(final draft Anderson7/06)

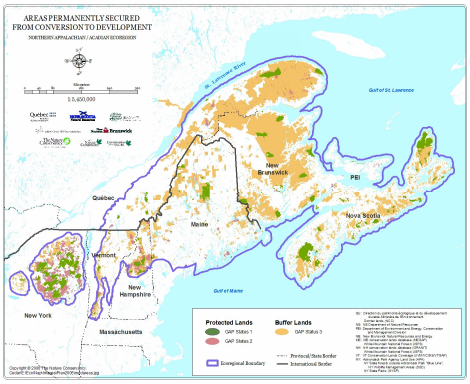
The Northern Appalachian / Acadian Ecoregion: Conservation Assessment

Status and Trends: 2006

Ecosystems

Species

Streams



Land

The Nature Conservancy: Eastern Regional Science
in collaboration with
The Nature Conservancy of Canada: Atlantic and Quebec regions
M. G. Anderson, B. Vickery, M. Gorman, L. Gratton,
M. Morrison, J. Maillet, A. Olivero, C. Ferree, D. Morse, G. Kehm, K. Rosalska

• KEY MESSAGES

Seven percent of the region is exclusively devoted to biodiversity protection. Another 28 percent is secured from conversion to development. Most secured lands are in the mountainous areas. Coastal regions and lowland valleys are the least protected.

The proportion of land secured from conversion to development is three times greater than that of land converted to agriculture or development. This is the only ecoregion in Eastern North America where land secured against conversion is proportionally higher than converted lands. Most likely this is due to the prominence of the forest products economy that has maintained forest cover across the region and slowed conversion to agriculture.

Large carnivores such as the wolf and mountain lion have been extirpated from the region. Another 148 endemic species (plants, vertebrates and invertebrates) are identified as specific conservation priorities because their populations are too small or few, or are declining too fast, to rely on broad-scale ecosystem protection alone as a conservation strategy. Of these 62% have fewer than ten protected populations.

Contiguous and ecologically complete forest ecosystems that once dominated the region are now largely young, simplified and increasingly fragmented by roads and development. Some 174 priority areas were identified that still maintain relatively intact interior forest systems over 25,000 acres in size. However only, twenty-eight percent of these have core protected areas on a scale that could maintain these ecosystems.

Forest cover has been increasing since the extensive deforestation of the 19th century. As a result, excluding developed land, agricultural land and roads, the remaining areas with over 80 percent natural cover amount to over 50% percent of the region. The Northern Appalachian / Acadian ecoregion is the most intact ecoregion in the eastern US and contains the broadest extent of nearly contiguous natural forest.

Non-forested upland ecosystems harbor extensive biodiversity. Over 400 sites containing 6000-plus examples, of beaches, barrens and alpine balds, grassy openings, stunted woodlands and stands of distinct forest types have been targeted for conservation. Of these, only very high elevation areas and serpentine bedrock features are over 50% protected for biodiversity. Protection of key places for coastal dunes and shores, acidic and calcareous barrens, and clay-plain forests are all below 30%

Critical wetland ecosystems have considerably less explicit protection than their upland counterparts, averaging 13%. Acidic wetlands, such as peatlands, enjoy the highest level of protection with about 37% protected for biodiversity. Floodplain and riverside systems as well as coastal and tidal wetlands all have less than 20% of their best examples on protected lands.

Conservation in this ecoregion is a collective effort. The protection of large contiguous areas of forest from conversion is mostly on state and provincial lands. Conservation of rare species and ecosystems is the result of actions by dozens of different public agencies and private organizations. Private ownerships account for 4% of the land protected for biodiversity in the ecoregion. Three quarters of that is attributable to The Nature Conservancy and the Nature Conservancy of Canada.

Threats to this region are on the rise. While in general the ecoregion is less threatened by housing development than other regions in the east, coastal and floodplain ecosystems are vulnerable to intense pressure in the next half-century. Further, there are emerging threats that cannot be prevented by land protection alone, such as impacts from atmospheric deposition, climate change, and invasive species, especially forest tree pathogens. These will require new conservation strategies.

KEY TERMS

Defining "Secured," "Protected" and "Managed"
The region encompasses many states and provinces with their own distinctive land use and ownership patterns, as well as institutional contexts. Our goal was to assess the conservation status of these lands and identify areas that were intended (by policy and practice) to contribute toward biodiversity conservation. We conducted a multi-jurisdictional review that used a standard framework to compare natural areas across administrative and political boundaries

As scientists and conservationists we agreed on conventions for talking about, mapping, and analyzing Land Status. The terms **Secured,** and **Protected** were very problematic. Our conventions are explained below:

Lands Permanently Secured against Conversion to Development (PSCD). This designation does not imply any specific biodiversity value other than ownership or restrictions that prevent land from being converted to development. Most secured lands are managed for extraction and/or recreation and some are managed very poorly. Secured lands are largely public lands subject to policy restrictions but they include some private management easements. Volunteer conservation lands or land under forest certification are not included under this heading as they have no permanent status and can be withdrawn at any time. Although we use the term permanence it is understood that the term is a hopeful one as it is theoretically possible to undue the protection of virtually any land in the region. For example, there may be provisions within state, crown or private conservation lands that allow it to be sold to new owners with lesser restrictions.

The PSCD lands are subdivided in to three levels of management status, with progressively less biodiversity focus. We classified the 3 groups into two basic levels: Protected and Secured

Protected (P): refers throughout this document to GAP 1 and GAP 2 lands. **GAP 1** lands are explicitly protected for biodiversity with a management plan to ensure this purpose and to allow for natural processes to occur freely (nature reserves, research natural areas). **GAP 2** lands are explicitly conserved for biodiversity but allow for alterations of natural processes, artificial manipulations and multiple uses (wildlife refuges, some US national parks).

Secured (S): refers throughout this document to lands that are secured only, and equal to a **GAP 3** status. Mostly they are public lands subject to extractive practices such as logging but governed to policy restrictions such as maintaining stream buffer areas (Crown lands, state forests). GAP 3 land will remain in primarily natural cover and is likely to play an important supporting role in maintaining biodiversity. Public managed lands are included here but commercially managed lands owned by private companies are not.

The shorthand used throughout this report is given below. We defined no standard meaning for "**Managed"**

Protected (P) = GAP 1, 2
Secured only (S) = GAP 3
Total Secured (P+S) = GAP 1,2,3

Our rules for assigning a value to a tract of land were consistent with the US GAP program in that:

- Management regime rather than institutional authority, mandate or ownership type would be the primary determinant in assigning status.
- Management intent (e.g., maintaining forest cover) would be used to define status, rather than the legal designation (e.g., protected area)
- Management effectiveness would not be measured, i.e., whether the management objectives or prescription had achieved the desired outcome.

Other terms The terms "occurrence", "example" and "element" may also require clarification.

Occurrence: Area of land and/or water where a species or natural community is, or was, present and has practical conservation value. For species these are often mapped locations of persistent breeding sites. For ecosystems and communities the word **Example** is sometime used as a synonym, as in "the best example of a floodplain forest". *see Natural Heritage Methodology.*

Element: Unit of natural biological diversity, representing species, ecological communities, ecological systems, or biological entities, such as migratory species aggregation areas.

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Acknowledgements

Ecoregional Core Team

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Invertebrates: Barbara Vickery, Josette Maillet, Paul Brunelle, Mark Elderkin, Dwayne Sabine, Reg Webster, Phillip DeMaynadier, Paul Novak, John Roe, Rose Paul, Mark Ferguson.

Plants: Josh Royte, Louise Gratton, Jacques Labrecque, Gildo Lavoie, Maureen Toner, Sean Blaney, Marian Munro, Gart Bishop, Dwayne Sabine, Mark Elderkin, Kate MacQuarrie

Forests, Terrestrial, Palustrine and Estuarine Ecosystems: Mark Anderson, Louise Gratton, Vince Zelazny, Judy Loo, Sean Basquill, Peter Neily, Kate MacQuarrie, Jon Hutchinson, Eric Sorenson, Liz Thompson, David Hunt, Greg Edinger, Doug Bechtel, Dan Sperduto, Stephanie Neid, Sue Gawler, Andy Cutko, Josh Royte.

Ecoregional Secured-Lands Team
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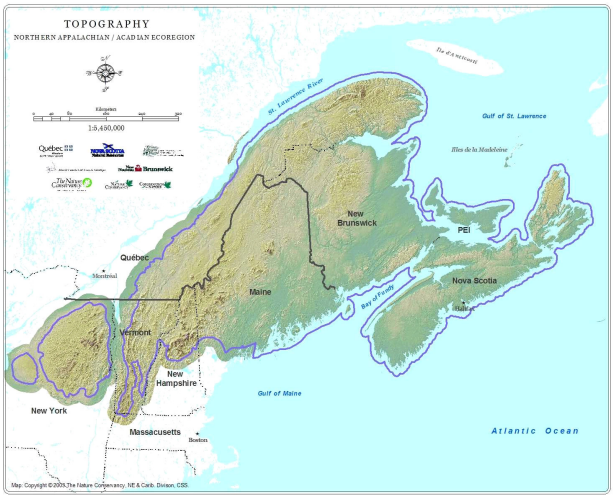
(final draft Anderson 06)

• Introduction

This report aims to measure and summarize the status of Nature Conservation in the Northern Appalachian / Acadian Ecoregion. Using sophisticated quantitative and spatial analysis techniques, it summarizes three decades of ecological inventory data, geological, hydrological, and landcover mapping, advanced predictive modeling techniques, and expert knowledge from the abundant store of academic, state, provincial and privately based conservation scientists in the region.

In particular, this analysis reports the results of The Nature Conservancy and the Nature Conservancy of Canada's **Ecoregional Assessment** completed over the last 3 years by a team of scientists representing many different institutions and areas of expertise. Additionally, it utilizes the Conservancy's recently compiled **Secured and Protected Lands data base** representing over 150,000 tracts of land in the eastern US and maritime Canada that have conservation value.

The Northern Appalachian / Acadian Ecoregion



The extent of the ecoregion is shown above. The 83 million acre area includes four Northeastern States, three Canadian Maritime Provinces and the portion of Quebec from the St. Lawrence river southward. It is a region of immense physical diversity from windswept alpine mountains to rugged rocky shoreline. Almost entirely forested, the region contains a wide range of bedrock types, landforms, elevation gradients, and an estimated 3,844 species of mammals, reptiles, amphibians, birds, plants, and macro-invertebrates. *Detailed information on the ecoregion assessment and each of the target ecosystems and species may be found in the full document contained on the accompanying CD*

Our goal in this assessment was a rigorous, repeatable identification of the most critical ecological features of the region, and a consistent, transparent rendering of trends. For brevity we report most numbers, the majority of which are averages, without their standard deviations, variances and error bars. Instead we emphasize trends and comparisons by reporting in percentages or broad categories. This flattens out the endless small variations in the precise numbers while having little or no effect on the distribution patterns.

We hope this document serves as an initial benchmark against which we may measure, focus and improve our conservation efforts in this remarkable region.

Ecoregional Statistics

- Total Acres = 82,865,628
- Forest 83%
- Wetlands 4%
- Water 11%
- Natural cover 97%
- Developed 3%
- Agriculture 22%
- GAP:1,2 land 7%
- GAP:3 land 28%
- Rare species = 523
- All plants, vertebrates and macro invertebrate species = 3,844

What We Hoped to Achieve:

In a populated, highly managed, but resilient region such as this one, our hope is to maintain all of the region's native species, ecosystems and dynamic processes using a small, but strategically chosen, portion of the landscape. Designing the plan required enough detail to ensure that every place, population and feature selected for the portfolio was critically judged by its potential biotic impact on the larger landscape. The results reveal patterns of diversity and threats that suggest inventive strategies for improved conservation. Our hope is that the portfolio, when conserved, will maintain all biodiversity across the ecoregion.

An International Team:

The assessment team consisted of seven key scientists and planners, three from the US- based Nature Conservancy (TNC) and four from the Nature Conservancy of Canada (NCC), each of who contributed a portion of their time. The team was convened in 2003 by TNC's Regional Director of Conservation Science, Dr. Mark Anderson and consisted of three geographic co-leaders, Barbara Vickery for the US, Martha Gorman for Maritime Canada and Louise Gratton for Quebec. Greg Kehm, Charles Ferree, and Arlene Olivero from TNC's Eastern Regional Office and Josette Maillet, Kasia Rozalska and Margo Morrison, from the Atlantic Canada Regional Office, provided technical support.

Additional core team members included Kara Brodribb and John Riley of NCC, Vince Zelazny of the New Brunswick DNR, Prince Edward Island: Rosemary Curley, Bill Glenn, Mary Lynn McCourt from Prince Edward Island DAF, David MacKinnon and Robert Cameron of Nova Scotia DEL, Sean Basquill of ACCDC and Peter Neily of Nova Scotia DNR. The core team provided the leadership for the technical teams whose memberships are listed in the individual chapters.

Challenges to Achieving Our Goals: Capacity and Data overflow

The Northern Appalachian / Acadian Ecoregion is an extensively studied ecoregion and there is much available data. Numerous private and public agencies monitor forest and wetland resources, breeding bird population, lynx trapping and other aspects of biodiversity. US state-based Natural Heritage Programs and Canadian Conservation Data Centres track over 18,000 individual occurrences of "elements of diversity." Quantitative information on threats and constraints such as roads, dams, toxic release points, housing density and population growth are readily available.

The challenge of acquiring, deciphering, compiling and quality controlling data across four states and four Canadian provinces was constant and time consuming. Facilitating collaboration across countries, maintaining relationships and renegotiating data sharing MOUs with provincial and state programs was likewise demanding.

A key tenet of this effort was to maximize the utility of our products to other organizations by providing a comprehensive and scrupulously objective analysis of the biodiversity targets in the ecoregion. We expect that many other organizations and partners will access the data, study the analysis and draw their own conclusions.

• BASIC PRINCIPLES

This report aims to answer the question – *Where are, and how protected are, the places that sustain the biodiversity of the region?* Some places harbor unique features or rare populations; others have the best examples of common or representative ecosystem types, and still others have large and influential remnants of once contiguous forest. All of these places are important in maintaining biodiversity and natural processes across the entire region.

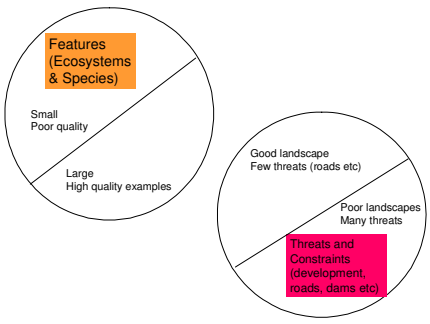
To assess the conservation status we examined the condition and spatial configuration of three factors:

- Conservation features
- Existing threats and constraints
- Land management status

The intersection of the first two factors produced what we refer to as the portfolio of critical occurrences (Figure 1 and 2). The portfolio is our best estimate of the most important places to protect to conserve all biodiversity. Adding the third factor (Figure 3 and 4) allowed us to determine the protection status of the lands that the critical features occur on to gauge where we stand with respect to the conservation of nature.

We developed comprehensive information concerning these three factors. Each data layer was obtained from the state or province, compiled for the region using comparable criteria, and maintained in a GIS framework. US Heritage programs and Canadian Conservation Data Centers provided ground inventory points with detailed information on rare species and community types.

Figure 1. The universe of conservation features within a region includes all examples of ecosystems, species, stream networks and special features. Some examples are robust, high quality examples with a large influence on the landscape – others are small and poor quality.



Likewise the landscape itself has regions that are functionally intact with few roads, little development, high amounts of natural cover and few threats. Other regions are highly fragmented and degraded by numerous factors.

Figure 2. The intersection of high quality examples with intact landscapes/low threats defines The Nature Conservancy's portfolio of critical examples

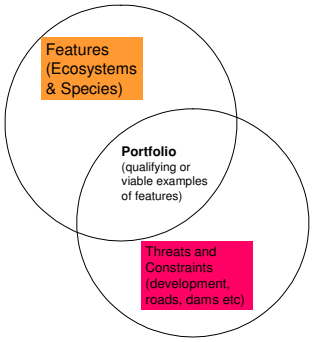


Figure 3. The third circle denotes the management status of land. Some lands are permanently dedicated to biodiversity conservation; others are only secured against conversion; most are unprotected.

