❖ Standard 8: Develop explicit abundance and distribution goals for conservation targets/biodiversity elements.

Case Study: **Goal Setting in the High Allegheny Plateau—An Illustration of the Eastern Regional Approach to Setting Numeric and Distributional Goals**

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Purpose and region of analysis

The High Allegheny Plateau planning team used a 2 component quantitative goal to facilitate comprehensive site selection for conservation portfolios. Each conservation goal included a numeric and distributional goal for species and patch community targets. The goal setting process deviated slightly for matrix community and aquatic targets. The High Allegheny Plateau is located in the Northeastern United States. This methodology was developed by members of ecoregional assessment teams throughout the Northeast. The Lower New England, St Lawrence-Lake Champlain, Northern Appalachian, Central Appalachian, Chesapeake Bay, North Atlantic Coast and Western Allegheny Plateau ecoregions also employed this approach to goal setting.

Criteria/Methods

The High Allegheny Plateau planning team developed a series of goals for the conservation of species, community, matrix community, and aquatic targets. A unique aspect of the approach used by the planning team was that explicit quantitative goals were set for both the number and distribution of occurrences of a target within an ecoregion. In order to achieve the conservation goals set for the High Allegheny Plateau, both the numeric and distributional goals need to be met. Due to the similarity of the methods, the species and community target goal setting approach can be described simultaneously. This will be followed by a summary of the matrix community, then aquatic system goal setting methodologies.

Species and Patch Communities

The numeric component of the goal-setting process for species and patch communities relied on a value drawn from the literature. Several published research articles (e.g. Cox et al 1994, Anderson 1999, Quinn and Hastings 1987) have concluded that 20 viable occurrences of a target will ensure the persistence of at least one occurrence over a century. This number served as the starting point for a more deliberate and individualized determination of the goal for groups of like species or patch communities. Target goals were set for groups of targets rather than individually because of time and resource limitations. For species, groups were defined using life history and

distributional traits. For patch communities, patch size and distribution were used. Numeric and distributional (or stratified) goals were then developed for species and patch community groups defining both the number of occurrences within an ecoregion and the distribution of those occurrences necessary to ensure the persistence of a species or patch that fell within a given group.

Species groups were determined using different factors than those used to determine patch community groups. For the numeric component of species conservation goals, the number 20, set forth in the general goal, was adjusted based on three factors:

1. the relative percentage of the total number of species occurrences in a particular ecoregion (occurs in only one ecoregion, occurs in the ecoregion and in one other or only a few adjacent ecoregions, widely distributed in more than three ecoregions, or more commonly found in other ecoregions)
2. the pattern of that species' distribution, (restricted, limited, widespread or peripheral or disjunct), and
3. the global Natural Heritage Program ranking of the species (G1, G2, or G3-G5).

The resultant matrix can be seen in Table 1

Table 1. Goals for species occurrences based on distribution and conservation status of a species.

CATEGORY	DEFINITION	G1	G2	G3-G5
Restricted	Occurs in only one ecoregion	20	20	20
Limited	Occurs in the ecoregion and in one other or only a few adjacent ecoregions	10	10	10
Widespread	Widely distributed in more than three ecoregions	5	5	5
Peripheral or Disjunct	More commonly found in other ecoregions	5	5	5

Patch community groups were differentiated by:

1. the relative percentage of the systems total distribution that fell within the ecoregion (widespread, peripheral/disjunct, limited or restricted/endemic) and,
2. the size of the patch type (small or large)

The resultant matrix can be seen below (Table 2).

Table 2: Conservation goals for large and small patch community occurrences

PATCH–FORMING ECOSYSTEMS	LARGE PATCH Stratification goal in parentheses	SMALL PATCH Stratification goal in parentheses
Restricted/Endemic	16 (4)	20 (4)
Limited	8 (2)	14 (2)
Widespread	4	4
Peripheral	*	*

*Objectives determined on a case by case basis.

A distribution component was added to the overall conservation goal and termed the stratification goal. This goal was set to insure that a species or community is conserved

throughout the range of environmental conditions under which it occurs or occurred historically. Geographic subunits were determined for the ecoregion reflecting variation in climate, soils, bedrock geology, vegetation zones, and landform settings. In general, the desired distribution criterion for a species was to conserve at least one viable population in each of the appropriate subsections. Subsections are the geographic sub-units that occur within an ecoregion as defined by Bailey et al (1994) and Keys et al (1995).

For patch-forming ecosystems, a hierarchical stratification of the ecoregion was developed. The distribution goal for a given community type was dependant upon its geographic distribution class. If a community type is widespread then no stratification was used to select sites. However, if a community type is restricted or limited in its distribution, portfolio sites had to occur within each of the stratified units in order for goals to be met. Restricted range communities required more within-ecoregion stratification than limited range communities. The stratification of an ecoregion into finer units was based on biophysical attributes. US Forest Service subsections (Keys et al 1995) were aggregated into subregions when they were more similar to each other in terms of ELUs than to other units. Below is an example of the stratification of the Northern Appalachian/Boreal Ecoregion (Table 3).

