

National Conservation Council

Scoring system for ranking of Nominations for Terrestrial Protected Areas (NCL Section 9)

The National Conservation Council (NCC) expects to receive, during set periods designated by public notice, nominations under the National Conservation Law (NCL) section 9 of areas for protected status. This scoring system is designed to assist NCC in arriving at objectively justifiable decisions regarding which of these nominations to carry forward, given the funding available in the given budgetary period and the purposes, objectives and criteria set out in NCL s.8.

The scoring system has been tested on a range of natural habitat areas in all three of the Cayman Islands. This document describes the principles and operation of the system.

Revisions to this scoring system may only be introduced outside annual nomination and assessment periods.

The scoring system

Each nominated parcel or area of land is scored by measuring or assessing a series of specific criteria, which are designed to be objectively measurable if at all possible.

For two non-technical criteria where no objective measure is possible, scoring is set by averaging subjective scores from Department of Environment (DoE) staff members with knowledge of the areas concerned, who are not directly involved in the nominations. One more technical criterion which is subjectively scored will be initially scored by DoE's Terrestrial Resources Unit but must be reviewed by Council in working group.

All criteria are initially scored on a scale of 1 to 5, with higher scores supporting a higher ranking (more justifiable to protect).

There are a total of 18 criteria in the current (2016) version of this scoring system. These are grouped into criteria for four value classes. Of these criteria, two (Connectivity and Strategy) are only applicable at the parcel level, while the remainder can also be used at wider geographical scales.

For each of these criteria, the corresponding purposes and objectives defined for protected areas in NCL Section 8(1), and the corresponding criteria for selection of protected areas set out in Section 8(2) are listed. All NCL purposes, objectives and criteria are addressed by the scoring

criteria, and all scoring criteria address at least one of the Section 8(2) criteria. The scoring system is thus a quantitative implementation of the selection process laid out in NCL Section 8.

Biological Value	Climate Value	Financial & Strategic Value	Social Value
Plant Biodiversity	Carbon Sequestration	Affordability	Tourism
Integrity	Climate Resilience	Management Ease	Eco-Services
Endangered Species		Island Weighting	
Probable Critical Habitat		Urgency	
Ecological Function		Connectivity	
Threat Distance		Strategy	
Habitat Representation			
Oasis Effect			

Weighting

By consensus of the DoE's Terrestrial Protected Areas Committee, the overall weighting for the total score for individual nominations should allocate 52% of the maximum possible total score to Biological value, 12% to Climate value, 18% to Financial & Strategic value, and 18% to Social value.

The number of criteria in each group already creates a prior weighting in favour of Biological, and Financial & Strategic values, which will vary depending on whether the analysis is at the parcel level or at a larger scale (because two Financial & Strategic criteria are not applicable at larger scales).

The final scores in each group will therefore be adjusted by the factors required to bring the final weighting to the agreed 52-12-18-18 ratio, before summing to generate the final total score for each nomination.

For example, weighting adjustment for a nomination of an area containing multiple parcels will be as follows:

	Biological	Climate	Fin/Strat	Social
Prior weighting	50% (8 criteria)	12.5% (2 criteria)	25% (4 criteria)	12.5% (2 criteria)
Adjustment factor	1.04	0.96	0.72	1.44
Final weighting	52%	12%	18%	18%

The Criteria

Plant Biodiversity	s.8(1)(a),(b),(c),(e), s.8(2)(a-f)
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The overall biodiversity of a nominated area is measured using vascular plant biodiversity as the key indicator.

This is considered the most useful indicator we have available because plant species lists are published for all classified terrestrial vegetation communities¹, and a combination of digital aerial photography, and habitat classification layers are available on the Department of Environment's Geographic Information Systems (GIS). Any nominated area can therefore be characterized by the plant communities present within it, and the documented species list for the dominant community present is used to derive the Plant Biodiversity score.

Plant species lists tend to be longer for communities that were characterized from the most sites, so this scoring is not perfectly comparable from area to area: however when reduced to a scale of 1 to 5, such effects are unlikely to influence scoring outcomes significantly.

Plant species lists range from a low of 3 (in Black and Red mangrove tidal forest), to a high of 130 (dry forests in Grand Cayman's central interior, dominated by Red Birch, Cabbage trees and Ironwood trees). This range is mathematically re-scaled to a range of 1-5 to generate the Biodiversity Score for each plant community.