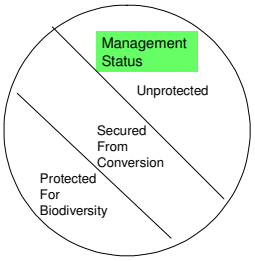
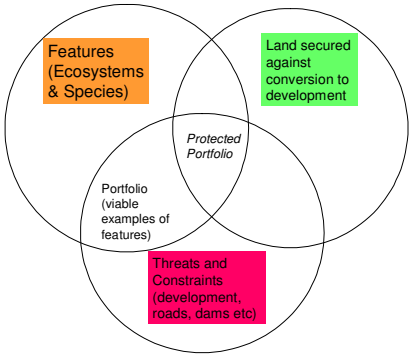


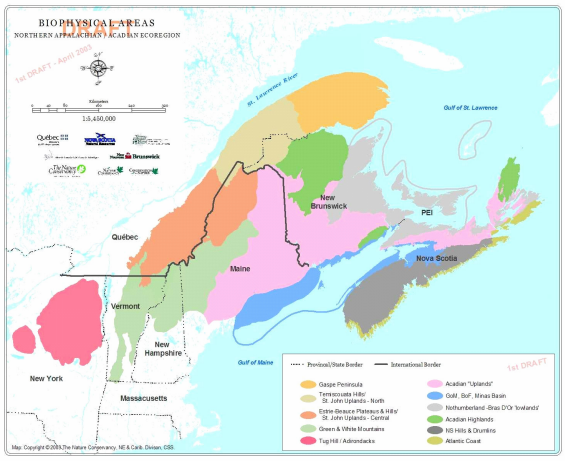
Figure 4. The intersection of these three dimensions, the **secured portfolio**, is the basis of this report on the conservation status of the region.



Northern Appalachian / Acadian Ecoregion

(final draft Anderson 06)

- **THE ECOREGION**



The map shows the subregions of the Ecoregion (full version in map appendix).

Location and Physiography:

The Northern Appalachian-Acadian (NAP) Ecoregion extends from the Tug Hill and Adirondack ranges of New York, across the Green Mountains of Vermont and the White Mountains of New Hampshire, into Maine and Maritime Canada. It includes all the provinces of New Brunswick, Nova Scotia, and Prince Edward Island, as well as Îles-de-la-Madeleine (Magdalene Islands) and the part of Quebec extending from the Gaspé Peninsula, southwesterly through the Appalachian complex of eastern Quebec to the United States border, south of Sherbrooke. (**See the Atlas of the Ecoregion** included on the CD for maps of elevation zones, climate zone, bedrock and surficial geology, topographic features, landcover and Ecological Land Units).

Subregions:

A set of relatively homogeneous subregions were delineated by a international team of scientists based on geology, elevations and landform patterns, using limits defined by previous research in the states and provinces. The resulting 11 subregions were used to ensure representation of conservation features across the full spectrum of ecological gradients characteristic of the region.

- **SUBREGIONS (by size)**

Acadian 'Uplands', 18,522,733 acres. Large lowland area with extensive wetland, rivers and floodplains.

Green & White Mountains, 10,461,891 acres. Mountainous regions in the US with several alpine peaks

Estrie-Beauce Plateaus & Hills/St. John Uplands - Central, 9,238,688 acres. Sedimentary region with low rolling hills on the US / Quebec boundary.

Northumberland - Bras D'Or 'lowlands', 8,003,893 acres. Very low wet region on the eastern Maritime coast. Includes all of Prince Edward Island.

Adirondacks & Tug Hill, 6,689,649 acres. Deciduous forest dominated region on ancient mountain core characterized by interesting bedrock (anorthosite) or shales in the Tug Hill.

Gaspè Peninsula, 6,169,321 acres. Sedimentary high mountains abruptly sloping to the Atlantic coast.

Acadian Highlands, 6,036,086 acres. Mid-elevation mountain region of northern New Brunswick.

Temiscouata Hills - St. John Uplands - North, 5,808,281 acres. Flat, northern sedimentary region of bogs and conifer forest.

Nova Scotia Hills & Drumlins, 5,747,103 acres. Glacially shaped region of Nova Scotia lowlands.

Gulf of Maine, Bay of Fundy, Minas Basin, 4,541,219 acres. Rocky shoreline and bay with very high tides and extensive tidal marshes.

Atlantic Coast, 1,371,542 acres. Southern rocky coastline of Nova Scotia, with bogs and tidal flats.

Total acres: 82,865,628

Ecoregion Boundaries and Subregions Team: Martha Gorman (NCC) Mark Anderson (TNC). Ting Li, Vince Gerardin, and Guy Jolicoeur (QC); Vince Zelazny (NBDNR), Connie Carpenter (USDA Forest Service NH); Peter Neily (NSDNR); Greg Kehm (TNC)

Biodiversity Significance:

The NAP Ecoregion extends over large ecological gradients from the boreal forest to the north and the deciduous forest to the south. The Gaspé Peninsula and higher elevations support taiga elements. At lower elevations and latitudes, there is a gradual shift toward higher proportions of northern hardwood and mixedwood species which marks the transition into the Acadian forest. It also supports local endemic species, as well as rare, disjunct, and peripheral populations of arctic, alpine, alleghenian and coastal plain species that are more common elsewhere.

The forest is a heterogeneous landscape containing varying proportions of upland hardwood and spruce-fir types. It is characterized by long-lived, shade-tolerant conifer and deciduous species, such as red spruce, balsam fir, yellow birch, sugar maple, red oak, red maple and American beech, while red and eastern white pine and eastern hemlock occur to a lesser but significant degree.

There has been a historical shift away from the uneven-aged and multi-generational "old growth" forest toward even-aged and early successional forest types due to human activities. This mirrors the historical trends toward mechanization and industrialization within the forest resource sector over the past century and a shift from harvesting large dimension lumber to smaller dimension pulpwood.

For vertebrate diversity, the NAP ecoregion is among the 20 richest ecoregions in the continental United States and Canada, and is the second-richest ecoregion within the temperate broadleaf and mixed forest types. The forests also contain 14 species of conifers, more than any other ecoregion within this major habitat type, with the exception of the Southern Appalachian-Blue Ridge Forests and the Southeastern Mixed Forests.

Characteristic mammals include moose, black bear, red fox, snowshoe hare, porcupine, fisher, beaver, bobcat, lynx, marten, muskrat, and raccoon, although some of these species are less common in the southern parts of the ecoregion. White-tailed deer have expanded northward in this ecoregion, displacing (or replacing) the woodland caribou from the northern realms where the latter were extirpated in the late 1800's by hunting. Coyotes have recently replaced wolves, which were eradicated from this ecoregion in historical times, along with the eastern cougar. The 148 endemic species are discussed in detail later in this document.

A diversity of aquatic, wetland, riparian, and coastal ecosystems are interspersed between forest and woodland habitats, including floodplains, marshes, estuaries, bogs, fens and peatlands, not to mention the vast stretches of cobble, sand and barrier beaches, dune systems that characterize the Northumberland Strait. Shoreline features include the coastal marshes and tidal mudflats of the Upper Bay of Fundy, the rocky headlands, ravines and coastal forests of the Lower Bay of Fundy and Atlantic Coast, and the many offshore islands that dot the coastline. Bald eagles reach their highest breeding density in eastern North America (Nova Scotia) and the Upper Bay of Fundy is a globally significant flyway for as many as 2.5 million semipalmated sandpipers that feed in the tidal mudflats. The ecoregion has many fast-flowing, cold water rocky rivers with highly fluctuating water levels that support rare species and assemblages.

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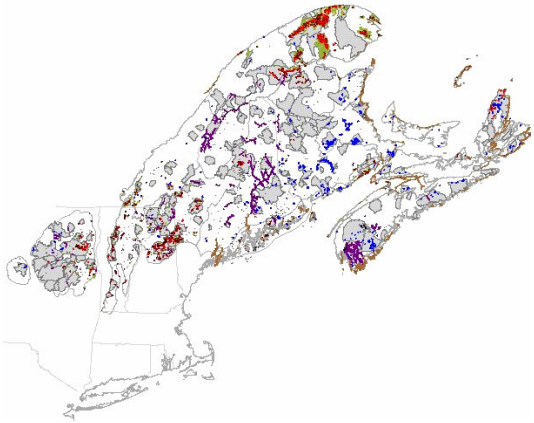
- **PORTFOLIO of CRITICAL OCCURRENCES**



The Portfolio Map (full version in appendix) shows the location of the best examples of:

- **Terrestrial Intact Forest Blocks**
  Large (10,000 – 100,000 acres) areas of contiguous forests with few roads and mostly intact interior forest ecosystem features.

- **Terrestrial Non-forest Ecosystems***
  Alpine ecosystems
  Summits and ridges
  Cliffs, steep slopes, bowls & ravines
  Barrens and flats
  Coastal dunes and beaches

- **Wetland Ecosystems**
  Forested swamps
  Bogs and fens
  Fresh water marshes
  Tidal salt and brackish marshes
  Seeps and swales
  Floodplains
  Shoreline meadows

- **Aquatic Stream Networks**
  Large rivers
  Medium sized streams
  Small headwater, feeder and coastal streams

- **Species**
  Rare mammals, birds, reptiles, amphibians, fish, invertebrates, plants and global endemics.
  Wide-ranging vertebrates
  Breeding, wintering and stopover concentrations of migratory waterfowl and other birds.

What is the Portfolio and Why is it Important?
The conservation portfolio was developed to identify those places that are the most critical to conserve. It reflects the understanding that some places play a more important role than others in maintaining biodiversity across the landscape. Particularly crucial are source habitats for interior forest species, complete and functional examples of common ecosystems, viable populations and breeding sites of rare species, and flowing stream systems connected from headwater to mouth.

These "occurrences" have been evaluated based on their size, condition and landscape context, and have had their importance confirmed by over 18,000 ground inventory points provided by US. State Natural Heritage Programs and Canadian Conservation Data centers. Additionally they reflect the knowledge and opinions of over 40 ecologists, biologists, forest managers and wildlife specialists from academic, state, provincial and federal institutions.

The portfolio of critical occurrences has taken almost four years of collaborative effort to develop and is revised and maintained annually based on new information and conservation progress.

How are these Data Used?
These are not the only places to do conservation, of course, but the portfolio provides a scientific gauge to assess whether our finite conservation dollars and efforts are being directed at the most influential and critical places.

Throughout this document conservation effort is summarized in two ways: 1) relative to all features in the region and 2) relative to the critical occurrences in the portfolio. The two perspectives allow for a refined understanding of how efforts are totaling up.

For further information on the portfolio contact your state Nature Conservancy office, provincial Nature Conservancy of Canada office or the Eastern Regional Conservation Science Team which is responsible for the development and maintenance of the information.

* Includes specialized patch-forming forest types

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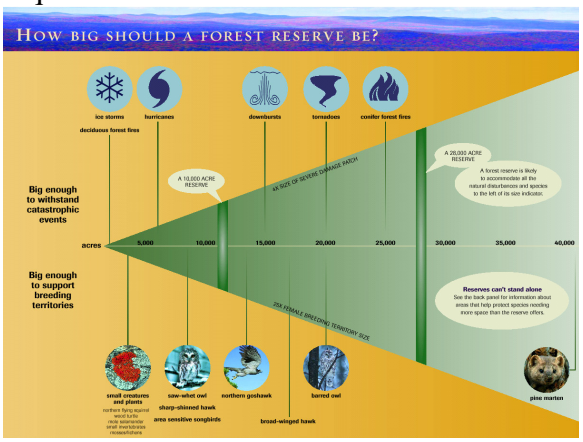
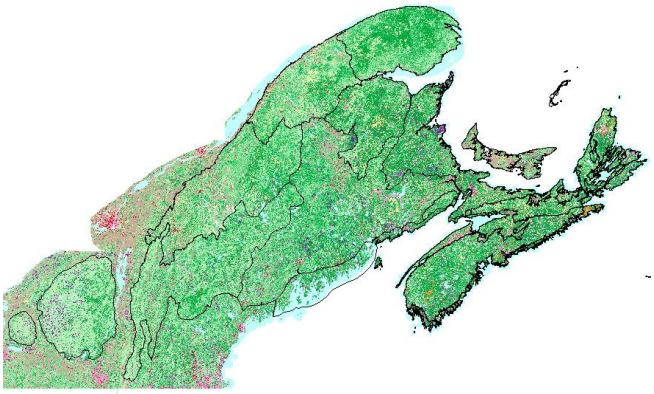
- **SCREENING CRITERIA**

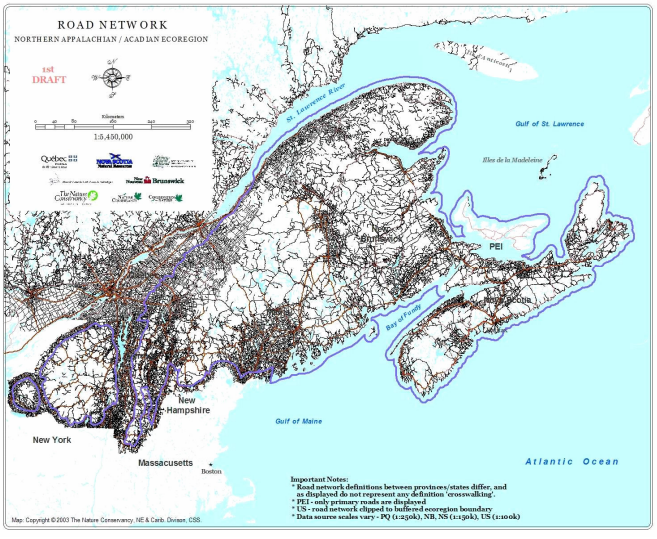
Size and Condition
Example: Chart of disturbances and species area requirements for Eastern Forests



Threats Surface Map components
Example: Land-cover (full version in appendix)



Example: Roads



What are these Criteria and Why are they Important?
The influence of a particular ecosystem example or a species breeding location on maintaining regional biodiversity is due, in large part to its **size** and **condition**. Ideally, an ecosystem should be complete with respect to its component species, should serve as source habitat for characteristic species and play a pivotal role in exporting individuals to the larger landscape. High quality examples contain habitat in which the component species thrive because the habitat provides adequate resources, minimizes mortality and facilitates reproduction. Critical population sites or breeding areas consistently produce surplus individuals that emigrate to the larger landscape. High quality habitat may also serve as refugia or strongholds of rare or uncommon species that have already disappeared from the surrounding landscape.

The landscape context in which the occurrence is found is also crucial in determining whether the feature will persist into the next century and what sort of threat pressures are likely to constrain its influence or impair its function. Landscape context is commonly evaluated by creating a spatially explicit "**threat surface**" map, developed by compiling maps of features such as development, agriculture, quarries, mining leases, roads, dams, toxic release points, ownerships, housing density, etc. This allows any point on the landscape to be objectively ranked as to degree of threat and the pressure summarized by a numeric index.

We established and applied **screening criteria** to every ecosystem and species example to determine if it was likely to be a **critical** occurrence and qualify for the portfolio. Those that met the criteria were referred to as **qualifying;** those that did not meet the criteria were classified as **supporting** occurrences – important but not crucial to the conservation of biodiversity in the ecoregion. The criteria used to separate the critical occurrences from the supporting ones were:

- **Size and Condition** of the occurrence.
- **Threat and Landscape context** surrounding the occurrence.

Application of the screening criteria eliminated thousands of potential occurrences from the portfolio narrowing the set of final places down to those that were judged to be absolutely critical in maintaining biodiversity in the region. These are used as a benchmark to determine the degree to which land protection is focused on crucial places.

