

Re: proposed definitions, functions, threats and strategies for Minimum Viable Landscape land use areas

To: Natural Environment team members

From: Tom Chase

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On our 18 November Natural Environment meeting we agreed that it would be helpful to be more specific about the role each land use type plays in creating the overall Minimum Viable Area. Knowing what functions we need to retain or restore would lead to a clearer understanding of what threatens each land use area, and what strategies may be customized to address those threats. I offer these suggestions, some of which we already discussed, to stimulate reaction and improvements.

1. Refer to the whole as a “Minimum Viable Landscape” (instead of “Minimum Viable Area”), and the various components (core, connector, buffer), collectively as land use areas.
2. Change “core” to “source” areas. This allows us to use “core” instead of “critical core” for those special areas within core that need special attention. And, for those in the ecological know, it distinguishes these large blocks of land as “source” producers of wildlife, as opposed to “sinks”.
3. Embrace the “village” areas as an ecological equal to the Source areas. Granted, the developed areas are where most threats to the MVL come from, but the village is the reason we make the case for ecosystem services.
4. Establish a Connector area between Chilmark Pond and Squibnocket (converting Quenames from Source to Connector in the process), and convert the suburbanized areas separating the Central Sandplains and Coastal Sandplains into Connector areas.
5. Expand the Central Sandplain Source area westward across State Road to touch the Western Moraine Source area (the land to the north and south sides remains a Connector area, especially the Mill Brook valley).
6. Remove the concept of “Transition areas” to address climate change and, instead, make sure Source areas represent the full ecological extremes across the Island, and bolster the Connector areas between them. If large and diverse enough, the Source areas will export wildlife, much of which will naturally populate higher elevations, moister areas, microclimates and so on.

Table 1. Minimum Viable Landscape land use areas and their functions

Land use area	Functions
Source	<p>One purpose of a Source area is to produce enough of its native species to withstand or recover from all of the natural and unnatural impacts to their populations. As a result a source area will naturally provide a surplus of native plants and animals which, through disperser pressure, will move out through Connector areas and into other Source areas and even into suburban “sinks”. To accomplish this, a Source area must be large and encompass the diversity of physical landscape types which characterize it or are unique to it (e.g. frost bottoms in the Central Sandplains). This physical diversity is the foundation for different habitats and species.</p> <p>A second role for a Source area is to provide ecosystem services upon which humans directly benefit. Examples include drinking water, pollination of vegetables, storm-surge protection, and fire protection (by having areas large enough to burn preemptively). Generally, when a Source area is large and healthy enough to sustain biodiversity, it also provides ecosystem services.</p> <p>Each core type is distinguished from others by its tendency towards different ecological conditions, which support different suites of species. For example, the Central Sandplains exhibit the greatest potential for natural fire, and the western moraine the least, so the former is better at supporting shrublands and the latter, forest.</p>
Core	<p>Core areas represent the physical extremes within the Source areas and, as such, are sites that do and will continue to support biodiversity, even as it changes with climate. For example, the greatest thermal extremes in the Central Sandplains are represented in frost bottoms, which support many rare moths. As climate changes, some of moth species may disappear from frost bottoms; nevertheless they can continue to exhibit thermal extremes and may support some existing – and some newly colonizing – rare moths in the future.</p>
Buffer	<p>Buffers minimize the negative influences and impacts from the Villages. For example, a program to minimize outdoor lighting in the Buffer zones could reduce the outflow of moths from Source areas into the Village.</p>
Connector	<p>Although each Source area is different from the others, all exchange some species or share other natural resources. Some species preferentially move along natural corridors, such as streams, and Connector areas should be capitalized on these where they transcend Source areas. Other species can emigrate by permeating relatively developed areas, as long as there are routes that are not outright lethal. Thus, replacing a pesticide-treated lawn with native plant landscaping may make a developed area more navigable to an insect pollinator, but such landscaping does not need to be large enough to serve as breeding habitat; the Connector areas’ function is largely temporary.</p>
Village	<p>The Villages are for human living, benefitting from the ecosystem services and the highest quality of life that the Minimum Viable Landscape can afford its residents. While green space in these areas are nearly always “sinks” – places occupied by wildlife, but not able to export surpluses – these places help develop an appreciation for the wilder areas and, because they are conveniently accessible,</p>

	reduce human-use pressure on them as well.
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Table 2. Characteristics of Source areas