¹ Burton (2008): *Vegetation Classification for the Cayman Islands*. In *Threatened Plants of the Cayman Islands: the Red List*. Kew Publishing, Richmond, UK.

Integrity	s.8(1)(a-d); s.8(2)(a),(b),(c),(g)
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The Integrity criterion indicates the extent to which the nominated area is free from historic or current habitat conversion for human uses.

Typically areas of interest as protected areas will be expected to have relatively high integrity, but many potentially eligible areas do have small second-growth patches, localized edge clearance, exploratory bulldozer tracks etc.

The integrity of a nominated area is assessed visually using digital aerial photography, and scored as follows:

5	Totally undisturbed
4	Less than 10% of the land area affected
3	More than 10% of land area affected
2	10% to 50% of land area affected, or area reticulated with roads, tracks etc.
1	More than 50% modified for human uses

Endangered Species

s.8 (1) (a); s.8 (2) (a),(b),(d),(e),(h)

To the extent known, the number of geographically restricted endangered species (both animals and plants) will be listed for any nominated area. Endangered species which have very broad distributions will not be factored in because they are less informative in the context of selecting one area over another.

The primary source of information for this criterion is DoE maps of point locations and area delineations for particular species. It is important to note this information is constantly accumulating, and so scores may need to be updated from year to year. We can only work with the information we have in geographic form, but should recognize it is significantly incomplete at this time.

In tests of the scoring system the highest incidence of endangered species was 4 and the lowest was 0, so in the current version the Endangered Species criterion score is simply the number of endangered species plus 1, bringing the scores into the standard range of 1-5.

Probable Critical Habitat

s.8 (1) (a),(d),(e); s.8 (2) (a),(b),(d),(e),(f),(h)

This criterion scores the presence of one or more areas within the nominated area, of habitat which would be reasonably expected to form a "Critical Habitat" for an endangered species at such time as a Conservation Plan (NCL s.17) is written for it.

Probable Critical Habitat areas are known for species with extremely restricted range, and also for wider ranging species which depend on specific areas for nesting or other key stages of their life cycles.

As with Endangered Species, the source for this information is existing DoE mapping, which is expanding and improving over time. The score value is the number of probable critical habitats present, plus 1.

Ecological Function

s.8(b),(c),(e); s.8(2)(a),(c)

This criterion scores the following ecological functions, which benefit natural environments and processes beyond the boundaries of the nominated area.

The six ecological functions identified at this time are as follows:

Filtration of surface water run-off from or to adjacent areas
Support of fresh water lenses
Stimulating or triggering rainfall in down-wind areas
Providing nutrient flows to marine ecosystems
Providing land-sea edge habitat for marine life
Draining surface water from higher surrounding land

The occurrence of these functions in a nominated area is assessed from the geographic setting of the area, its geological substrate (rock, soil, peat), the ecosystem it is part of, and documented geographic information such as locations of fresh water lenses, and drainage channels.

In tests, areas contained between 0 and 6 ecological functions. This range is mathematically re-scaled to a 1-5 score value.

Threat Distance

s.8(1)(a),(b); s.8(2)(a),(g)

Geographic data layers held by the Department of Environment include a biological threats layer, generated with assistance from the Nature Conservancy during a workshop on protected area planning. The layer models the fall-off in threats from various kinds of infrastructure, such as buildings, quarries, roads and land clearances. Proximity to these features brings threats from invasive species moving out into adjacent natural areas. Proximity to these features also signals higher likelihood that land conversions for human uses will spread into adjacent wild areas.

The threats layer is overlain on the nominated area, and the Threat Distance score is measured as follows:

5	None of the area affected by mapped threats
4	Less than a quarter affected by threats
3	Between a quarter and a third affected by threats
2	Between a third and half affected by threats
1	More than half the area affected by threats

Habitat Representation

s.8(1)(a),(b),(c)

This criterion addresses the degree to which some habitats are under-represented in the existing protected area system, as compared to a theoretical optimum where an equally representative proportion of each habitat is protected.

Nominated areas which propose protection of a habitat which is currently under-represented in protected areas are given a higher score for this criterion. Areas which propose protection of habitats already well represented in protected areas will score lower.