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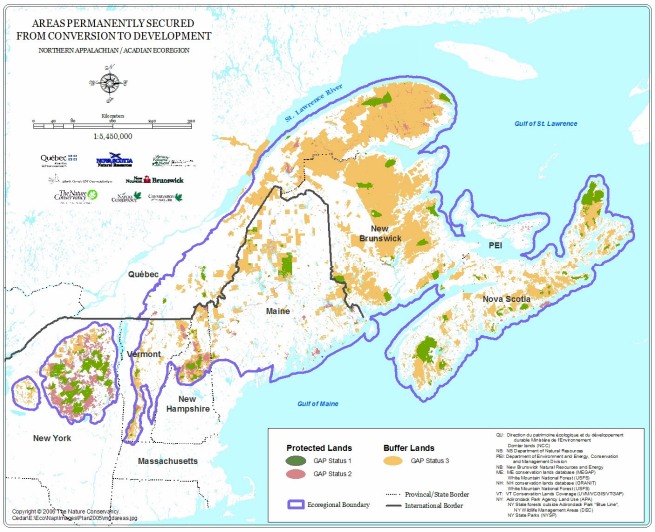
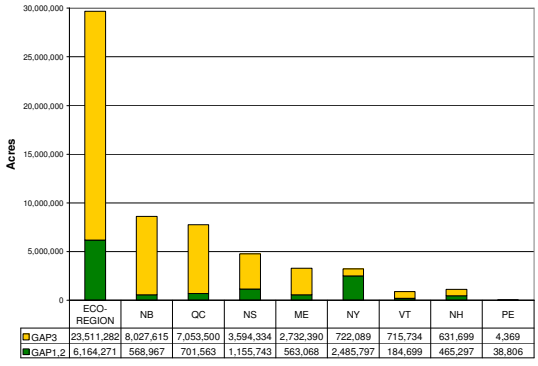
PERMANENTLY SECURED LAND

Map of Areas Permanently Secured against Conversion to Development

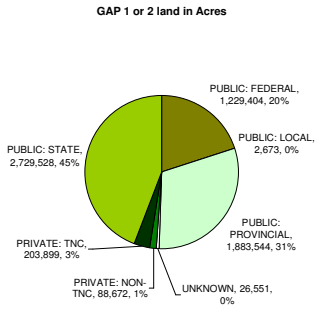


Protected (GAP:1,2) and Secured only (GAP: 3) Land by Ecoregion



ECO-REGION	NB	QC	NS	ME	NY	VT	NH	PE
GAP3	23,511,282	8,027,615	7,053,500	3,594,334	2,732,390	722,089	715,734	631,699	4,369
GAP1,2	6,164,271	568,967	701,563	1,155,743	563,068	2,485,797	184,699	465,297	38,806

Distribution of Ownerships



Data Sources: TNC: Lands permanently secured from conversion to development (Dec 2005)

What is GAP Status and Why is it Important?
This indicator looks at land ownership and identifies those tracts of lands that have permanent legal protection against conversion to development. We classified the land into three status levels: GAP 1 lands are explicitly protected for biodiversity with a management plan to ensure this purpose and to allow for natural processes to occur freely (nature reserves, research natural areas). GAP 2 lands are explicitly conserved for biodiversity but allow for alterations of natural processes, artificial manipulations and multiple uses (wildlife refuges, some US national parks). Most of the lands shown are GAP 3, defined as subject to extractive practices such as logging but governed to policy restrictions such as maintaining stream buffer areas (Crown lands, state forests). GAP 3 land will remain in primarily natural cover and is likely to play a key supporting role in maintaining biodiversity.

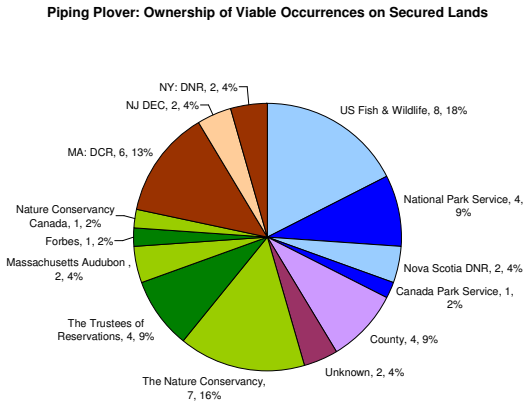
What Do the Data Show? Thirty-six percent of the region, over 29 million acres, are secured against conversion but only 7% is explicitly protected for biodiversity. Amounts range from a high in New Brunswick of over 8.5 million acres to a low in PEI of 43,000 acres. New York has the highest amount of reserve land (GAP status 1 or 2) with almost 2.5 million acres, most of that in the Adirondack state park.

Public lands account for 96% of the GAP 1 & 2 lands and state or provincial lands make up the bulk of it. Private land accounts for 4% of the area explicitly protected for biodiversity. Nature Conservancy and Nature Conservancy of Canada lands account for three quarters of that – 204,000 acres.

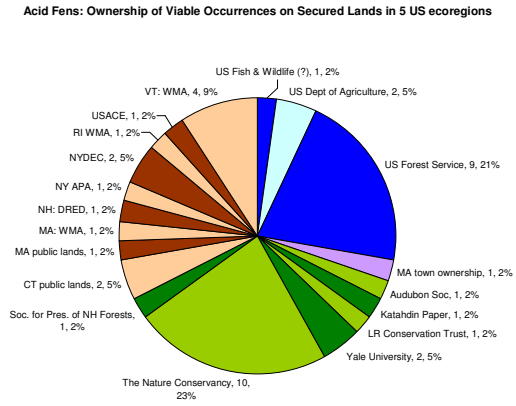
How is this measure calculated?
The data base was created using existing state, provincial and federal data layers compiled and calibrated by The Nature Conservancy's Eastern Regional Science team into a single coverage. Base information was augmented with parcel data from The Nature Conservancy and other land trusts, collected, categorized and digitized using funding provided by Sweetwater Trust and other foundations.

- **COLLECTIVE CONSERVATION**
  Percent Ownership of Features

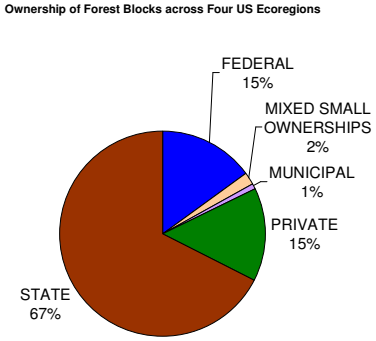
Species Example: Piping Plover



Ecosystem Example: Acidic Fens



Matrix Forest Example: Four US Ecoregions



In the above charts Federal/Provincial land is in blue, State land in brown, Municipal land in purple and Private ownerships in green

Data source: TNC's ecoregional assessments

What is this Measure and Why is it Important? The conservation of critical ecosystems and species is a joint public–private effort. This measure examines, accounts for, and recognizes, the vast network of players involved in achieving a cumulative conservation effect. Sorting out acquisitions, fee ownership, management leads and easement holders can be complex. The charts and tables have been simplified to provide the clearest picture of how responsibilities are distributed across organizations and individuals.

What Do the Data Show? Patterns differ from target to target but general trends are reflected in these three examples given. The conservation of species such as the piping plover, and small ecological systems such as the acidic fens, is dispersed across ownerships (14 for the plover and 19 for the fens), ownership categories (shown by color groups) and ecoregions (3 for the plover, and 5 for the fens).

The conservation of large contiguous matrix-forest blocks in the US is dominated by state lands (70%) with federal and private contributing about 15 % each. In Canada the same pattern holds with provincial lands making up the bulk of forest protection. Within a single forest block conservation ownerships range from sole organizations to over 20 different organizations and individuals.

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The analysis highlights the significant results achieved by collective and collaborative conservation efforts. Notable is the large role played by private conservation lands in the East.

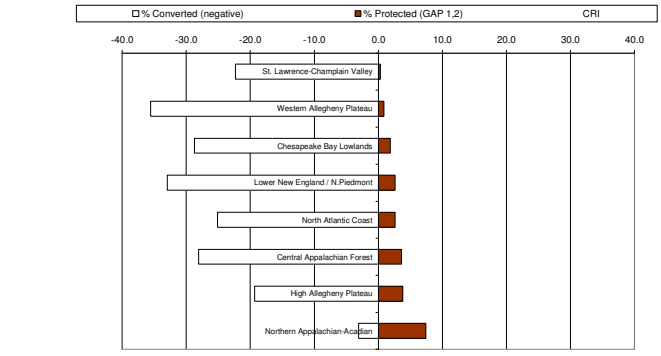
How is the measure calculated? Information on tract boundaries, fee ownership, easement holders, organization types, acreages, and level of protection are maintained in a spatial data base of over 150,000 separate tracts of permanently secured lands. This information can be overlaid with other spatial data sets such as the locations of critical features to identify the correspondence between ownerships and targets.

Northern Appalachian / Acadian Ecoregion .

(final draft Anderson 06)

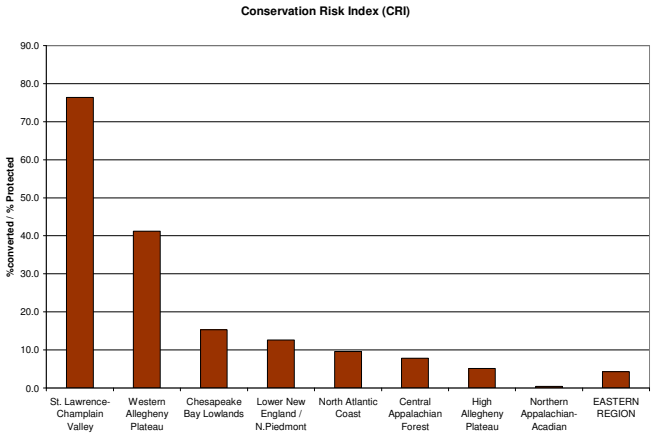
- **CONSERVATION RISK INDEX**

Ratio of Conversion to Protection by Ecoregion



	Northern Appalachian-Acadian	High Allegheny Plateau	Central Appalachian Forest	North Atlantic Coast	Lower New England / N.Piedmont	Chesapeake Bay Lowlands	Western Allegheny Plateau	St. Lawrence-Champlain Valley
CRI	0.4	5.1	7.8	9.6	12.6	15.3	41.2	76.4
% Protected (GAP 1,2)	7.4	3.8	3.6	2.6	2.6	1.9	0.9	0.3
% Converted (negative)	-3.1	-19.3	-28.1	-25.1	-33.0	-28.7	-35.6	-22.3

The Conservation Risk Index (CRI)



Data Sources: National Land Cover Dataset (NLCD- US Environmental Protection Agency), Permanently Secured Lands (The Nature Conservancy – Eastern US region)

Crisis and Opportunity Ecoregions have been identified at a coarse level for all the biomes and ecoregions on Earth. This categorization is an important part of the prioritization process used byT the Nature Conservancy to reach its 2015 goa.l

What is This Measure and Why is it Important?
The Conservation Risk Index (CRI) measures the disparity between habitat loss and protection. It is calculated as:

CRI = % converted / % conserved

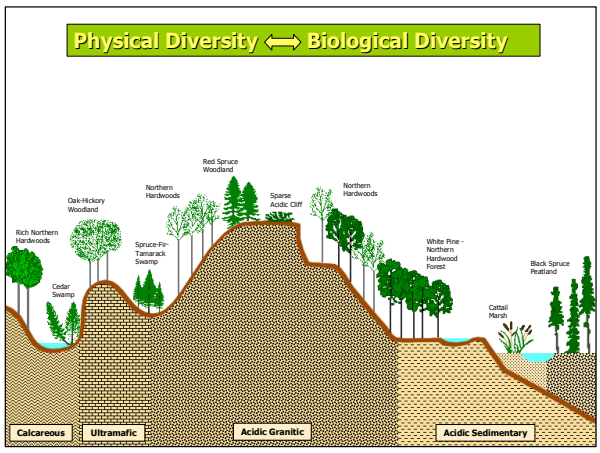
Assuming that the region was once entirely covered by natural systems, this indicator examines the proportion of the region that is now converted and compares it to the proportion that has been protected for biodiversity. A high CRI suggests that conversion is 5 to 10 to 50 times greater than conservation. Regions with 20% or above conversion and a CRI of over 2 (twice as much conversion as protection) are considered "Vulnerable" while those with conversion >40% and CRI > 10 are considered "Endangered" and those with conversion >50% and CRI > 24 are considered "Critically Endangered" (Hoekstra et al 2005). In these analyses, lands managed for forest extraction are treated as natural cover but are not considered protected.

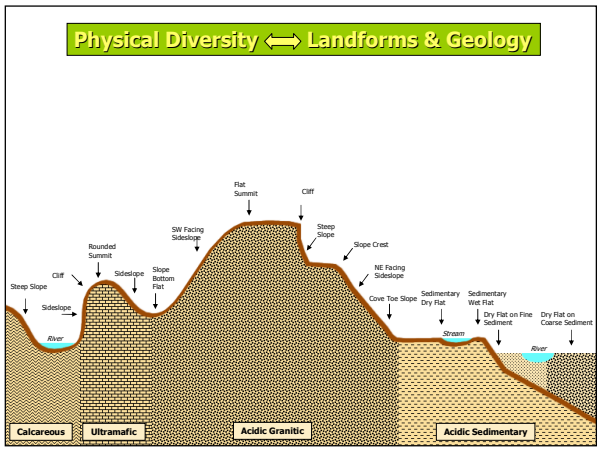
What Do the Data Show? The Northern Appalachian – Acadian ecoregion stands out among the eastern ecoregions as the only region where land protection is slightly ahead of land conversion, resulting in a CRI value less than 1. This is likely due to two factors, the first being the existence of large protected areas such as the Adirondack State Park in New York, Baxter State Park in Maine, the White and Green Mountain National Forests of Vermont and New Hampshire, and the extensive provincial reserve system in the Quebec highlands and Canadian Maritimes.

Second, historic logging activities have maintained forest cover across the region, preventing conversion to development or agriculture. Thus, although two centuries of logging has created young, simplified forests where structurally complex and biodiversity rich ecosystems once stood, it has been effective in preventing the wholesale conversion, at a landscape scale, that can be seen in other ecoregions.

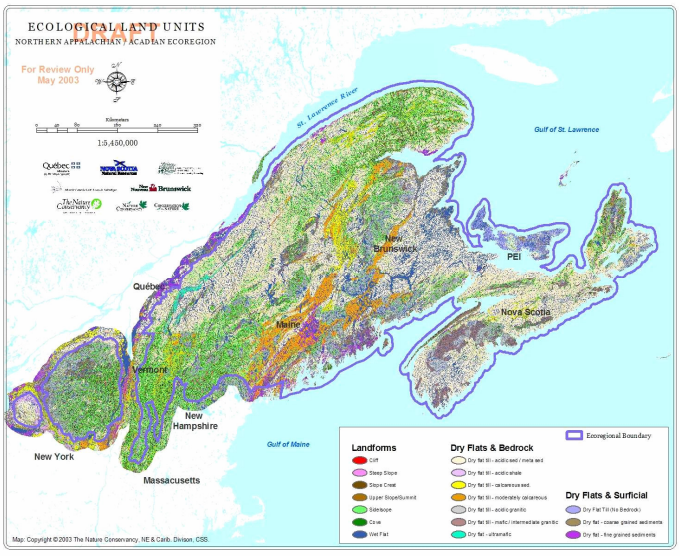
For comparison the US eastern region is 18% converted and has a 4 to 1 ratio of conversion to protection (CRI = 4.3), indicating that the amount of land that has been converted to non-natural cover is four times greater than the amount protected.

- **ECOLOGICAL LAND UNITS**





ELU MAP see MAP appendix for larger image



What are Ecological Land Units and Why are they Important?
This indicator examines the protection level of various physical and biophysical features to answer the questions - Are we consistently missing certain environments in our current protection network? Are we overemphasizing particular settings or features at the expense of others? To evaluate this we developed a data layer known as ecological land units (ELUs), composed of topographic landforms, bedrock and surficial geology and elevation zones. For example, a "high elevation granite cliff" is a single ELU. The units were carefully created to reflect physical environments that underlie and explain biodiversity patterns. The region's remarkable rich hardwood forests, for instance, tend to occur on steep slopes at mid elevations on solis derived from sedimentary or calcareous bedrock –a setting easily measured by an ELU analysis.