Source area	Defining characteristics
Western moraine	Physical: greatest topographic variation, highest elevations; most significant freshwater streams and wetlands, and moist soils. Ecological processes: least effected by summer salt spray, fire, and wind throw; most nutrients cycled through decomposition, not fire. Best place for: extensive woodlands, large trees, box turtles, woodland nesting birds, crane fly orchid, many fresh water species (trout, brook lamprey).
Squibnocket/Moshup's moraine	Physical: most complex soil types; mosaic of wet and dry habitats Ecological processes: portion of moraine most exposed to summer salt spray; shortest growing season. Best place for: maritime shrublands, fall migrating songbirds, several orchids and some invertebrates.
Eastern moraine	Physical: portion of moraine with least topography and streams; driest; most seasonal ponds; portion of moraine with most barrier beaches and open bays. Ecological processes: nutrients cycled through both fire and decomposition; high wind throw; longest growing season. Best place for: open oak woodlands; cavity-nesting birds; bay scallops; spadefoot toads, spotted salamanders
Central sandplains	Physical: driest, flattest topography Ecological processes: most exposure to fire (no coves as fire breaks); greatest thermal extremes (frost bottoms); extreme drought Best place for: scrub oak barrens, pine barrens, many rare moths.
Coastal sandplains	Physical: dry and flat adjacent to moist soils; salt ponds (irregular openings and salinity) Ecological processes: fire with fire shadows, extreme summer salt spray; extreme erosion and redeposition; Best place for: coastal grassland, heathlands, many bird species, many invertebrates, oysters, blue claw crabs.

Table 3. Threats to land use areas and their functions

Threat	Some prevention, restoration and mitigation solutions	Most sensitive land use areas
Fragmentation <ul style="list-style-type: none"> • typically from residential development • deters some species, breaks up populations, impacts gene flow, predator/prey balance 	Protect land Undevelopment Native plant lawns and landscaping Habitat restoration	All Source, Core, and Connector areas
Habitat conversion <ul style="list-style-type: none"> • e.g. turning woodland into a lawn • destroys and further fragments habitat 	Protect land Habitat restoration Native plant lawns and landscaping	All Source, Core and connector areas
Fire suppression <ul style="list-style-type: none"> • Preventing fire where it naturally occurs • Results in hazardous fuel build-up, excludes may native plant and animal species 	Prescribed fire In some cases, mechanical cutting In some cases, compatible harvest (fire wood, biomass)	Central and Coastal Sandplain and Core areas
Excess nitrogen <ul style="list-style-type: none"> • especially from septic systems and lawns and acid rain • impacts eelgrass, shellfish and fish species 	Composting or de-nitrifying septic systems Native plant lawns and landscaping	Eastern Moraine, Coastal Sandplain and hydrological points of origin in Western Moraine and Buffer areas
Pollutants/toxins <ul style="list-style-type: none"> • biocides from lawns and gardens; toxic road run-off • impacts many invertebrates and accumulates up the food chain 	Native plant lawns and landscaping Organic pest management Improved road catchment systems	Eastern Moraine, coastal sandplain and points of origin in western moraine core and buffer areas
Invasive species <ul style="list-style-type: none"> • usually meaning non-native plants, such as bittersweet • can overtake large areas 	Habitat restoration Native plant lawns and landscaping	All areas, especially point of origin in Buffer areas

of habitat		
<ul style="list-style-type: none"> • Unnaturally abundant predators, usually because of super-abundant foods (garbage, road kills, fish waste, etc.), den and nest sites (e.g. under sheds) or other forms of protection (e.g. house cats); includes skunks, raccoons, house cats, rats, gulls, crows • Excessive predation pressure on many prey species, especially ground-nesting birds, small mammals, reptiles 	<p>Enclose compost piles and bird feeders in wire mesh, feed pets indoors, reduce lawns (grub source), return fish waste to water Close off den sites under or in out-buildings Keep cats indoors</p>	<p>All areas, especially point of origin in Buffer areas</p>
<p>Outdoor lighting</p> <ul style="list-style-type: none"> • disrupts the movement and migration of moths, other nocturnal invertebrates and various birds • exposes moths and invertebrates to excessive predation; disrupts pollination 	<p>Avoid mercury vapor bulbs Hood lights Use motion-detectors</p>	<p>All areas, especially point of origin in Buffer areas</p>
<p>Barriers</p> <ul style="list-style-type: none"> • roads, dams, sea walls, etc. • prevents movements of many species between critical habitats, including breeding sites 	<p>Prevent paving Re-route, un-pave development roads Reduce volume and speed of traffic (e.g. speed bumps) Provide wildlife underpasses at natural crossing Remove dams or provide fish ladders Install large, stream-level culverts Remove shoreline hardening</p>	<p>All Connector and Source areas</p>

<p>Climate change</p> <ul style="list-style-type: none"> • increased temperature, drought, storm surge, sea level rise • adds new and exacerbates many aforementioned threats (e.g. excess nitrogen, fire suppression, barriers, respectively) 	<p>Increase prescribed fire and reduce built-up fuel loads Prevent shoreline hardening Restore shrublands in storm surge zones Protect future wetlands (upslope)</p>	<p>All Source and Core areas</p>