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From: Greg Eckert
To: Mike Murray; Sandra Hamilton; Jerry Mitchell; Kirsten Leong
Subject: DRAFT outline for use at meetings this week
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Attachments: Framework for defining and achieving desired conditions for focal resources at Cape Hatteras National Seashore.doc
Hypothetical Scorecard.doc

I'd like Mike's feedback before circulating this. My thought is to take my other notes, the notes others have been posting and continued research of existing reports and flesh this out for the BRMD document

Framework for defining and achieving desired conditions for focal resources at Cape Hatteras National Seashore.doc

Hypothetical Scorecard.doc

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Framework for defining and achieving desired conditions for focal resources at Cape Hatteras National Seashore

I. Introduction

Short discussion on our approaches to addressing complexity and uncertainty

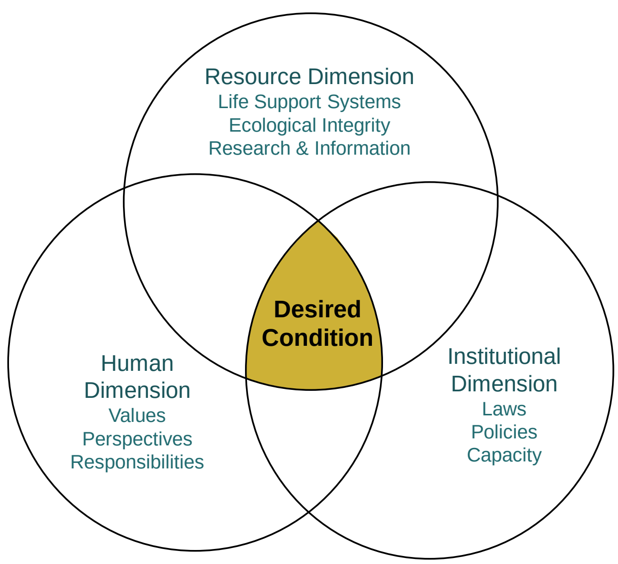
Brief description of the NPS DFC – AM – Periodic Review Process

II. Background

Cape Hatteras environment, natural resources, management issues (will keep this shor and refer readers to other documents they have probably seen)

III. Defining Desired Conditions

Desired conditions are descriptions of resources reflecting management success, that is, after management goals have been achieved. Desired conditions emerge from three dimensions, or areas of influence: Resource, Institutional and Human.



III.A. Developing the resource dimension of desired conditions

Scoping

Scoping is conducted to capture the appropriate geographic area and level of resource organization (landscape, community, species, feature) for desired condition analysis. While impacts drive the designation of some of the focal species resources, scoping remains useful to capture the range of contributing factors and barriers to clearly understanding the resource.

Preliminary stressor review

While desired conditions identify what we want and ought to manage for, and not what we do not want, a stressor analysis is important to identify what aspects of the resource have been irreversibly changed.

Selection of focal resources

Note: It will become apparent that resource designation will include processes and interactions as well as components!

- Shoreline / beach dynamics
- Multi-species habitats
- Species
    - Piping plover
    - Turtles –
    - Beach Amaranth
    - Lest tern
    - Common tern
    - Gull-billed tern
    - Black skimmer
    - Wilsons plover
    - American oystercatcher

Conceptual Model - -Key Ecological Attribute development

A key ecological attribute of a focal ecological resource is a characteristic of the resource's biology, ecology, or physical environment that is so critical to the resource's persistence, in the face of both natural and human-caused disturbance, that its alteration beyond some critical range of variation will lead to the degradation or loss of the resource within decades or less.

Conservation planners conventionally use three broad headings to help identify key ecological attributes: Size, Condition, and Landscape Context. These three "Summary Integrity Factors" partially overlap, and provide starting points for identifying potential attributes to consider.