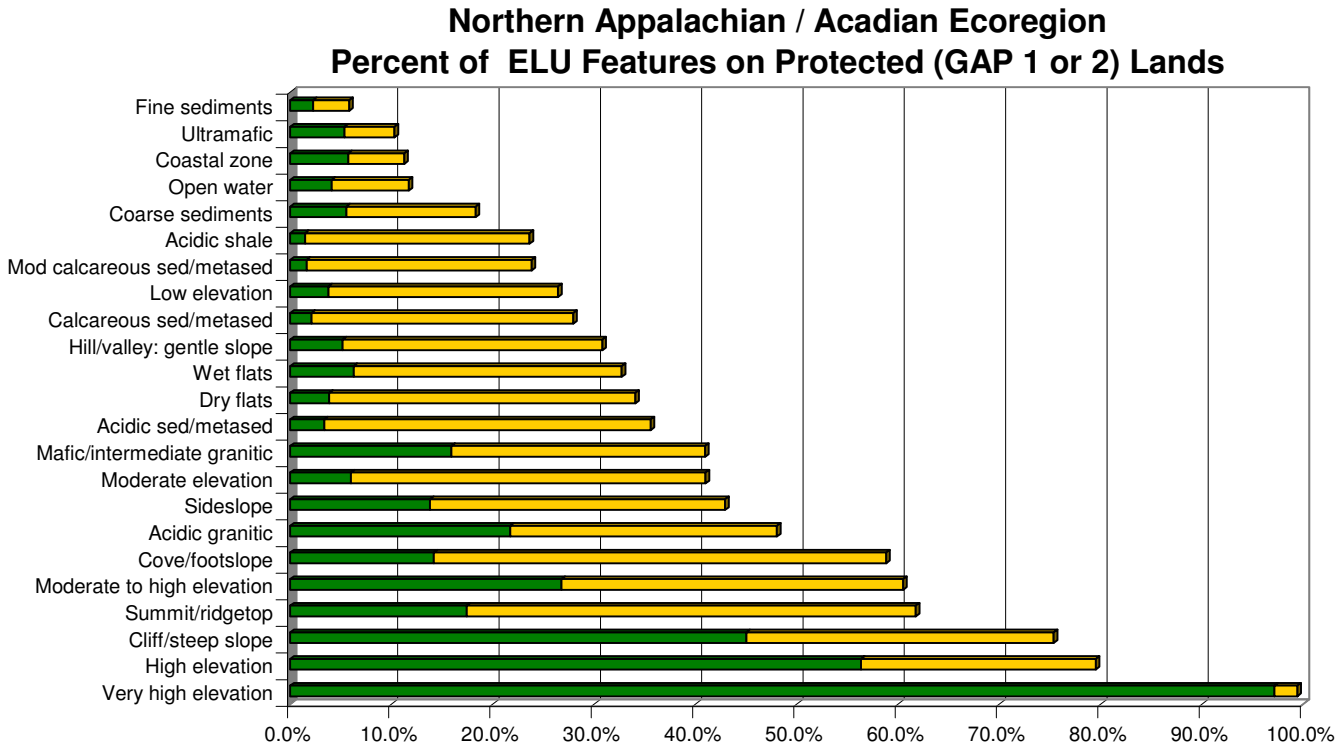
We consider two aspects of protection on the following two pages. **Percent protected** (page 16) summarizes the amount of each feature occurring on secured lands. **Representativeness** (page 17) examines the proportion of the feature that occurs on protected reserves (GAP1,2) relative to the proportion of that feature in the region.

What Do the Data Show? Both measures indicate that high elevations, cliffs, summits, ridge-tops and ravines are the most extensively protected features in the region and are many times more common in the protected lands than they are throughout the region. This indicates a strong bias in past conservation efforts towards scenic features that often occur on lands not suitable for other uses. Many of these settings, of course, have significant biodiversity components.

Fine sediment soils (floodplains, clayplains and valley bottoms), dry flatlands and gently sloping hills are poorly protected and much more common in the region than they are in the protected lands. Coastal areas and sandy soils are also incompletely protected and more common in the landscape than in the protected areas.

Data sources: TNC: Ecological land units, TNC Lands permanently secured from conversion.

- **ELU: PERCENT OF FEATURE PROTECTED**



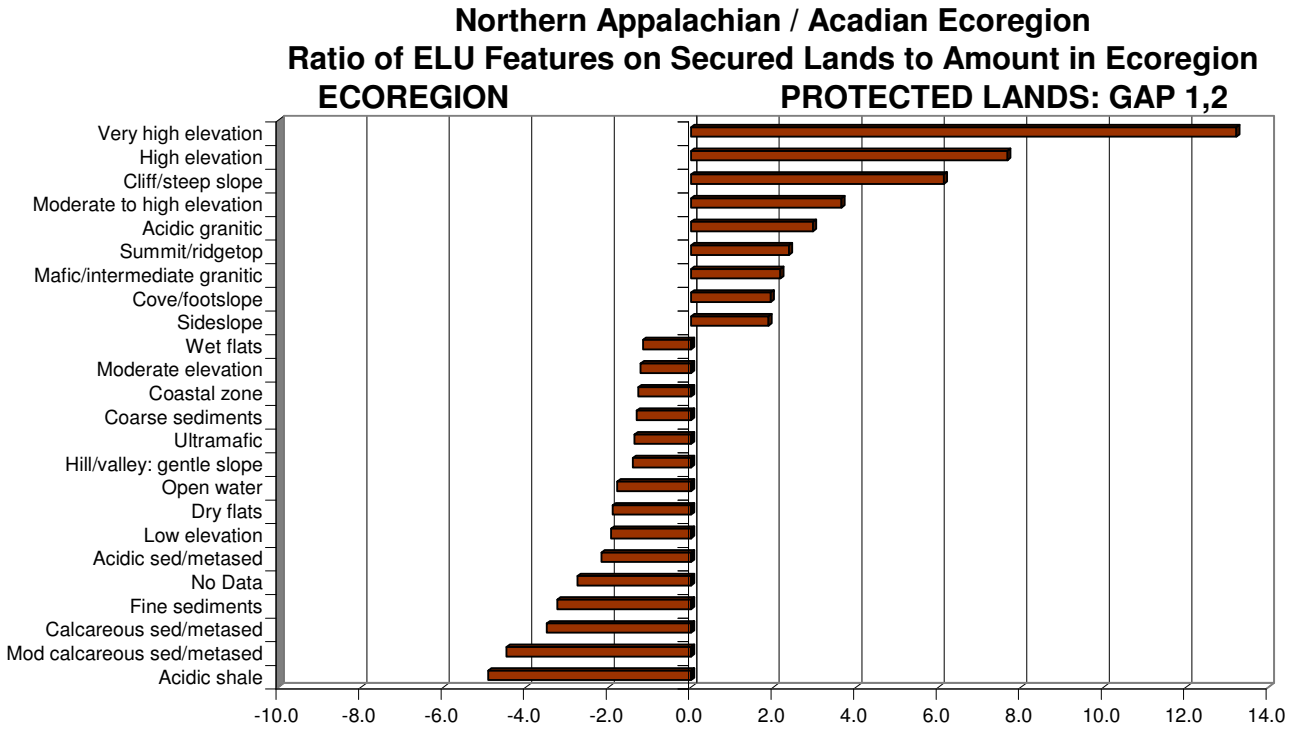
Ecological component features along the vertical axis are not mutually exclusive (e.g. cliffs occur across all elevations)

What is this Measure and Why is it Important?
This indicator examines the amount of each of ecological feature on land permanently secured from conversion to development. To evaluate this we combined the ecological land unit (ELU) data layer with the secured lands data. The ecological land units (ELUs) reflect physical environments that underlie and explain biodiversity patterns (see previous page). They may be used to determine the cumulative effect of conservation efforts over the last two centuries.

What do the data show? High elevations over 1700‘ feet, and steep slopes and cliffs are well covered having over 40% on secured lands with a GAP 3 status. Very high alpine communities are almost 100% on secured lands with 98% of that being on land protected for biodiversity. Protected lands cover 20-40% of granite bedrock and mid-elevation features but drop to below 20% for all other features, including summits.

Urgently in need of protection are **fine sediment floodplains and marshes, coastal zone and coarse sediment features, low elevations and moderately calcareous to calcareous bedrocks**, and **unique bedrocks.** These are all settings below 10% on secured lands with very small percentages protected for biodiversity. The calcareous and unique bedrock regions coincide with high endemism. The coastal regions also harbor some of this regions most unique and threatened systems and species.

• ELU: REPRESENTATIVENESS



How do you read this chart? Ecological features that are found in protected lands at exactly the same proportion as they occur in the region would be shown on the chart at the vertical "zero line" indicating a 1 to 1 ratio. Those with proportionally higher representation in the protected lands are shown to the right of the line; those with proportionally larger abundances in the region are shown left of the line. The length of the bar indicates the magnitude of the discrepancy.

What Do the Data Show? In parallel to the previous chart, cliffs, high elevations, summits, ridge-tops, and ravines are two to fourteen times more common in the protected lands than they are in the region, indicating a strong bias in current land protection towards hard acidic bedrock features occurring on lands not suitable for other uses. Fine sediment soils (floodplains, clayplains and valley bottoms), calcareous soils, low elevation, dry flatlands and gently sloping hills are two to five times more common in the region than they are in the protected lands. We recommend that future protection efforts focus on the latter environments to achieve a balanced and representative conservation portfolio supporting all biodiversity.

Coastal zone and coarse sand features (almost all at very low elevations) are somewhat underrepresented in the protected areas, being two to three times more common in the landscape.

Wetlands are twice as common in the landscape as in the reserve lands. Many of the critical wetlands are large and occur at low elevations on coarse and fine sediments. These are mostly unprotected. See the pages on the wetland portfolio for more detailed information on the protection of the critical wetlands in the region.

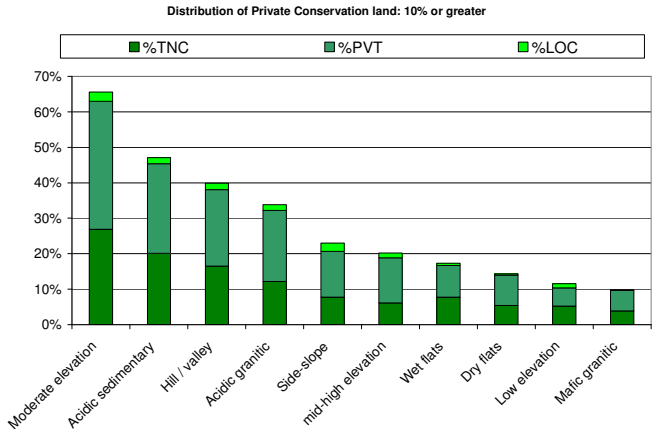
Data sources: TNC: Ecological land units, TNC Lands permanently secured from conversion.

- **PERCENT OF FEATURES IN PRIVATE OWNERSHIP**

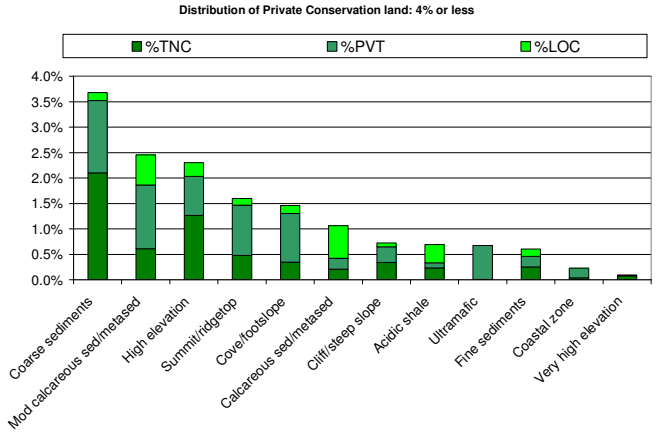
Conservation of Landscape Features on Private Land

TNC = The Nature Conservancy (US)
PVT = Other Private conservation lands, including the Nature Conservancy of Canada
LOC = Local, small public ownerships.

Features accounting for 10% or more



Features accounting for 4% or less



Note: In the figures above, features along the horizontal axis are not mutually exclusive, thus they do not sum to 100%.

What is this Measure and Why is it Important? The ecological land unit and secured lands analysis indicate that land conservation efforts should step up the protection of fine sediment, low elevation, calcareous bedrock and coastal/coarse sediment regions. To what extent is this already happening? This measure examines the secured lands data by ownership patterns to identify trends in who is protecting what.

What do the data show? In aggregate, private conservation efforts account for 6% of the total secured lands. Examination of private and local effort reveals that low to moderate elevations predominate as do acidic sedimentary and granite bedrocks. Flats and gently sloping hills collectively comprise 71% of the landforms.

Features accounting for less than 4% of private conservation lands can be divided into two categories. The first are features that currently enjoy high levels of protection in the existing conservation lands. These include:

- high and very high elevation
- steep slopes
- coves and toeslopes
- Ultra mafic bedrocks

The second are features and settings that could benefit from private efforts but that currently make up 1% or less of the private lands. These include

- Calcareous substrates
- Fine sediment settings
- Coastal zone features

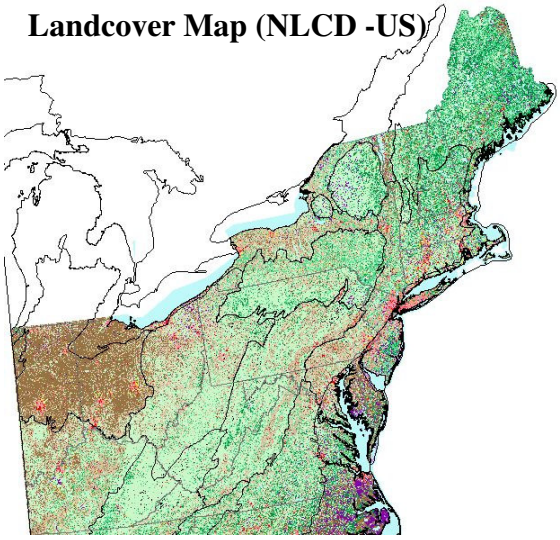
This suggests areas of focus where private conservation dollars could strongly complement public land conservation.

Northern Appalachian / Acadian Ecoregion .

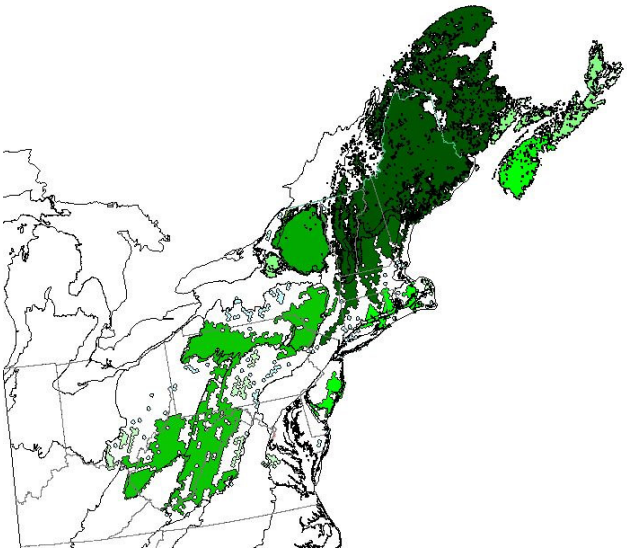
(final draft Anderson 06)

- LANDSCAPE INTACTNESS

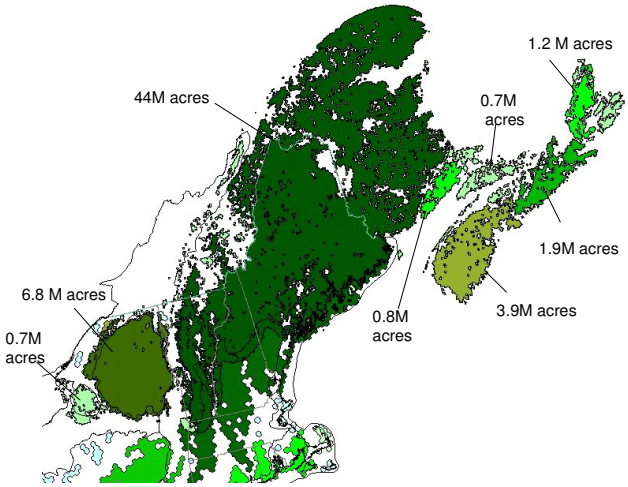
Landcover Map (NLCD -US)



Blocks of Contiguous Natural Cover over 80%



Close up of NAP /Acadia Ecoregion



What is this Measure and Why is it Important?
This measure is used to find areas of contiguous natural cover. Contiguous cover areas are likely to have intact landscape processes and high levels of connectivity. For features that occur in these areas, the likelihood of them persisting over time is greater than the same features occurring in highly fragmented areas.