Table 3: Example of stratification table for the Northern Appalachians (Anderson 1999). Acres are shown in parentheses.

Northern Appalachian / Boreal Ecoregion						
Northern Appalachian Mountains (16.8M)				Boreal Hills and Lowlands (15.4M)		
Adirondacks / Tug Hill (6.7M)		White and Green Mountains (10.2M)		Northern Boreal Hills (5.3M)	Southern Boreal Hills (10.1M)	
Tug Hill Plateau	Adirondack Mountains	White Mountains	Green Mountains Vermont Piedmont	Northern Boreal Hills	Central Maine Lowland	Southern Maine Coastal
M212F	M212D	M212A	M212C M212B	M212Aa,b 212Aa	212A,B 212C,D	212C 212D
(700K)	(5.9M)	(6.8M)	(3.4M)	(5.3M)	(6.9M)	(3.1M)

In this example, sites for a restricted system would be selected such that at least one occurrence would be protected in each of four subregions (Adirondacks/Tug Hill, White and Green Mountains, Northern Boreal Hills, and Southern Boreal Hills) and those with a limited distribution would be selected within two subregions (Northern Appalachian Mountains and Boreal Hills and Lowlands). For wide ranging community types, sites could be selected anywhere within the ecoregion.

Matrix communities

Matrix communities in this ecoregion are forests. Because of the large scale at which these communities occur, they are a special case in the planning process. Quantitative numeric goals were not set for matrix communities. . Instead, the entire ecoregion was assessed to determine the location, extent and quality of existing forest landscape blocks (matrix community type occurrences for this ecoregion). All occurrences were categorized as Tier 1 or Tier 2 occurrences where Tier 1 were the best examples of a

forest landscape group and Tier 2 were also of acceptable quality for protection but were inferior to a Tier 1 block. It was also important to identify matrix communities that collectively represented all of the types of landscapes typical of the ecoregion. This helps buffer against large scale threats and maximize the number of small scale targets (species and patch forming communities) that are protected within these matrix communities. Therefore, the team set the goal of identifying one to four Tier 1 blocks within each forest-landscape combination for inclusion in the final portfolio.

Aquatic communities
The two components incorporated into the aquatic conservation goals were representation and connectivity. The minimum representation goal was set to one example of each size 2 and 3 watershed types. This number was set higher if:

1. the planning team had strong feelings other examples were needed to represent the diversity within the system;
2. there were equally intact interchangeable units for which priority of one or the other could not be decided, or;
3. there were other compelling reasons such as the addition of very critical areas for specie level targets, an occurrence could create a good terrestrial/aquatic linkage, another example was needed to fill out regional connectivity network or, active partners were already working on the example and TNC could gain partnerships by expanding our work and including the example.

More specific abundance goals were not set yet should be in future iterations of the plan.

Two connectivity goals were set. At the regional scale, the goal was to identify one "focus network" which is a network of rivers where connectivity exists from the headwaters to the mouth of a large river for each size 3 river type where a regional wide-ranging species occurred. At the intermediate scale, the goal was to conserve at least one connected suite of headwaters to the corresponding medium sized river for each intermediate scale target including intermediate scale potadromous fish, communities and processes.

Products/Outcomes

What follows is a series of tables illustrating final goals set for terrestrial (Table 4) and aquatic (Table 5) communities and matrix forest blocks (Table 6) within High Allegheny Plateau Ecoregion. For more detail pertaining to goals set for target species see Zaremba et al. (2003).

Table 4: Minimum conservation goals for HAL natural communities as a function of

patch size and rangewide distribution of the type.

		Patch Size	
Rangewide Distribution	Minimum Stratification (Level)	Large or Linear (4)	Small (5)
Restricted	4 (5 groups of subsections)	20	25
Limited	3 (4 groups of subsections)	16	20
Widespread	2 (2 groups of subsections)	4*	5*
Peripheral	2 (2 groups of subsections)	4*	5*

* For Widespread and Peripheral associations the total ecoregional goal is 4 for Large Patch and 5 for Small Patch associations. If the association occurs in both glaciated and non glaciated parts of HAL, then these occurrences must be distributed in both units.

Table 5: Abundance Goals for HAL Aquatic Ecological Systems

Aquatic Ecological System Type	*Goal per EDU*
Headwater streams (size 1 system types)	Minimum of 3 examples per system type per EDU
Medium-sized tributaries (size 2 system types)	Minimum of 2 examples per system type per EDU
Small rivers (size 3 system types)	Minimum of 1 example per system type per EDU
Large rivers (size 4 system types)	1 per EDU

Table 6: Goals and Status of Portfolio for Matrix Forest Block Groups in HAL

Block Group Code	Goal	# Tier 1	# Tier 2	# Needed for Portfolio
A1a	2	1	2	1*
A1b	2	2	1	1
A2a	2	1	2	1*
A2b	2	2	2	Goal met
B2	2	6	0	Goal exceeded
B1a	2	2	3	Goal met
B1b2	2	4	8	Goal exceeded
B1b1	2	6	6	Goal exceeded
C	2	1	0	1*

* All matrix blocks in these groups need extensive restoration

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