- "*Size*" refers to attributes related to the numerical size and/or geographic extent of the focal ecological resource. Examples include the size of a population of a species, the number of viable sub-populations, or the area within which a particular ecological system occurs.
- "*Condition*" refers to attributes related to biological composition, reproduction and health, and succession; critical ecological processes affecting biological structure, composition and interactions; and physical environmental features and dynamics within the geographic scope of the focal ecological resource. Examples include species composition and variation, and patch and succession dynamics in ecological systems, and locally generated disturbance regimes that trigger these dynamics.
- "*Landscape Context*" refers both to the spatial structure (spatial patterning and connectivity) of the landscape within which the focal ecological resource

occurs; and to critical processes and environmental features that affect the focal ecological resource from beyond its immediate geographic scope. Examples of the former include attributes of fragmentation, patchiness, and proximity or connectivity among habitats. Examples of the latter include connectivity between, and movements of matter and energy between a focal ecological system and surrounding systems; and regional or larger-scale disturbances.

Identifying the key ecological attributes for a focal ecological resource involves building a *conceptual ecological model*. This model must rest on knowledge of the resource itself, its setting, and similar or associated species, natural communities or ecological systems. The result is a set of hypotheses about how the focal ecological resource "works," its defining characteristics and dynamics, and critical environmental conditions and disturbance regimes that may act as drivers of these characteristics and dynamics. These hypotheses both guide management and monitoring, and highlight gaps in knowledge that require additional investigations.

<u>Indicator selection</u>
An indicator, in simplest terms, is what you measure to keep track of the status of a key ecological attribute. An indicator may be either:

- A specific, measurable characteristic of the key ecological attribute, such as the total number of adults in a population;
- A collection of such characteristics combined into a "multi-metric" index, such as a multi-species index of forest canopy composition; or
- A measurable effect of the key ecological attribute, such as a ratio of the frequencies of two common taxa of aquatic insects (the indicator) that varies with changes in average Nitrate concentration (the key attribute) in a stream.

<u>Assessment of an acceptable range of variation</u>
We will suggest a range of measures for indicators under which conditions would be deemed acceptable. From this exercise, we will also seek to identify key thresholds of condition. For example, fledge ragtes above a certain level that lead to population increase will be deemed acceptable, while fledge rates that only maintain current levels of a population for Piping plover (as an example) will be designated "of concern" and anything below that will be considered "impaired."

<u>Ecological Integrity scorecard</u>
An example of a scorecard summarizing the resource dimension is attached. This can be modified to include the desired condition values.

III. B. Institutional Analysis
This includes an analysis of capacity, partners, and directives that drive decision-making

<u>Goal Structure analysis</u>
This includes the NPS Organic and Seashore Establishing legislation. This analysis shows how higher level directives influence the identification of goal components, such as specific resources, the development of finer level goals, and the incorporation of

applicable and relevant and appropriate requirements (ARARs). The Endangered Species Act and Recovery Plans will be considered ARARs

III.C. Human Dimension analysis

Stakeholder identification

Stakeholder perspectives

III.D. Reconciliation of three dimensions

Begin with key ecological attributes

Additional attributes?

Reconciliation of acceptable ranges of variation of indicators

III.E. Develop Desired Condition Statements

Instead of a range of measures for specific indicators, desired condition statements provide a descriptive articulation or clear expression through a narrative. Statements lend to the holisitic nature of the resource, and they are an effective communication tool. Tables of indicator target values should complement statements, but not be used in lieu of statements. If we only manage for a suite of indicator targets chances increase that we lose sight of our broader resource goals.

For example, this type of language would be used in a DFC statement (and as a complement to a scorecard):

> During storm events water levels are elevated allowing ocean waves to 'overwash' low-lying areas. As the waves dissipate the entrained sand is deposited as a 'washover fan' increasing the elevation of the barrier and allowing it to keep pace with sea level rise. Along low-lying, narrow barriers (or during very large storm events) the ocean waves completely overwash the island and the sand is deposited on the island AND along the backbarrier shoreline. This does two things, (in addition to the above-mentioned benefit) first it widens the island offsetting the erosion along the ocean shoreline, which in turn allows the barrier to migrate landward as a response to storm events and sea level rise and second it creates new habitat, including: salt marsh, sand flats, dunes, etc.

IV. Frame adaptive management

We will follow the steps provided by the DOI Guide on Adaptive Management

1. Identify stakeholders (already conducted as part of DFC development

2. Define objectives - - these are developed from the DFC, and KEAs, but do not necessarily be identical – review definition of an objective. These management objectives are specific, measurable, achievable, results-oriented and time-fixed.