How is this Measure Calculated?
To build this indicator the entire region was divided into a regular grid consisting of 25,000 acre interlocking cells (hexagons). The amount of natural land cover was calculated for each cell and those with natural land cover 80% or higher were selected.* Adjacent selected cells were aggregated into larger units.

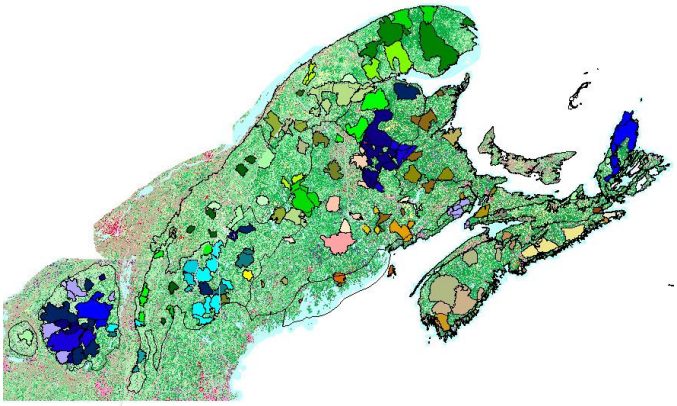
What Do the Data Show? The results identified 80+ blocks of contiguous cover in the eastern region with ten of them being over a half a million acres. The largest block, covering most of the Northern Appalachian / Acadian region, was over 44 million acres. These are potentially key areas where conservation could be taken to the landscape scale working with people and industry to prevent fragmentation and maintain critical connections. Smaller scale protection within these intact landscapes could focus on specific features.

The Northern Appalachians emerges as the most intact region in the Eastern US. Its huge central block extends from the Gaspè Peninsula, across most of southern portion of the ecoregion to the highlands of New Jersey. Other large blocks of natural cover include the Adirondack, southern and central Nova Scotia, Cape Breton and New Brunswick's Fundy region. The critical "bridge" region between Nova Scotia and New Brunswick as well as the Tug Hill plateau adjacent to the Adirondacks and the Gaspè to northern Maine region all emerge as key connections where natural landcover is still intact enough to facilitate the movement of many species.

* *for technical reasons, the cutoff used was actually 78%*

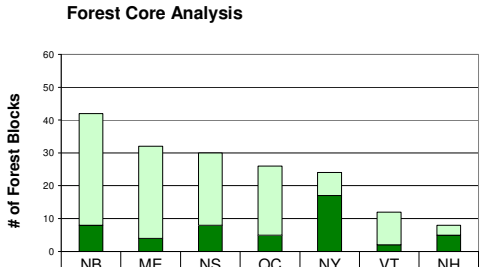
(final draft Anderson 06)

- **FOREST ECOSYSTEMS: PORTFOLIO**



Portfolio: Map shows 174 matrix forest "blocks" collectively representing all forest types of the region. The background shows land cover.

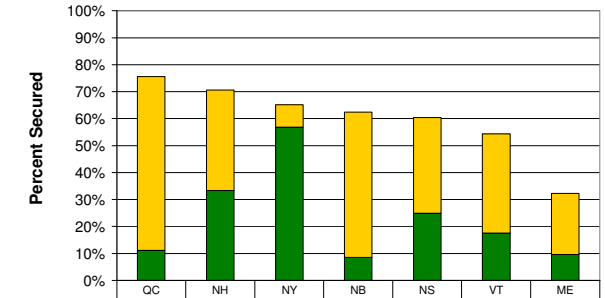
Reserves: The number of forest blocks that contain GAP 1,2 core reserves of 25,000 acres or more



	NB	ME	NS	QC	NY	VT	NH
% with core areas	19%	13%	27%	19%	71%	17%	63%
Total Tier 1 Blocks	42	32	30	26	24	12	8
Total Set of Potential Areas	86	92	49	30	40	29	14
Blocks without a 25,000 acre protected area	34	28	22	21	7	10	3
Blocks with 25,000 acre core protected area	8	4	8	5	17	2	5

Forest Blocks: Percent Secured. Total P:20%, S:39%

- **Northern Appalachians: Secured Lands in Forest Blocks**



	QC	NH	NY	NB	NS	VT	ME
Total Tier 1 Blocks	26	8	24	42	30	12	32
Unsecured	992,063	292,733	1,116,666	2,109,460	1,537,926	335,324	2,593,400
Secured: GAP 3	2,617,534	370,744	263,596	3,030,812	1,378,101	270,855	869,920
Protected: GAP1,2	453,701	331,442	1,823,432	480,921	969,423	129,396	367,066

What are Matrix Forest Blocks and Why are they Important? Forests are the dominant ecosystem of Eastern North America, which is the center of distribution for many trees such as red spruce and striped maple as well as thousand of shrubs, ferns, herbs and forest dwelling species. The ecoregional assessments identified 174 critical forest blocks, representing the best remaining examples of forest interior regions, that collectively contain all forest types of the region.

This indicator examines two aspects of forest conservation: 1) the protection of large forest reserves where conservation is focused on the restoration of forest ecosystems and on providing source breeding areas for interior species, 2) the conservation of forest cover at huge scales through preventing conversion and promoting best management practices.

What Do the Data Show? The establishment of core reserves within the best remaining examples of every forest type is proceeding rapidly. Currently 28% of the 174 critical forest blocks have protected reserves (GAP 1,2) of 25,000 acres or greater. These protected forest cores are concentrated in the mountainous portions of the ecoregion. New York, via the Adirondack state park, has protected core forest in 71% of their blocks.

Securing the land from conversion can be an important first step in protecting and restoring interior forest ecosystems. The **percent secured** measure looks directly at the land status within each block regardless of whether there is a core protected area. The results show that in aggregate for the region, 20% of the forest block land is protected (GAP 1,2) and another 39% is secured only (GAP3). All states and provinces have over 30% of the land within their forest blocks in some form of securement (GAP1-3). Quebec leads the group in having secured 75% total (GAP1-3) of the land inside their forest blocks with 11% of that protected for biodiversity (GAP1,2). While New York leads in protected lands (GAP1) at 55%.

Many of the blocks that do not have full core areas do have partial or small core regions collectively accounting for 574,000 acres. To bring all of those blocks up to a 25,000 acre standard would require 2.5 million acres. Twice that amount is already secured within the blocks suggesting that core protection is largely a matter of raising the GAP status of the land from "3" to "1 or 2." **Data source:** TNC's ecoregional assessments

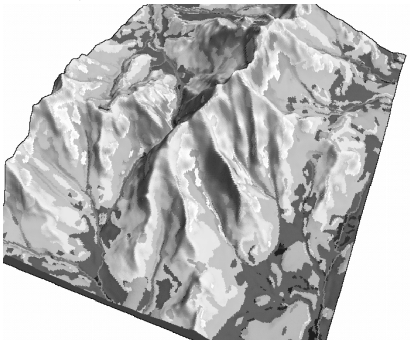
(final draft Anderson 06)

- **UPLAND NON-FOREST* ECOSYSTEMS: BASIC TYPES**

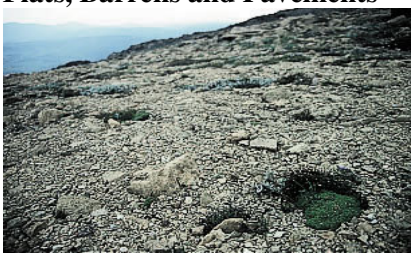
Summits, Peaks, Ridgetops, Knolls

Steep slopes and Cliffs

Bowls, Ravines and Coves



Flats, Barrens and Pavements



* Includes non-matrix patch-forming forest types.

Summits and Peaks: Ranging from alpine summits with a unique gem-like flora to the fog-shrouded granite domes of coastal islands, mountain and hill tops are some of the most characteristic features of the ecoregion. The stunted spruce-fir krummholz, alpine meadows and rare Bicknell's thrush bring them global attention.
Statistics: 104,745 individual summits, ave 26 acre
Total acreage: 2,758,928 acres, 3% of region
Portfolio: 9% of all summits, 0.03% of region
Portfolio Protection by area: P: 35% (GAP 1,2)

Steep slopes and Cliffs: Remote cliffs, rocky crags, landslide scars, river bluffs and talus slopes contribute unmistakable character to the rugged landscapes of the region. Unique biodiversity associated with these differs with bedrock types. Vertical cliff faces are choice settings for peregrine falcons and tenacious ferns like the slender cliff brake. Accumulated talus creates habitat for rattlesnakes, voles and shrews.
Statistics: 16,392 features, ave 27 acres
Total Acreage: 488,011, <1% of the region
Portfolio: 27% of steep slopes, 0.003% of region
Portfolio Protection by area: P:13% (GAP 1,2)

Bowls and Ravines: Gentle bowls, moist draws, wooded ravines, and enriched coves provide some of the most fertile settings in the region. As local repositories of soil minerals, this setting supports nutrient-loving plants such as ginseng, maidenhair and Goldie's fern, trillium, basswood, and white ash. Calcareous soils accentuate the fertility.
Statistics: 216272, ave 18 acres
Total Acreage: 3,889,364, 5% of ecoregion
Portfolio: 14% of all bowls/ravines, <1% of region
Portfolio Protection by area: P: 76% (GAP 1,2)

Flats, Barrens and Pavements. Dry flats are the most common setting in the region and are mostly dominated by matrix forest. The non-forest ecosystems of interest are extreme rocky pavements or glades with shallow soils, sparse trees and scattered heaths and grasses. Some are edaphically maintained but many are fire prone. These are not easy to locate using models. Our assessment relied heavily on ground inventory data.
Dry Flats
Total Acreage: 18, 844,515, 23% of ecoregion
Portfolio: 442 occurrences
Portfolio Protection by count: P:17% (GAP1,2), S:12% (GAP 3)

- **WETLAND ECOSYSTEMS: BASIC TYPES**

Open Bogs, Marshes, Fens, Meadows

Riparian wetlands

Coastal shores and wetlands:
Salt/brackish marsh, maritime bogs, beach/dunes, tidal flats.

(photo credit: Ron Garnett-AirScapes)

Data source: TNC's ecoregional assessments

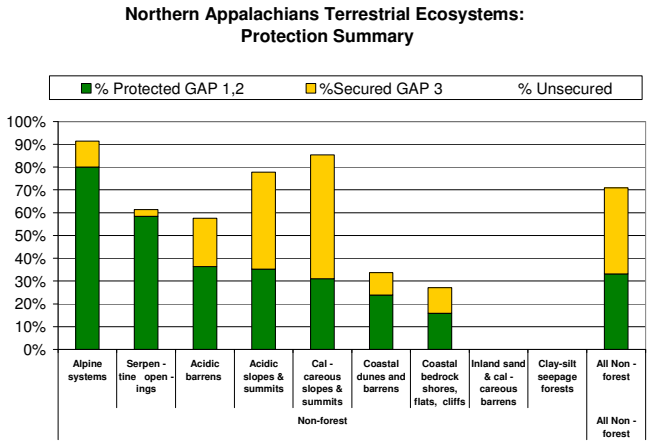
Open Bogs and Marshes: Much of the Northern Appalachian / Acadian region is soggy. Holocene glaciers left behind a legacy of deranged drainage patterns forming over a million acres of marshes, mudflats, seeps, swamps and spongy bogs –especially in the Acadian lowlands. Breeding populations of rails, bitterns, night herons, marsh wrens, frogs, salamanders and insects - plus a myriad of sedges, rushes, bladderworts, orchids, water-lilies, and pondweeds depend on these ecosystems.
Statistics: 29,312 individual wetlands, ave 43 acres
Total acreage: 1,273,517 acres, 2% of region
Portfolio: 24% of all wetlands, 0.05% of region
Portfolio Protection by area: P: 26% (GAP 1,2), S: 30% (GAP3)

Riparian wetlands: Submerged riversides and floodplains provide critical feeding and spawning areas for many species. During dryer seasons, receding water reveals a myriad of fresh silt deposits, scoured riverbanks, sand bars, alluvial meadows and oxbow lakes amid lush floodplain forests. Rich in biodiversity, intact riparian systems provide habitat for flood tolerant trees like silver maple, green ash, American elm and box elder and ideal conditions for many native ferns, nettles, vines and herbs. Wood turtles, fowler's toad, and other herptiles breed on these wetlands.
Statistics: 21,834 features, ave 201 acres
Total Acreage: 4,282,458, 5% of the region
Portfolio: 18% of riparian features, 1% of region
Portfolio Protection by area: P:3% (GAP 1,2)

Coastal wetlands The 7,453 miles of coastal shoreline in this region hosts almost 24,000 examples of beaches, salt marshes, tidal flats and rocky shores although they account for less than 1% of the ecoregion surface. It is remarkable how much biodiversity is concentrated here. Tidal wetland are important to many of our rarest birds such as the salt marsh sparrow, roseate tern, arctic tern, willet and black-legged kittiwake. Rare or declining species include seaside dock, saltmarsh sedge, seashore saltgrass, creeping alkali grass, American sea-blite, and small spikerush.
Statistics: 23,950 features, ave size 39 acres
Total Acreage: 926,664, >1% of ecoregion
Portfolio: 44% of all coastal features, <0.05% of region
Portfolio Protection by area: P:18% (GAP 1,2)

(final draft Anderson 06)

- **UPLAND NON-FOREST* PORTFOLIO OCCURRENCES**



Portfolio: 6560 critical occurrences identified in nine ecosystem types described below. Protected **(P)** 33% on GAP 1 or 2 land, Secured **(S)** 38% on GAP 3 land.

Acidic slopes & summits: Sloping terrestrial ecosystems on acidic shales, conglomerates, sandstones, siltstones, or granites. Includes land with over 6% slope or narrow summits associated with sloping features. A large, diverse group that includes mountains, rocky summits, cliffs, talus slopes, steep hillsides, landslide scares, unstable shale slopes, bowls, ravines, dry river bluffs and craggy outcrops. P:35%, S:42%

Calcareous slopes & summits: Sloping terrestrial ecosystems on limestone, dolomites, or moderately calcareous sedimentary rocks. Includes land with over 6% slopes or narrow summits associated with sloping features. These calcareous summits, cliffs, talus slopes and river bluffs are uncommon due to their susceptibility to weathering. Many rare plants are associated with the high PH and nutrient content. P:31%, S:54%

Acidic barrens and pavements: Level terrestrial ecosystems on acidic shales, conglomerates, sandstones, siltstones, or granites and defined by flats with less than 6% slope. A common setting dominated by forest. The non-forest ecosystems are extreme rocky glades and pavements with shallow soils, sparse trees and scattered heaths and grasses. Many are fire prone. P:36%, S:21%

Calcareous barrens: Terrestrial ecosystems on limestone, dolomites, dolostone, or moderately calcareous shales and sandstones and defined by flats with less than 6% slope. Ecosystems in this group have exposed bedrock and shallow soils, exemplified by the limestone glades and woodlands. Most are sparsely wooded with scattered herbs and rarities. P:0%, S:0%

Sandy barrens and flats: Terrestrial ecosystems on coarse sands above 20ft elevation and not directly in the maritime zone. Ecosystems in this group have well drained, droughty acidic soils and are often fire-prone or slow to recover from disturbances. They share characteristics with acidic flats and coastal communities. The most common are pitch pine –scrub oak barrens associated with fires or agricultural abandonment. The group also includes dry oak forests, inland sand barrens and successional shrublands. P:0%, S:0%

Clay-silt seepage forest: Terrestrial ecosystems on fine grained silts and clays deposited on ancient lake beds at elevations above 20ft. Ecosystems in this group have poorly drained, silty soils sometimes rich in nutrients. A number of moist patch-forming forest types occur here often with "mesic", "seepage", or "clayplain" in their state names. Some distinctive grassland types including moist calcareous grasslands and related communities occasionally occur in this setting. P:0%, S:0%

Coastal dunes and barrens: Terrestrial ecosystems on coarse or fine sands directly on the coast at elevations below 20ft and influenced by maritime processes. Ecosystems in this group include maritime dunes and shrublands, coastal oak-holly woodlands, pitch pine woodlands, maritime spruce-fir forests, and coastal post oak forest. P:24%, S:10%

Coastal bedrock shores, flats and cliffs: Terrestrial ecosystems on rocky shores, coastal cliffs and open headlands. P:16%, S11%

Serpentine Barrens and Openings: Terrestrial ecosystems on soils or bedrock very high in magnesium and ferric irons (mafic) toxic to many species but conducive to tolerant plant rarities. Mostly serpentine bedrock outcrops and openings. P:58%, S:3%

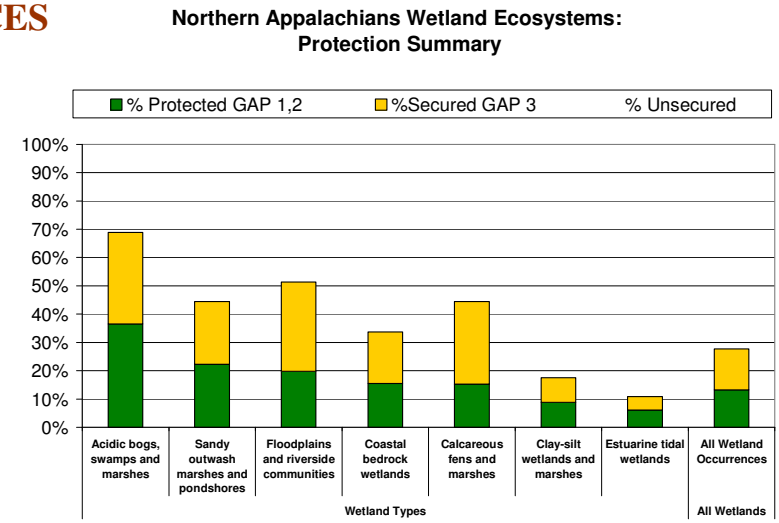
Alpine: Krummholz-meadow-rock mosaics over 4500'. P:80%, S11%

Caves: Subterranean systems, usually in limestone. P:8%, S:0%

* includes non-matrix, patch-forming forest types

(final draft Anderson 06)

- **WETLAND PORTFOLIO OCCURRENCES**



Portfolio: 4,682 critical occurrences identified in seven wetland types described below. Protected (**P**) 13% on GAP 1 or 2 land, Secured (**S**) 14% on GAP 3 land.