These habitat representation scores are calculated separately for each of the three islands.

Habitat mapping already generated by the Department of Environment is used to measure the area of each major habitat of biological value that is present in the nominated area.

For the same major habitats, a “deficit” value is calculated by comparing the areas contained in current protected areas, against a theoretical optimum assuming a proportionate representation. The ideal reference point would be the pre-deforestation baseline before human settlement, but that information is not available. Instead, the theoretical optimum is based on modelling and workshop participant inputs, using MARXAN software in the same workshop as generated the threats layer.

The habitat representation score is then derived by multiplying the area that would be contributed by the nominated area to the habitat deficit, times the proportion unprotected, for each habitat it turn. These are then summed across all habitats to generate a total contribution to deficit, and scaled to a 1-5 range.

Oasis Effect

s.8(1)(a),(d-f); s.8(2)(a-c),(f),(h)

This criterion places value on sites which contain geographically concentrated resources in landscapes where those resources are generally rare. Such sites are of critical importance to certain species assemblages, seasonally or year-round.

These resources include:

- islands of natural habitat in largely urban areas, which concentrate resident and migratory birds and may conserve locally scarce biodiversity;
- fresh water ponds, holes and splits that provide seasonally vital drinking water for animals and humidity for epiphytes;
- brackish and saline ponds that provide concentrated seasonal food resources to resident and migratory water birds.

Nominated areas cannot score above 1 on this criterion unless they qualify as an oasis or contain at least one oasis.

An oasis in this context is defined by:

- a concentrated habitat, water or food resource area less than 80 acres, or a larger if a saline or brackish pond, which meets any one or combination of the following conditions:
 - it is an area of natural habitat completely surrounded by human-modified landscape
 - it contains a freshwater pond, hole or split
 - it contains a feeding area for water birds

For nominated areas which are oases or contain oases under the above definition, presence/applicability of the three identified oasis resources is first sub-scored separately.

Habitat oasis effect is measured by the distance from the nominated area to the nearest neighboring area of natural habitat, excluding any such habitat which has been subdivided into house lots.

Habitat Oasis effect	Distance to nearest neighbouring natural habitat
5	1,000 ft. or more
4	750 to 999 ft.
3	500 to 749 ft.
2	250 to 499 ft.
1	0 to 249 ft.

Freshwater oasis effect is data limited. Until such time as we can map freshwater holes fully, DoE staff will assess nominated areas for this resource based on aerial photography and field knowledge, consulting with other experts and conducting field investigations as necessary.

Freshwater Oasis	
5	Area is dominated by freshwater pond or holes
4	Abundant freshwater holes
3	Moderately common freshwater holes
2	Occasional freshwater hole sparsely present over area
1	No freshwater holes known in area

Food oasis effect is focused on birds using brackish/saline ponds where food resources become seasonally concentrated. These areas should be scored based on the abundance and diversity of birds recorded using them. DoE staff will consult with local ornithologists who can integrate information over multiple years to distinguish sites on significance.

Food oasis	
5	Large ponds regularly attracting large feeding groups of diverse bird species: extremely significant
4	Highly significant
3	Moderately significant
2	Slightly significant
1	Not significant or not applicable

The overall score for the Oasis Effect criterion will be the average of these three sub-scores.

Carbon Sequestration

s.8(1)(e); s.8(2)(f)

This criterion places value on areas which help store and/or lock away carbon, thus contributing locally to a globally urgent need to reverse the increase in atmospheric CO₂ concentration, and so to limit catastrophic climate change. The Cayman Islands is limited (by small size) in the scale of its global contribution in carbon sequestration, but we can play our proportionate part as a group of islands under extreme threat from sea level rise.

This score is allocated simply by assessing the major habitat or habitats present in the nominated area. Habitats are scored as in the following table. Where more than one major habitat is abundant in a nominated area, the sub-areas are quantified and the score is the area-weighted average of the two or more habitat areas.

5	Mangrove and Buttonwood forests and shrublands on peat substrates
4	Primary forests
3	Forest-Shrubland transition areas
2	Dry shrublands
1	Bare and sparsely vegetated areas

Climate Resilience

s.8(1)(a),(b),(c),(e); s.8(2)(a-g)

This criterion is a measure of how robust the nominated area will be under expected conditions arising from global climate change. The key changes expected are rising sea level, and a drier climate.

