial distribution of the conservation focal areas.