Acidic bogs, swamps and marshes: Palustrine ecosystems on acidic shales, conglomerates, sandstones or siltstones, or granites. A large diverse group that includes a variety of tree-dominated forested swamps, shrub-dominated bogs and shrub swamps, or sedge-dominated acidic fens and flushes. Most have pH values below 5 and accumulate sphagnum or sedge peat to form a spongy substrate. P:37%, S:32%

Calcareous fens and marshes: Palustrine ecosystems on limestone, dolomite or moderately calcareous sedimentary rocks. Rare plants are associated with the high PH waters, especially where oxygenated from mild flows along gentle slopes. Typical state named types include rich fens, sloping fens, shrub fens, red maple - larch treed fens, calcareous seeps and spring fens. These have had extensive inventory and study over the last decade. P:15%, S:29%

Sandy outwash pondshores and marshes: Palustrine ecosystems on coarse sands above 20ft elevation and not directly in the maritime zone. Wetland in this group tend to have fluctuating hydrologies resulting from being set in well-drained sands deposited over an impervious soil horizon. Emblematic of this group are the coastal plain pondshores with their unique floras. Equally common are vernal pools, buttonbush shrub swamps and coastal plain poor fens. P:22%, S:22%

Clay-silt wetlands and marshes: Palustrine ecosystems on fine grained silts and clays deposited on ancient lake beds at elevations above 20ft. A large proportion of emergent marshes and hardwood swamps occur in these sediments often in conjunction with the moist seepage forests of slightly drier areas. P:9%, S:9%

Estuarine tidal wetlands: Wetlands wholly or partially inundated by tidal saline waters. In sheltered bays tidal marshes may be extensive or they may occur as fringing wetlands along intricate shorelines. Typical communities include high and low salt marsh, brackish marsh, tidal flats and salt ponds. P:6%, S:5%

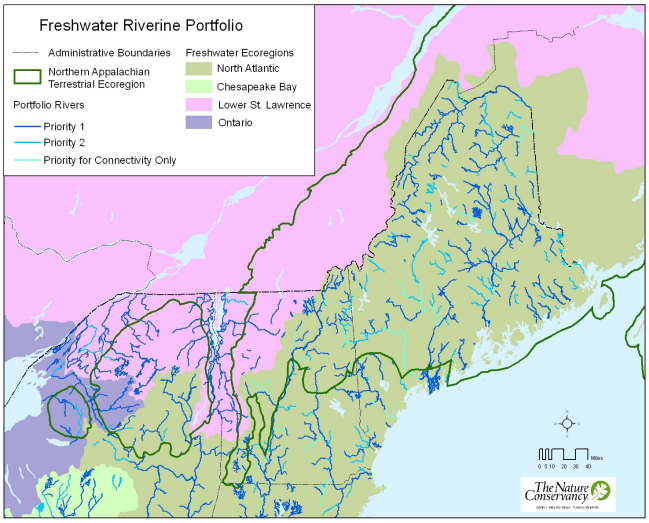
Coastal Bedrock wetlands: Wetlands in the maritime zone on relatively thin soils over bedrock. Types include maritime slope bog, coastal plateau bog and sea level fens. P:15%, S:18%.

Floodplains and riverside communities: Wetlands associated with moderate to large sized rivers and dependent on river flooding processes. Floodplain forests, riverside scour meadows, riverside seeps and outcrops, sand and gravel bar communities. (Note: upper floodplain terrace forests were classified as upland, and alluvial swamps and marshes were classified as palustrine wetlands in one of the previous groups). P:20%, S:32%.

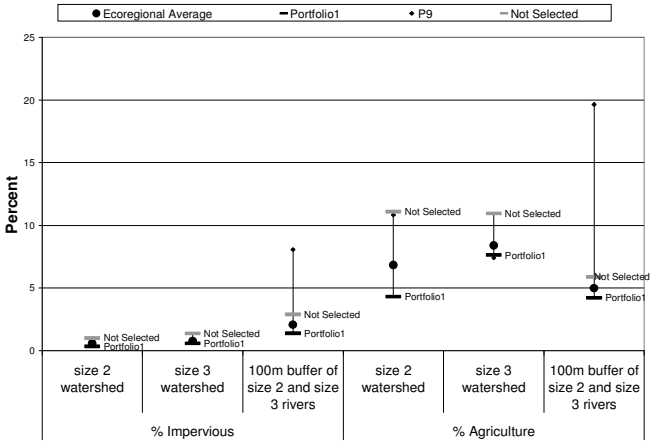
(final draft Anderson 06)

- **FRESHWATER ECOSYSTEMS**

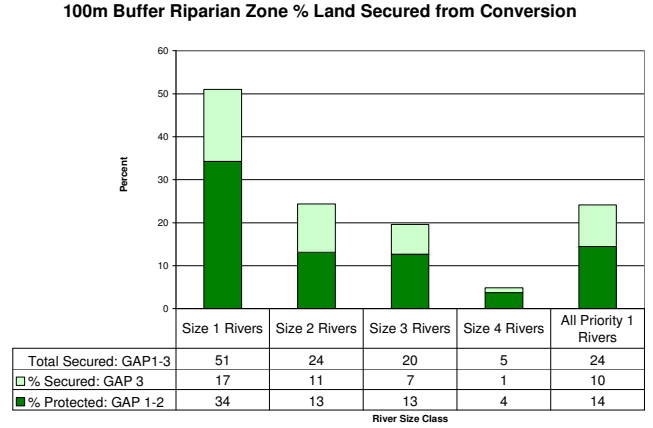
Stream Portfolio for the U.S. Portion of the Northern Appalachians



Impervious Surfaces and Agriculture



Riparian Zone Land Secured From Conversion



What is the Stream Portfolio ?

The objective of the Nature Conservancy's freshwater aquatic system assessment was to identify the most intact and functional river networks and lake/pond ecosystems in such a way as to represent the full variety of freshwater diversity present within the ecoregions. Streams were evaluated within four general size classes: headwater and feeder streams (**Size 1**: 0-30 sq. mile watersheds), moderate-sized streams (**Size 2**: 30-200 sq. mile watersheds), large stream (**Size 3**: 200 – 1000 sq mile watersheds), and large deep rivers **Size 4**: 1000+ sq. mile watersheds). Portfolio "Priority 1" rivers were selected as the most viable and critical rivers. "Priority 2" rivers were identified as alternates to the portfolio. "Connectivity only" reaches were identified to complete critical connectivity networks in the region.

What Do the Data Show?

The portfolio selection process resulted in 3,407 miles of high quality, mostly connected, medium to large river systems. Additionally, 380 miles of stream reaches identified for connectivity purposes

Land use impacts, dam impacts, and level of conservation land protection were evaluated. Watersheds and stream buffers around the portfolio streams have very low levels of impervious surfaces and agricultural cover. Impervious surfaces are less than 2%. Given that impacts to aquatic biodiversity begin to be recognized at watershed level less than 5% (CWP 2003), the portfolio rivers are highly intact. Agricultural cover is less than 7%.

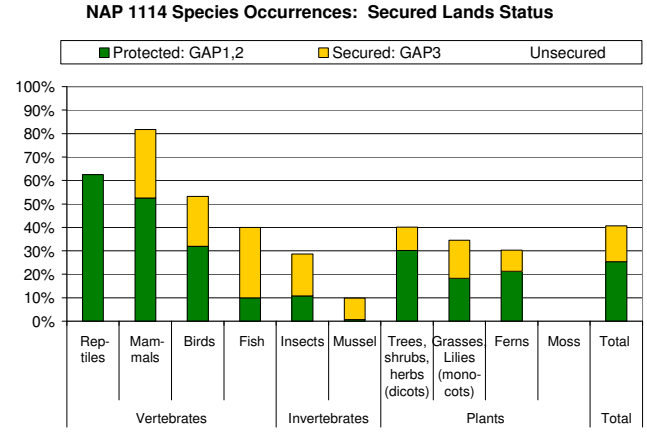
The portfolio rivers are fragmented by over 150 dams. Moderate to large river watersheds without dams are very rare, with 55% of size 2 and 86% of size 3 portfolio watersheds containing dams. Unfragmented river mainstems are also uncommon in the portfolio, with 28% of the size 2 and 66% of the size 3 rivers being fragmented by at least one dam on its mainstem..

Twenty four percent of the portfolio river buffers are secured against conversion. This ranges from over 50% in exemplary headwaters to 6% in large rivers. Overall 14% of portfolio river riparian land is protected for biodiversity (GAP1-2), while another 10% is secured from conversion (GAP3).

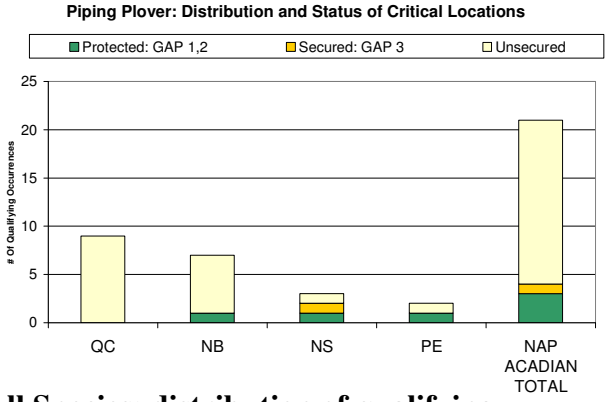
Data Sources: EPA NLCD Land Cover 2000. EPA National Inventory of Dams 1999. TNC: Lands permanently secured from conversion to development (Dec 2005)

• SPECIES PROTECTION LEVELS

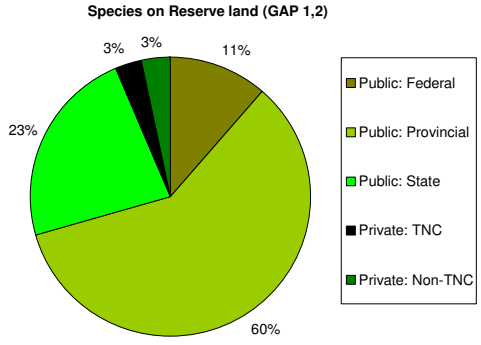
Estimated Flora and Macrofauna = 3,844
Primary Conservation Targets = 108
Qualifying Occurrences = 1,088 (1,114 incl. fish)
Overall Secured Status P:25%, S:15%



Individual Species Example: Piping Plover



All Species: distribution of qualifying occurrences on reserve lands



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What is this Measure and Why is it Important?
For many rare species, direct protection of their habitat and breeding areas is a critical step towards ensuring their long term persistence. This indicator examines 108 rare, endemic or wide-ranging species* and asks the question – How many critical mapped locations (viable populations or persistent breeding sites) are currently found on reserve lands or secured lands? How many populations are unprotected? **(excluding fish)*

What Do the Data Show? In the East, considerable progress has been made in species conservation over the last several decades. Of the 1,112 qualifying occurrences identified for rare species 40% are secured on GAP 1-3 lands including 25% protected (GAP 1,2) on biodiversity focused reserves.

Conservation trends are relatively consistent across taxonomic groups. For **vertebrates** (mammals, birds, reptiles and amphibians) 61% of the 22 qualifying occurrences are on secured (GAP1-3) land, including 37% protected (GAP 1,2) on biodiversity reserves. Over 209 occurrences of rare **invertebrate** species have been located and 13% are now on secured (GAP1-3) land with 3% protected on biodiversity reserves. Rare **plants** are poorly protected with only 13% of the 565 qualifying locations now on secured (GAP1-3) lands, including 9% protected (GAP 1,2) on reserves.

Species-by-species information is summarized by region, ecoregion and state or province in the appendix. The Piping Plover example illustrates how to interpret the charts and tables. The Plover breeds at 21 critical locations (qualifying occurrences) in this ecoregion, 3 of these areas are protected on GAP 1,2 reserve lands, 1 is on GAP 3 secured lands and 17 are on unsecured lands. To meet an initial minimum goal for the protection of at least 10 breeding areas in the ecoregion, conservation should focus on the Quebec and New Brunswick occurrences which are mostly unprotected.

For all species in this region, private conservation accounts for 6% of the protected reserves (GAP 1,2).