High lands, and land in the highest rainfall areas, are the least vulnerable to biodiversity loss.

5	Forest areas over 20ft in elevation, not in lowest rainfall settings
4	Areas over 20 feet in elevation, in drier (easternmost) zones
3	Forests and Forest/Shrubland transitions between 6 and 20 ft. in elevation
2	Dry Shrubland on land 6ft. or less above the groundwater table
1	Wetland areas adjacent to the sea, first in line for inundation by rising sea level

Scores are assigned directly based on geographic location of the nominated area, the CI Government's digital elevation model, and habitat mapping. Intermediate scores are assigned for areas which span multiple categories.

Affordability

s.8(2)(g)

Cost per acre of land is the main financial consideration when assessing conservation return for capital investment. Actual land values can at best be estimated by professional valuation, but valuations in advance for all nominated areas would be costly and difficult to justify.

For an affordability scale of 1 to 5, actual or realistic values are less important than ranking. To achieve this, a simple land cost index calculator is used which begins with a baseline arbitrary value of \$10,000 per acre and adjusts this for a series of factors that typically exert the most significant influences on land valuation². The final "value" is the baseline plus the sum of all the applicable factor multipliers each applied separately to the baseline.

The per-acre values output by the cost index calculator should not be taken to indicate real life valuations. They serve only to classify land on an ordinal scale from "free" to "very expensive" in four steps.

Ocean frontage	x10, x3, x2, or 0	Depending on proximity
Parcel size	x1, x0.5, 0	<10, 10-100, >100 acres
District	Ranges x5 to x-0.5	GT, WB, BT, EE, NC, CB, LC
Terrain	x0, x-0.25, x-0.5, x-0.8	Dry, mixed, swamp, pond
Planning Zone	x-0.9, 0, x0.1, x0.5, x0.8	POS, AgRes, LDR,MDR,HDR+
Restrictions	x-0.9, x-0.25, 0	ProtArea, adjacent to PA, none
Access	x-0.1 to x0.5	Far, near, ROW, Gazette, unsurf, surfaced
Crown	Zero total	Crown land has sum cost of zero

This calculator outputs cost index “values” per acre for nominated areas, which are then scored into the 1-5 range as follows:

5	Crown land (zero capital cost)
4	<15,000
3	15,000 to <30,000
2	30,000 to <60,000
1	60,000 and over

² Choice of principle factors influencing land values was made in consultation with a local Chartered Quantity Surveyor.

Management Ease

s.8(1)(f); s.8(2)(g),(h)

Also factoring into the expense of acquiring land for protected area, is the likely ongoing cost of management. The management ease criterion estimates this on the 1 to 5 scale by considering costs associated with perimeter protection, managing human activity, and likelihood of developing and having to maintain visitor infrastructure. Both existing and planned or probable infrastructure and activities are considered.

To some extent visitor activity has potential to generate revenue to offset costs. This potential is greater in larger areas, which also have capacity to leave aside undisturbed areas. Larger areas are therefore ranked higher than small areas with visitor infrastructure.

5	Remote area with no boundary issues, access or plans to create access
4	Areas with some boundary issues or limited access, requiring some management
3	Larger areas expected to see low-level human activity, minimal infrastructure
2	Larger areas expected to be intensively visited, requiring infrastructure
1	Small areas with visitor facilities, fencing needs, adjacent to converted land

Island Weighting

s.8(1)(a-c); s.8(2)(a-f)

This is a strategic policy criterion, based on the principle that effort in conservation land purchase overall should be appropriately balanced between the three islands. In proportion to total land area, the percent of land area protected currently varies from island to island, and will change every time a protected area is added.

For the 2016 version of this scoring system, island weights are calculated as follows:

Little Cayman	5
Cayman Brac	4.58
Grand Cayman	1

Urgency

s.8(2)(g)

This criterion must partly be assessed subjectively, with the only objective information being available from pre-consultations with developers and records of unimplemented planning permissions, available through the Department of Environment's Sustainable Development Unit.

Scores are intended to reflect how soon the land is likely to be committed to conversion for human uses, if not protected.

Members of the Department of Environments' Sustainable Development Unit will be tasked with assigning scores in the range 1 (unlikely to be developed in the foreseeable future) to 5 (under immediate threat of development), by consensus.