3. Alternative development – the potential actions taken to achieve objectives

4. Hypotheses and models-

5. Develop monitoring plan – This includes monitoring objectives

6. Decision making, design and implementation

7. Monitor

8. Evaluate monitoring data

9. Periodic review process and iteration – Many of the details for the review process will be derived from the nature of management and monitoring objectives. These will reflect the time to expected and relevant changes in resource condition.

Table 1. Example of an ecological integrity scorecard for a hypothetical wetland system

Grey shaded cells indicate the current scoring for a given indicator					
			Indicator Rating Criteria		
Key Ecological Attribute	**Indicator**	**Indicator Definition**	**Acceptable**	**Potential Concern**	**Imminent Loss**
LANDSCAPE CONTEXT					
Landscape Composition	Adjacent Land Use	Addresses the intensity of human dominated land uses within 100 m of the wetland.	Average Land Use Score = 0.80-1.0	Average Land Use Score = 0.4-0.80	Average Land Use Score = < 0.4
	Buffer Width	Wetland buffers are vegetated, natural (non-anthropogenic) areas that surround a wetland.	Wide > 50 m	Narrow. 25 m to 50 m	Very Narrow. < 25 m
	Landscape Predictors of Hydrologic Alteration	Onsite or adjacent land uses and water uses that could result in changes to wetland hydrology.	Low intensity alteration such as roads at/near grade, small diversion or ditches (< 1 ft. deep) or small amount of flow additions	Moderate intensity alteration such as 2-lane road, low dikes, roads w/culverts adequate for stream flow, medium diversion or ditches (1-3 ft. deep) or moderate flow additions.	High intensity alteration such as 4-lane Hwy., large dikes, diversions, or ditches (>3 ft. deep) able to lower water table, large amount of fill, or artificial groundwater pumping or high amounts of flow additions.
Landscape Pattern	Percentage of unfragmented landscape within 1 km.	Measures extent to which landscape lacks barriers to the movement of species, water, nutrients, etc. between natural ecological systems.	Embedded in 60-100% unfragmented natural landscape; internal fragmentation minimal	Embedded in 20-60% unfragmented natural landscape; Internal fragmentation moderate	Embedded in < 20% unfragmented natural landscape. Internal fragmentation high
CONDITION					
Plant Assemblage Composition	Percent of Cover of Native Plant Species	Percent cover of the plant species that are native, relative to total cover (sum by species)	85-< 100% cover of native plant species	50-85% cover of native plant species	<50% cover of native plant species
	Invasive Species – Plants	Percent of marsh dominated by invasive, aggressive plants.	Native species such as *Typha* and *Phragmites* and/or other non-native invasive species occupy < 10% of wetland.	Native species such as *Typha* and *Phragmites* and/or other non-native invasive species occupy 10-50% of wetland.	Native species such as *Typha* and *Phragmites* and/or other non-native invasive species occupy >50% of wetland.
Hydrologic Regime	Flashiness Index	Measures the variability in water depth fluctuations it compared to reference data.	Flashiness Index = 1.0 - 2.0	Flashiness Index = between 2.0 -3.0 if wetland is NOT associated with riverine	Flashiness Index = > 3.0 if wetland is NOT associated with riverine environment
SIZE					
Absolute Size	Absolute Size	The current size of the wetland relative to other examples of this type	> 25 acres (10 ha)	1 to 25 acres (0.4 to 10 ha)	< 1 acre (<0.4 ha)

Grey shaded cells indicate the current scoring for a given indicator					
Key Ecological Attribute	**Indicator**	**Indicator Definition**	*Indicator Rating Criteria*		
			Acceptable	**Potential Concern**	**Imminent Loss**
Relative Size	Relative Size	The current size of the wetland divided by the total potential size of the wetland multiplied by 100.	Wetland area < Abiotic Potential; Relative Size = 90 – 100% ; (< 10% of wetland has been reduced, destroyed or severely disturbed due to roads, impoundments, development, human-induced drainage, etc.	Wetland area < Abiotic Potential; Relative Size = 75 – 90%; 10-25% of wetland has been reduced, destroyed or severely disturbed due to roads, impoundments, development, human-induced drainage, etc	Wetland area < Abiotic Potential; Relative Size = < 75%; > 25% of wetland has been reduced, destroyed or severely disturbed due to roads, impoundments, development, human-induced drainage, etc