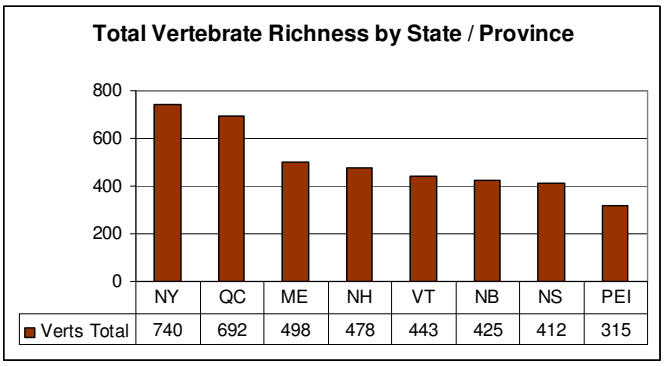
Data Sources: TNC ecoregional plans, Natureserve: Natural Heritage occurrence data; used with permission

(final draft Anderson 06)

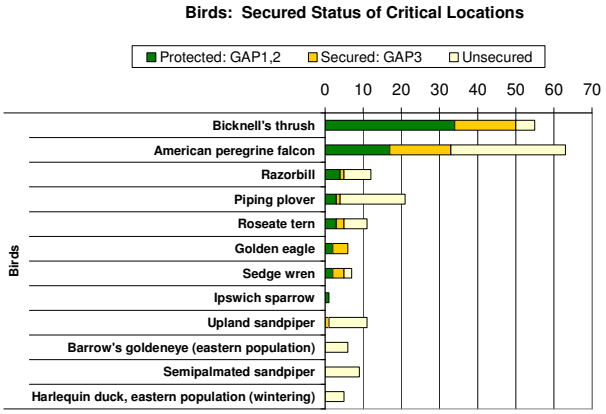
- **VERTEBRATES**

Estimated Fauna: 472 species
Primary Targets = 22 (28 incl. fish)
Qualifying Occurrences = 66, P:37%, S:24%

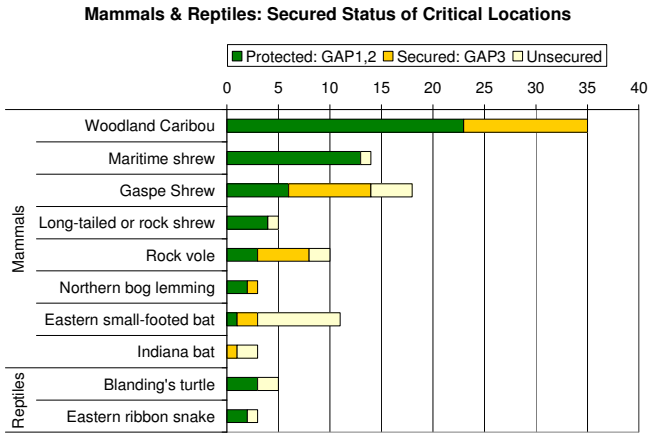
Total Vertebrate Richness



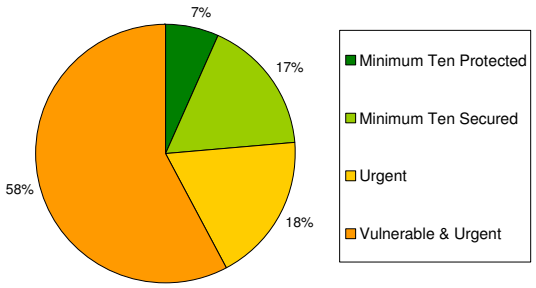
Primary Target Birds



Primary Target Mammals and Reptiles



Data Sources: TNC ecoregional plans, Natureserve: Natural Heritage occurrence data; used with permission. Scientific names given on pg 31



What is this Measure and Why is it Important?
In the ecoregional planning process, 22 species of vertebrates were identified as needing direct conservation action. For each of these **primary targets**, known population sites were identified and evaluated, and a conservation plan was developed. This status measure looks specifically at high quality occurrences and groups them into protection categories

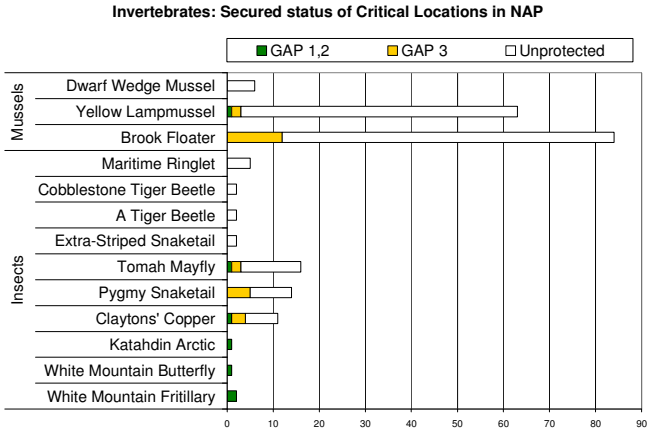
- **Vulnerable: not urgent (0%)** = less than 10 known qualifying occurrences, all are on GAP1-3 lands.
- **Vulnerable and Urgent (58%)** = less than 10 known qualifying occurrences and not all on GAP 1-3 lands.
- **Urgent (18%)** = more than 10 known qualifying occurrences but less than 10 on GAP 1-2 lands
- **Minimum Ten Secured (17%)** = over 10 qualifying occurrences on GAP 3 lands but less than 10 on GAP 1-2 reserves
- **Minimum Ten Protected (7%)** = over 10 qualifying occurrences on GAP 1-2 reserves

What Do the Data Show? Vertebrate protections is difficult to judge from qualifying occurrences, most of the location identified are critical breeding, wintering or feeding concentration areas that are used repeatedly from year to year. Bicknell's thrush, a high elevation breeder and peregrine falcon a cliff nester both have over thirty occurrences on secured lands. All the other bird targets have less than ten occurrences on secured lands although several may benefit from policy level protection relative to coastal and offshore features. The woodland caribou herd consisting of one small, mostly protected metapopulation in Quebec is experiencing disease problems related to the introduction of white-tailed deer. All other targets all have less than ten protected locations with the exception of the maritime shrew. Lynx, a wide ranging carnivore was treated in a separate report.

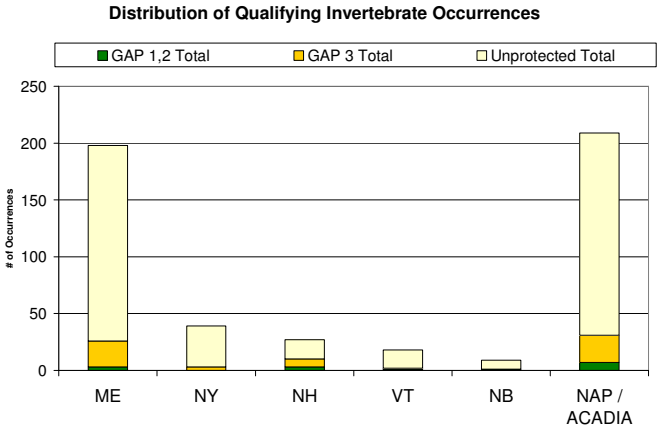
- **INVERTEBRATES**

Estimated Fauna: 668 species
Primary Targets = 13 species
Qualifying Occurrences = 209, P:3%, S:10%

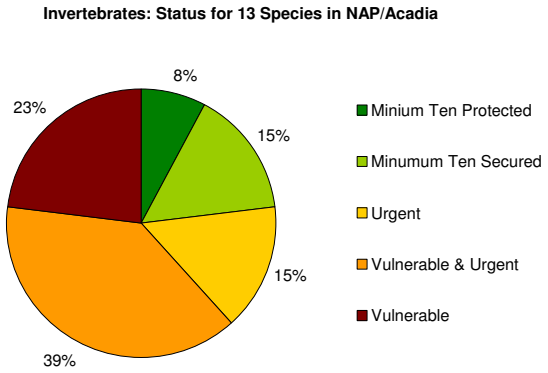
Invertebrate: Secured Status in NAP / Acadia



Distribution of Qualifying Occurrences by Province/State



Data Sources: TNC ecoregional plans, Natureserve: Natural Heritage and Canadian Conservation Data Center occurrence data; used with permission. Scientific names given on pg 31



What is this Measure and Why is it Important?
In the ecoregional planning process, 13 species were identified as needing direct conservation action. For each of these **primary targets**, known population sites were identified and evaluated, and a conservation plan was developed. This status measure looks specifically at high quality occurrences and groups them into protection categories

- **Vulnerable: not urgent (23%)** = less than 10 known qualifying occurrences, all are on GAP1-3 lands.
- **Vulnerable and Urgent (39%)** = less than 10 known qualifying occurrences and some are not on GAP 1-3 lands.
- **Urgent (15%)** = more than 10 known qualifying occurrences but less than 10 on GAP 1-2 lands.
- **Ten Secured (15%)** = more than 10 qualifying occurrences on GAP 3 lands but less than 10 qualifying occurrences on GAP 1-2 reserves.
- **Ten Protected (8%)** = over 10 qualifying occurrences on GAP 1-2 reserves.

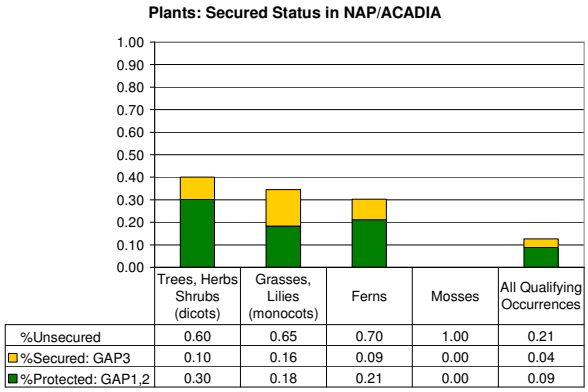
What Do the Data Show? Occurrences of rare invertebrates are not evenly tracked across states and provinces. Of those that are tracked 23% had more than ten occurrences on secured land. These were all butterflies and moths. Fifty-four percent of the species were still in urgent need of both protection and inventory efforts. Moreover, 62% are still vulnerable to extinction from due to low population and locations

(final draft Anderson 06)

- **PLANTS**

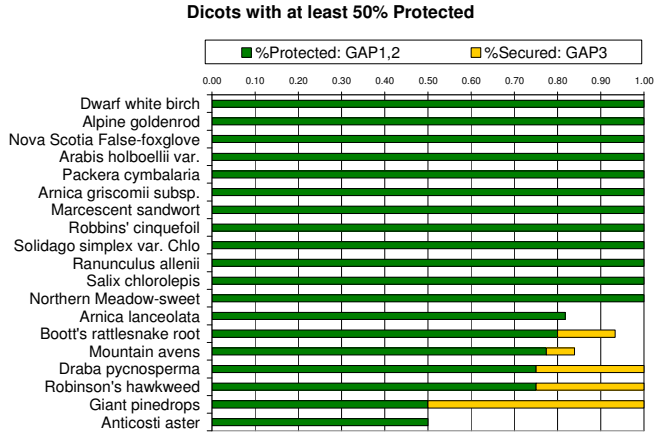
Estimated Flora: 2704 species
Primary targets = 67 species,
Qualifying Occurrences = 565, P:9%, S:4%

Primary Target Plants: Secured Status

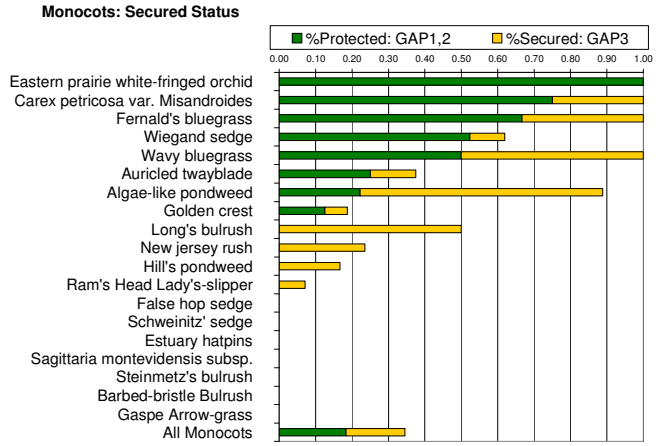


	Trees, Herbs Shrubs (dicots)	Grasses, Lilies (monocots)	Ferns	Mosses	All Qualifying Occurrences
%Unsecured	0.60	0.65	0.70	1.00	0.21
%Secured: GAP3	0.10	0.16	0.09	0.00	0.04
%Protected: GAP1,2	0.30	0.18	0.21	0.00	0.09

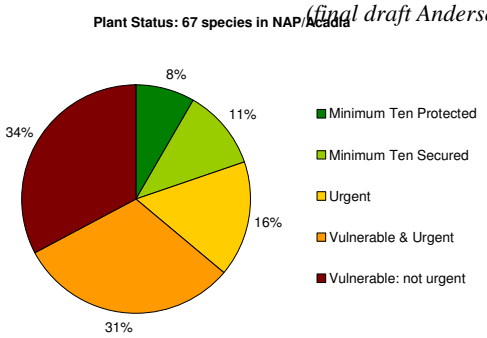
Trees, Shrubs, Herbs (Dicots)



Grasses, Sedges, Lilies (Monocots)



Data Sources: TNC ecoregional plans, Natureserve: Natural Heritage occurrence data; used with permission.

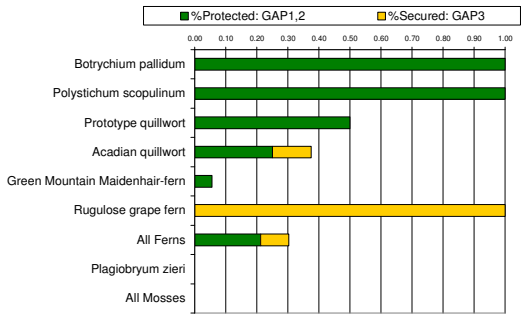


What is this Measure and Why is it Important?
In the ecoregional planning process 67 species were identified as needing direct conservation action. For each of these **primary targets**, known population sites were identified and evaluated, and a conservation plan was developed. This status measure looks specifically at high quality occurrences and groups them into protection categories

- **Vulnerable: not urgent (34%)** = less than 10 known qualifying occurrences, all are on GAP1-3 lands.
- **Vulnerable and Urgent (31%)** = less than 10 known qualifying occurrences and some are not on GAP 1-3 lands.
- **Urgent (16%)** = more than 10 known qualifying occurrences but less than 10 on GAP 1-2 reserves.
- **Minimum Ten Secured (11%)** = more than 10 qualifying occurrences on GAP 3 land but less than 10 on GAP 1-2 reserves.
- **Minimum Ten Protected (8%)** = over 10 qualifying occurrences on GAP 1-2 reserves.

What Do the Data Show? Nineteen percent of the species have at least a minimum of ten secured locations but 47% of the species were still in urgent need of both protection and inventory efforts. Moreover, 34% are still vulnerable to extinction due to low population sizes.

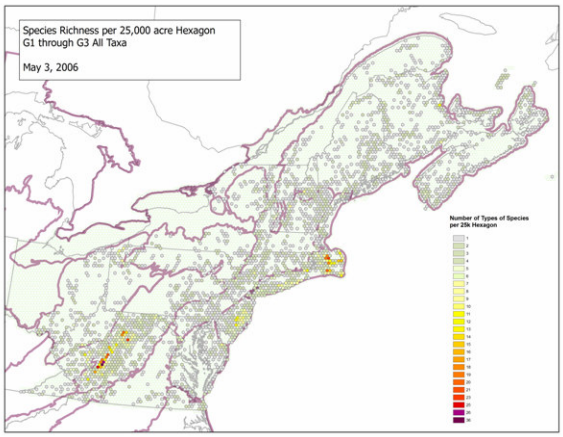
Ferns and Mosses



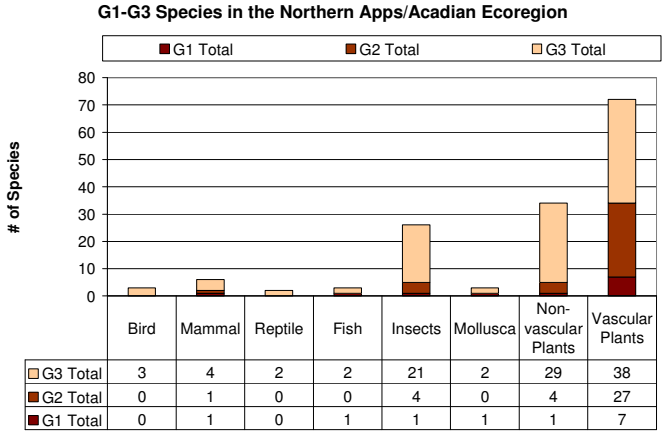
Scientific names given on pg 31

- **ENDEMISM**

All Endemic G1 – G3 Species



Distribution of 148 Rare G1-G3 Species



	Bird	Mammal	Reptile	Fish	Insects	Mollusca	Non-vascular Plants	Vascular Plants
G3 Total	3	4	2	2	21	2	29	38
G2 Total	0	1	0	0	4	0	4	27
G1 Total	0	1	0	1	1	1	1	7

Red Spruce distribution map, an example of a common regional endemic not include here.

Data Source: TNC ecoregional assessments, Natureserve, Natural Heritage community element occurrences. Flora of North America

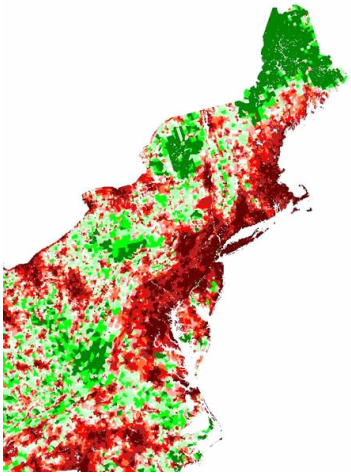
What is an Endemic and Why is it Important?
Endemic species are those for which the entire known population is restricted to, or centered around, a particular geographic region. It follows that the region is solely responsible for the conservation of that species. All of the globally rare G1 and G2 species in the east are endemic as are most of the slightly more common G3 species.