Connectivity

s.8(1)(a-d); s.8(2)(a-g)

This is a parcel-level criterion, which should be set to zero score if the system is used to assess larger, multi-parcel areas.

Where used at the parcel level, the criterion measures the degree to which the parcel connects to, and improves the overall configuration of an existing protected area.

The score is made by inspection of parcel and protected area maps, with associated habitat map layers as needed.

5	Parcel connects two protected areas, or fills a "hole" in a protected area
4	Parcel is extensively connected to a protected area boundary, improves its configuration and/or includes missing key habitat, or contributes to a corridor
3	Parcel connects to protected area but not in a particularly ideal way
2	Parcel is close to protected area offering potential for future connection
1	Parcel is unrelated to existing protected areas

Strategy

s.8(1)(a-f); s.8(2)(a-h)

Again, this is a parcel level criterion, which should be set to zero score if the system is used to assess larger, multi-parcel areas.

Strategic parcels may be those which for example:

- begin the creation of a new protected area
- offer Crown-plus-purchase combinations to lower costs
- buffer environmentally sensitive areas from adjacent development or other threats
- help establish corridors between protected areas
- secure options for visitor activity (e.g trailhead land, traditional trail buffers)
- protect actual or to-be-designated Critical Habitat

Additional strategic values may become evident on consideration of particular nominations.

Scoring of this criterion should be carried out by the DoE Terrestrial Resources Unit, but should also be explicitly reviewed by Council in Working Group as an independent check to ensure impartiality in respect of DoE and non-DoE nominations.

From a baseline score of 1, the strategy score is increased by 2 for each of the above strategic values found to apply in a nominated area. In event the total score in any nomination exceeds 5 then the score should be rescaled across all nominations to bring it back to a 1-5 scale.

Tourism

s.8(1)(e),(f); s.8(2)(g),(h)

This criterion estimates the actual or potential value of a nominated area as a nature tourism asset, bringing direct and indirect benefits to the economy.

Because there are no quantitative metrics which can be used to generate score values for this criterion, scores are assigned by averaging individual subjective assessments by members of the DoE staff not directly involved in protected areas nominations.

Respondents are asked to score nominations highest (5) for areas which have the maximum potential to attract and provide for nature tourism, and score lowest (1) for areas which are inaccessible to visitors and likely to remain so. Areas that serve (or will

serve) a lower volume of visitors, or which are uncertain prospects for future nature tourism activity are rated intermediate.

Social	s.8(1)(c),(e),(f); s.8(1)(g),(h)
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This criterion assesses the value of ecological services the nominated area does or will bring to the people of the Cayman Islands. These services may include recreational and physical health opportunities potentially consistent with the purposes of a protected area, such as walking, running, wildlife photography, nature study, swimming and beach activities.

They may also include non-use values, such as pride in knowing of a protected area or species that helps define the character of an island, or value of the option that they may wish to visit a protected area in the future, or that their children might. People living close to a protected area may value views of a wild, natural area, or value the knowledge that they will not have neighbors building houses there, and they may enjoy edge benefits such as forest birds coming out to visit gardens.

Finally there may be some direct services of benefit to people living adjacent or near to a protected area, such as access to fresh ground water maintained by a large forest area, and natural food sources for birds and fruit bats that otherwise might do more damage to backyard fruit crops.

Although there have been attempts to value these sorts of ecosystem services in financial terms, this is a technically difficult process. For the purposes of this scoring system, again for this criterion, scores for nominated areas are assigned by averaging individual subjective assessments by staff members of the DoE not directly involved in nominations, on a scale of 1 to 5.

Implementation

Once nominations have been received and screened to verify they meet the requirements of NCL s.9, all nominations will be delineated on DoE's GIS and then entered into a scoring spreadsheet that implements the scoring system detailed above. DoE will then apply the scoring methodologies detailed in this document, for each nominated area, and will output each area's scores for each criterion, and in total, in a report to NCC.

This Scoring System for ranking proposed protected areas was created by the Department of Environment's Terrestrial Protected Areas Committee. This committee consists of staff from the Department of Environment, with representatives from the National Trust for the Cayman Islands and the National Conservation Council. The membership covers a broad range of expertise relevant to terrestrial conservation.

11th August, 2016

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