Target Setting

Targets are defined as the quantified minimum requirement or threshold for a given ecological objective within the Natural Heritage System (NHS). Collaboratively identifying a balance of values and issues to be considered and in what amount is at the heart of the systematic conservation planning process. Natural features provide many concurrent environmental functions so ecological objectives can readily overlap (e.g. a patch of forest cover not only provides habitat but also hydrologic and water quality benefits).

The Scenario Development Team (SDT) representing a diverse group of local stakeholders came together through consensus to determine and discuss the requisite considerations for a local natural heritage system (NHS). Using the best available science and information as recommendations and guidelines, the stakeholders defined and set targets for those ecological objectives that best describe what they collectively think the Natural Heritage System should provide.

Conservation planning literature supports the concept that the state of the historic landscape, or pre-settlement condition should be used in conjunction with the most current available data as the base references to help inform the establishment of targets. Without information about a landscape's reference condition, such as historical natural vegetation, natural resources planning and management activities are flawed because the current state of the landscape becomes an acceptable threshold. This assumption will lead to further environmental and landscape degradation including loss and impairment of floral and faunal biodiversity.

How are Constraints and Targets different from each other?

When considering socio-political constraints and targets it is important to remember that the goals for each within the evaluation process are very different.

Socio-political constraints address the "what-is" on the landscape and frame where on the landscape it is currently practical to expect contributions towards ecological objectives. Targets on the other hand look at "what could be or what should be" in the sense that they outline what is required as a minimum based on the best available science to ensure the long term health of the system and the sustainability of its resources. Where there is no science available to guide the development of a discrete target for a conservation feature, the target can be based on expert opinion, local knowledge and/or stakeholder consensus.

The SDT chose to look at constraints before targets in this process. It was believed that it would be easier to understand constraint setting as it deals with existing land uses and designations. Targets can be a somewhat abstract concept. Given the learning curve associated with the Natural Heritage System process in general, the project team wanted to give the SDT time to feel comfortable with the process prior to making decisions about what is required in the system. In hindsight this may have contributed to the confusion and misconceptions that this process would be about land use policy development. Starting with decisions around targets for ecological objectives of a Natural Heritage System may have given a better sense of the task at hand, in other words, as an exercise in conservation biology rather than a land use policy process.

How does MARXAN deal with Targets?

While planning unit status and cost frame an analysis in terms of where MARXAN can actually evaluate, the balance of the modeling process is about finding the most optimal areas to include within the system

to achieve the ecological targets set by the Scenario Development Team. As with the assignment of hexagon costs and status, targets for ecological objectives can be readily adjusted to help quantify trade-offs between scenario outcomes. Nature for Niagara's Future ran most of its learning scenarios with targets modified from the Scenario Development Team's initial scientifically based baseline decisions, such as setting all objectives to 50% of what currently exists in the conservation feature inventories.

Coarse and fine scale targets work together in this process. Coarse filter covers most of the planning area and usually represents habitats or higher level communities. It does not consider any single species but rather, a general suite of species that usually occur together. By setting fine scale targets, the coarse scale is refined to include those critical areas where taxa of particular conservation concern are known to occur. (Ardon: 2010, p. 26)

Identifying Objectives and Setting Targets

The identification of ecological objectives for a Natural Heritage System in Niagara was to be scientifically based and supported by *guidelines* recommended in conservation biology literature. These broad guidelines are generally linked to an ecological response or threshold for a landscape which can be refined to local conditions. Most are already based on minimums so to deviate and 'manage down' from them would suggest further habitat losses and impairments in habitat and ecological function. The targets that have been used are identified because they are effective reporting measures and because they are relatively easy to understand and communicate. As conservation guidance they are principally intended to start us down the right path to what a sustainable landscape might look like.

The target decisions by the Scenario Development Team based on these guidelines form a Baseline Comparator Scenario. These baseline targets represent the scientific "measuring stick" that is being used to evaluate the study area. Performance of the Baseline Comparator Scenario informs how well the landscape is doing in relation to what science suggests is sustainable. When using the Baseline as a comparator to Learning Scenario results, deviations from the baseline targets can be quantified.

When setting targets, it is important to consider not only how much is required as a minimum within the system but also if there are scientific or even ethical reasons to consider more than the minimum. There might also be reasons to consider more than one target for the same feature.

The 6 questions we asked ourselves when setting targets were as follows; 1- What data exists? 2- What existed historically for this feature? 3- How much do we have currently? 4- What does the research say about how much is enough? 5-Does the research need to be adapted to meet the Niagara condition? 6- Are there scientific, practical, or ethical reasons to consider more than the minimum?