A few caveats are useful in interpreting endemic patterns. First, this analysis and most "Hot Spot" analyses are based largely on vertebrates, higher plants and well studied macro invertebrates. Estimates suggest that the former two (vertebrates and higher plants) account for about 10% of the species within an ecosystem. Adding the macro invertebrates is helpful although the data is less consistent. Fundamentally, however, most of the species that perform the functional aspects and account for the diversity of nature are the billions of micro-invertebrates, algae and fungi that are not well inventoried nor counted.

Second, most regional endemics such as red spruce or moosewood have the core of their distribution centered in this region but are not uncommon in the region. These "high regional responsibility" species were not included in this analysis. Many scientists have come to believe that the conservation of <u>all</u> species can probably only be accomplished through the protection of functioning ecosystems – hence the change in conservation biology from a species-by-species focus to an ecosystem focus.

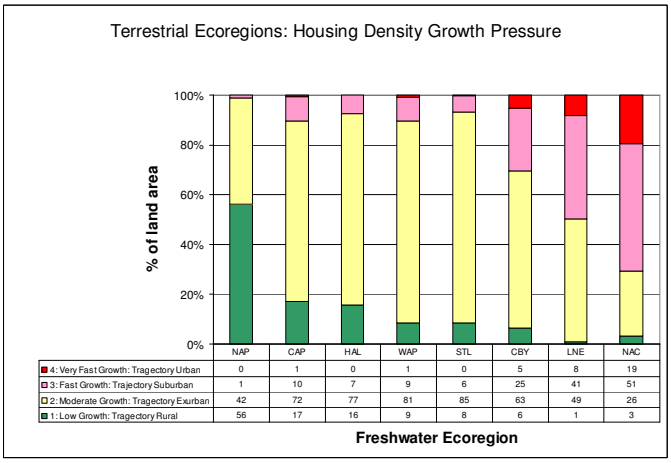
What Do the Data Show?
The Northern Appalachian / Acadian ecoregion is particularly rich in rare mosses and liverworts (34), vascular plants (72), and insects (26). Other taxa are represented by a few examples each.

- **HOUSING DENSITY PRESSURE**

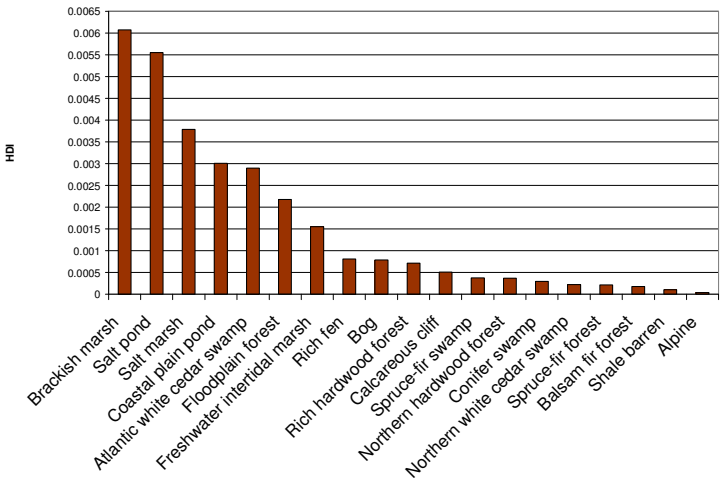


Highest rates
in dark red

Map of Housing Density Rates (explained in text) and rates summarized by ecoregion



Natural Communities and Ecosystems in relation to Housing Density Pressure:



What is this Measure and Why is it Important?
The Housing Density Pressure (HDP) index estimates rate and intensity of housing pressure based on trends in the census data from 1940 projected through 2050. On the map dark red indicates areas where the rate of change is fast with housing density predicted to reach urban levels in the next 45 years, dark green indicates areas where the rate of change are slow. The latter areas will remain at low density rural levels through 2050. The index is calculated by fitting a regression line to five decades of census data and four decades of forecasted trends.

What Do the Data Show?
Coastal systems are subject to the highest housing density pressure with in the next half century. Our best salt marshes, beaches, coastal plain ponds and tidal wetlands are all found in counties that are rapidly moving towards urban densities. **Floodplain systems**, already heavily impaired by agricultural fragmentation and water regulations, are also at high risk from housing density pressure. **Calcareous soil ecosystems** such as rich fens and rich hardwood forests are subject to moderate rates of housing density pressure.

At the other end of the spectrum, alpine systems, high elevation spruce fir forests and remote conifer swamps are under very little development pressure for the next half century. These systems are also the ones most prevalently on lands secure against conversion, underscoring the pattern that protection has historically focused on some of our regions least threatened ecosystems.

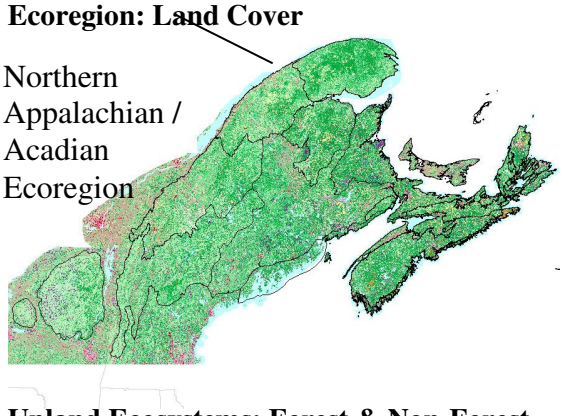
The Northern Appalachian / Acadian ecoregion stands out as the region in the eastern US that is least subject to housing density pressure with almost 60% of the area expected to remain in a rural state over the next 50 years.

Data Source: Theobold 2003, TNC Eastern Conservation Science TNC ecoregional assessments, Natureserve, Natural Heritage community element occurrences

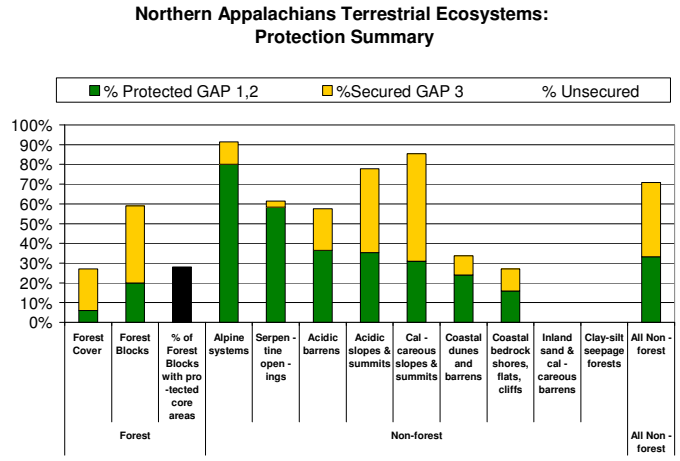
(final draft Anderson 06)

ECOREGION SUMMARY

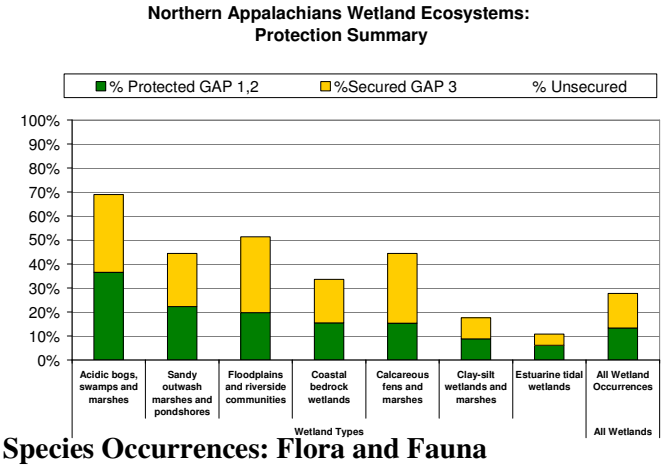
Ecoregion: Land Cover



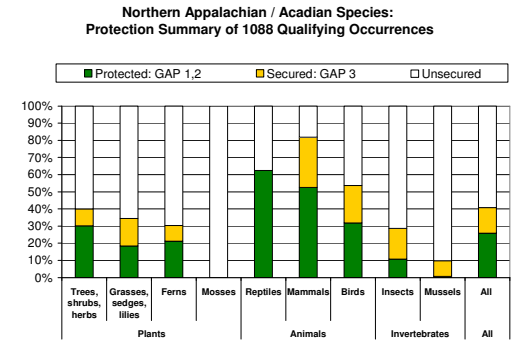
Upland Ecosystems: Forest & Non-Forest



Wetland Ecosystems



Species Occurrences: Flora and Fauna



NORTHERN APPALACHIAN / ACADIAN

Rugged region of mountains, lowlands and shoreline extending from the Adirondack Mountains to the Quebec Highlands and south to the coast. Heavily forested, variations of red spruce-balsam fir and maple-beech-birch northern hardwood forests dominate. High relief areas contain alpine communities, rocky summits, cliffs, and talus slope. Low-lying areas with extensive peatlands, floodplain forests, and riverside seeps. Coastal islands, rocky shores, intermittent beaches and tidal marshes flank the Atlantic.

- **Size: 82,865,628 acres**
- **GAP 1,2 = 7%, GAP 3 = 28%**
- **Unsecured = 65%**
- **Converted to Protected ratio: 3.1**
- **Natural Cover: 97%**
- **# Endemic species: 148**
- **Portfolio Target Occurrences: 11,206**
- **Portfolio Streams: 3,407 miles US only**

Portfolio Protection Status: Qualifying Occurrences

Terrestrial

- **Forest Blocks: 174 / 28% w Cores**
- **Non-Forest occurrences 6,560 / 33% GAP 1,2**
- **Wetland occurrences: 3,384/ 13% GAP 1,2**
- **Species occurrences: 1,088 / 26% GAP 1,2**

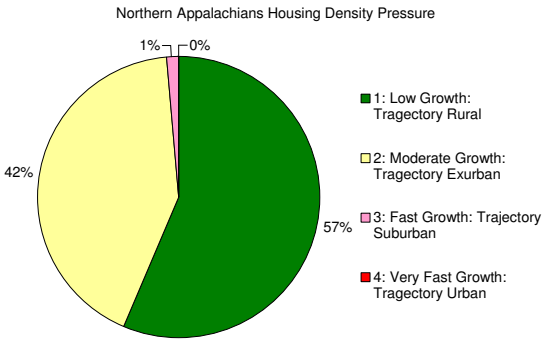
Average = 25% =/- 9%
Sum = 26%

Aquatic

- **Stream miles: 3,407 / 14% GAP 1,2 (US)**

Terrestrial Protection Average = 25% +/- 9%

Housing Density Pressure



Northern Appalachian / Acadian Ecoregion .

(final draft Anderson 06)

COMMON NAME	STANDARD NAME
A moth	Siphlonisca aerodromia
A tiger beetle	Cicindela ancocisconensis
Acadian quillwort	Isoetes acadiensis
Acipenser brevirostrum	Acipenser brevirostrum
Acipenser oxyrinchus	Acipenser oxyrinchus
Algae-like pondweed	Potamogeton confervoides
Alpine goldenrod	Solidago multiradiata var. Arctica
American burying beetle	Oeneis melissa semidea
American ginseng	Panax quinquefolius
American peregrine falcon	Falco peregrinus (anatum)
Anticosti aster	Symphyotrichum anticostense
Arabis boivinii	Arabis boivinii
Arabis holboellii var. Secunda	Arabis holboellii var. Secunda
Arnica griscomii subsp. Griscomii	Arnica griscomii subsp. Griscomii
Arnica lanceolata	Arnica lanceolata
Astragalus australis	Astragalus australis
Auricled twayblade	Listera auriculata
Barbed-bristle bulrush	Scirpus ancistrochaetus
Barrow's goldeneye	Bucephala islandica
Beach pinweed	Lechea maritima var. Subcylin
Bicknell's thrush	Catharus bicknelli
Blake's milk-vetch	Astragalus robbinsii var. Minor
Blanding's turtle	Emydoidea blandingii
Boott's rattlesnake root	Prenanthes boottii
Botrychium pallidum	Botrychium pallidum
Brook floater	Alasmidonta varicosa
Brook snaketail	Ophiogomphus howei
Carex petricosa var. Misandroides	Carex petricosa var. Misandroides
Cobblestone tiger beetle	Cicindela marginipennis
Connecticut beggar-ticks	Bidens heterodoxa
Coregonus huntsmani	Coregonus huntsmani
Cut-leaved coneflower	Rudbeckia laciniata var. Gaspèrea
Draba pycnosperma	Draba pycnosperma
Dwarf wedge mussel	Alasmidonta heterodon
Dwarf white birch	Betula minor
Eastern jacob's ladder	Polemonium vanbruntiae
Eastern prairie white-fringed orchid	Platanthera leucophaea
Eastern ribbon snake	Thamnophis sauritus
Eastern small-footed bat	Myotis leibii
Eaton's beggarticks	Bidens eatonii
Estuary hatpins	Eriocaulon parkeri
False hop sedge	Carex lupuliformis
Fernald's bluegrass	Poa laxa ssp. Fernaldiana
Furbish lousewort	Pedicularis furbishiae
Gaspè arrow-grass	Triglochin gaspensis
Gaspè shrew	Sorex gaspensis
Giant pinedrops	Pterospora andromedea
Golden crest	Lophiola aurea
Golden eagle	Aquila chrysaetos
Green Mountain maidenhair-fern	Adiantum viridimontanum
Harlequin duck	Histrionicus histrionic
Hill's pondweed	Potamogeton hillii
Indiana bat	Myotis sodalis
Ipswich sparrow	Passerculus sandwichensis princep
Karner blue butterfly	Lycaena dorcas claytoni
Katahdin arctic	Ophiogomphus anomalus
Large-leaved sandwort	Moehringia macrophylla
Long's bulrush	Scirpus longii
Long-tailed or rock shrew	Sorex dispar
Marcescent sandwort	Minuartia marcescens
Maritime ringlet	Coenonympha nipisiquit
Maritime shrew	Sorex maritimensis
Mountain avens	Geum peckii
New Jersey rush	Juncus caesariensis
Northern bog lemming	Synaptomys borealis
Northern meadow-sweet	Spiraea septentrionalis
Nova Scotia false-foxglove	Agalinis neoscotica

COMMON NAME	STANDARD NAME
Osmerus sp. 1	Osmerus sp. 1
Oxytropis viscida	Oxytropis viscida
Packera cymbalaria	Packera cymbalaria
Piping plover	Charadrius melodus
Plagiobryum zieri	Plagiobryum zieri
Plymouth gentian	Sabatia kennedyana
Polystichum scopulinum	Polystichum scopulinum
Prototype quillwort	Isoetes prototypus
Ram's head lady's-slipper	Cypripedium arietinum
Ranunculus allenii	Ranunculus allenii
Razorbill	Alca torda
Robbins' cinquefoil	Potentilla robbinsiana
Robinson's hawkweed	Hieracium robinsonii
Rock vole	Microtus chrotorrhinus
Rose coreopsis	Coreopsis rosea
Roseate tern	Sterna dougallii
Rugulose grape fern	Botrychium rugulosum
Sagittaria montevidensis	Sagittaria montevidensis.
Salix chlorolepis	Salix chlorolepis
Salmo salar	Salmo salar
Salvelinus alpinus oquassa	Salvelinus alpinus oquassa
Schweinitz' sedge	Carex schweinitzii
Sedge wren	Cistothorus platensis
Semipalmated sandpiper	Calidris pusilla
Solidago simplex	Solidago simplex var. Simplex
Solidago simplex	Solidago simplex var. Chlo
St. Lawrence aster	Symphyotrichum laurentianum
Steinmetz's bulrush	Schoenoplectus x steinmetzii
Upland sandpiper	Bartramia longicauda
Wavy bluegrass	Poa fernaldiana
White Mountain butterfly	Oeneis polixenes katahdin
White Mountain fritillary	Boloria titania montinus
Wiegand sedge	Carex wiegandii
Woodland caribou	Rangifer tarandus
Yellow lampmussel	Lampsilis cariosa