Prior to each Scenario Development Team meeting, technical advisors prepared background information on existing science-based thresholds and targets in consultation with resource experts. The current condition and data for each feature in the study area was evaluated using data prepared in GIS. If a particular expertise (e.g. hydrogeology) was missing on the Scenario Planning Team, experts were invited to meetings to support the discussion. Where consensus on a target could not be reached, alternative 'what if' targets were identified for investigation through learning scenarios.

Again, given the learning curve associated with the systematic conservation planning process in general, and due to the rapid pace of meetings and the associated preparation requirements, most of the conservation values and issues identified were brought forward for consideration by the project management team based on the examples from similar projects being conducted in other parts of the province. As a result, the complement of ecological objectives and targets identified for a Natural Heritage

System in Niagara are by no means exhaustive. Beyond those identified that did not get implemented because of data gaps, there may be many more that were simply not thought of and brought forward to the SDT or as yet, the science community is unaware of their existence. Scenario Development Team (SDT) meetings tended to be events of mental fortitude just to come to grips with the process itself and to digest the information that was compiled in advance of each session. The current analysis can certainly be further refined in the future with the advent of additional information or overlooked concepts.

An example of this would be the concept of natural cover that exists within mapped floodplains. The concept of floodplains was discussed as socio-political constraint but because the regulatory status does not preclude natural cover from persisting within a floodplain they were not assigned a status of included or factored into the cost. Natural cover within mapped floodplains certainly provide unique watershed and habitat functions, so there could have been a completely valid ecological objective developed with an associated target for this conservation value, however this was never considered.

Valuation is achieved by understanding how features contribute to systems goals. Perceiving that the list of objectives and their associated targets are not necessarily complete is extremely important because the whole quantitative and relative assessment of natural heritage features that is facilitated by this process is referenced against their cumulative total. By adding missing or overlooked functions of natural features as objectives, the understanding of how all features work together systematically and their relative importance to those goals is better understood.

There were a total of 62 ecological objectives which when distributed across the soil landscapes translated into 726 targets that were tracked under the analysis. A fact sheet has been prepared for each feature identified.

Concept of Distribution

In a lot of cases many of the ecological objectives were applied since distributed targets as many of the guidelines from the conservation biology literature work at different scales. This consideration is important to ensure that contributions to system objectives do not come from one corner of the study area and because many environmental functions do not operate across broad landscape scales such as Niagara watershed as a whole. As a result, many of the watershed type functions were applied to the Watershed Planning Areas of the Niagara Peninsula Conservation Authority which are aggregations of Local Management Areas (LMAs) from the Niagara Water Strategy. Additionally, the Biodiversity Representation and Habitat functions were applied at the Soil Landscape level which is the most detailed spatial entity within the National Ecological Framework for Canada and the soil landscapes are the closest approximation we have to EcoSections which are subunits to EcoDistricts (they nest within EcoDistricts, and within EcoSections are the EcoSites).

Types of Ecological Objectives/Targets

Under target setting the values fall within general functional categories of NHS objectives to be considered. They are component parts of the ecosystem that help sustain overall system health and longevity. The four main target categories discussed were.

Hydrological Function Purpose: These values regulate the quality and quantity of water above and below the ground to maintain healthy watersheds. Targets are set based on watershed boundaries to

protect streams, rivers and lakes from erosion and contaminants, maintain groundwater levels and minimize flooding.

Ecological Function – Coarse Scale Purpose: These landscape values contribute to ecosystem functions such as the movement of species. Stakeholders set targets for the number and size of patches and for how close together the patches should be in order to sustain healthy plant, animal and fish populations. Coarse scale features, such as patch size and forest interior, ensure that habitats are included for a broad range of species.

Ecological Function – Fine Scale Purpose: The values and targets in this category address individual species and their habitat needs. This finer level of detail ensures species specific habitat requirements are represented in the natural heritage system.

Biodiversity Representation Purpose: The values in this category represent unique vegetation communities, the foundation for ecosystems that contribute to the biodiversity of Ontario. The targets set for these values ensure that all native forests, wetlands, grasslands and other vegetation communities are represented appropriately in a natural heritage system.

Fact sheets were laid out as follows:

Title
Kind of Value – Constraint or Target
Under which objective (category)?
Example: Constraint – Conservation Lands

Value
Example: Provincial Parks

Definition of Value
Example: How are Provincial Parks defined for the purpose of the project? Why is it important to consider this value in a NHS?

Dataset
What data was used?
Existing limitations of the data.

Discussion
Important information from the discussion of the Scenario Development Team to arrive at a decision.
-Issues
-Highlights
-Data gaps identified

Decision of the Scenario Development Team (SDT)
How the SDT chose to deal with this particular value.

How this value was represented in the learning scenarios

How this value was represented in the preferred scenario
What information was gathered from the analysis on this value?

Recommendations
What can we do to improve the analysis? Data gaps still existing? Outstanding issues?