

Ecosystem health report cards

An approach to integrated assessment

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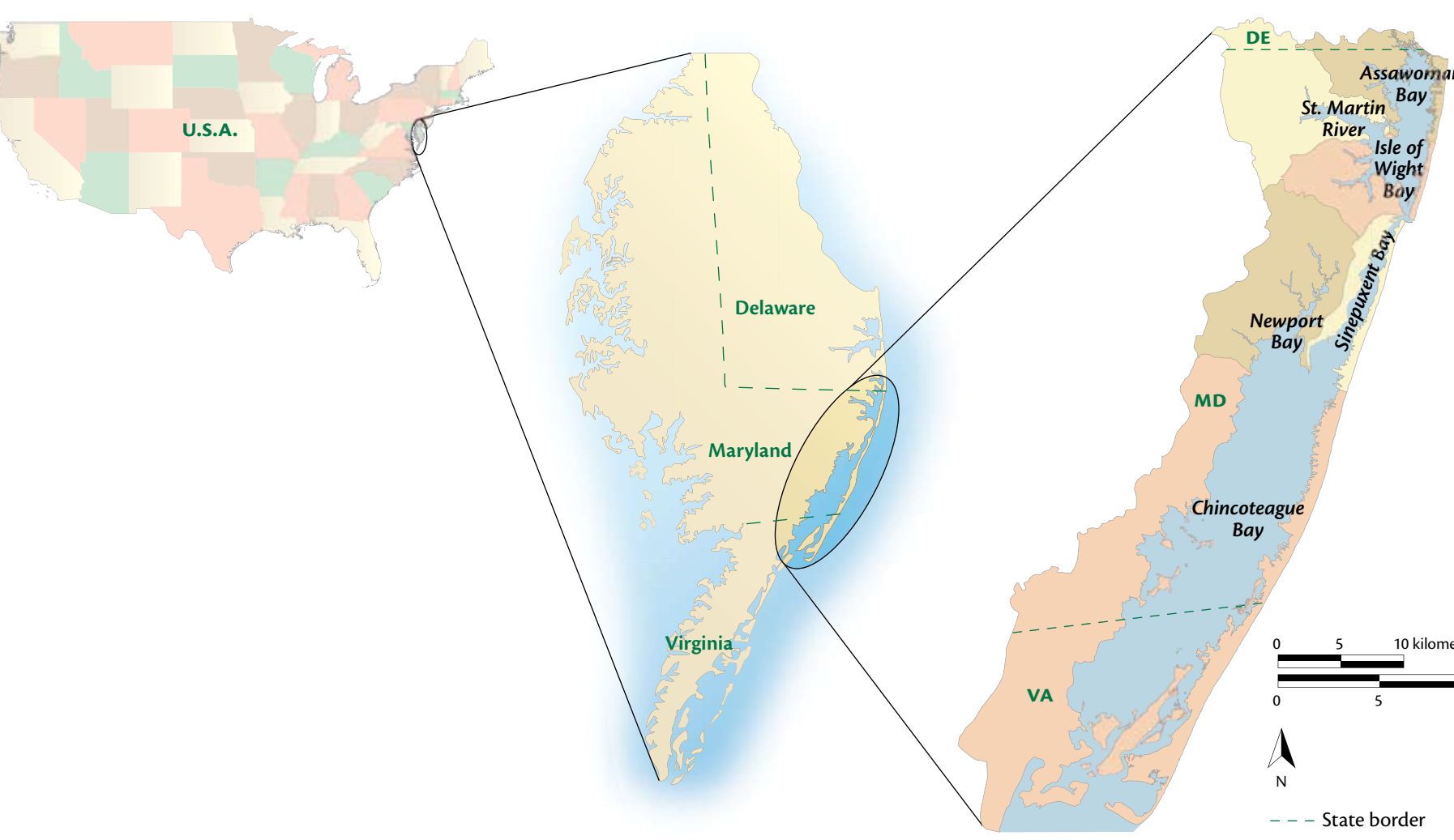
Abstract

The coastal zone supports a large and increasing human population, as well as a significant fraction of the global biological productivity, including most global fisheries. The diversity of habitats in the global coastal zone is heavily impacted by anthropogenic trapping and modifying of water on its way to the ocean. Integrated ecological assessment of the world's coastal ecosystems is essential for effective management and remediation.

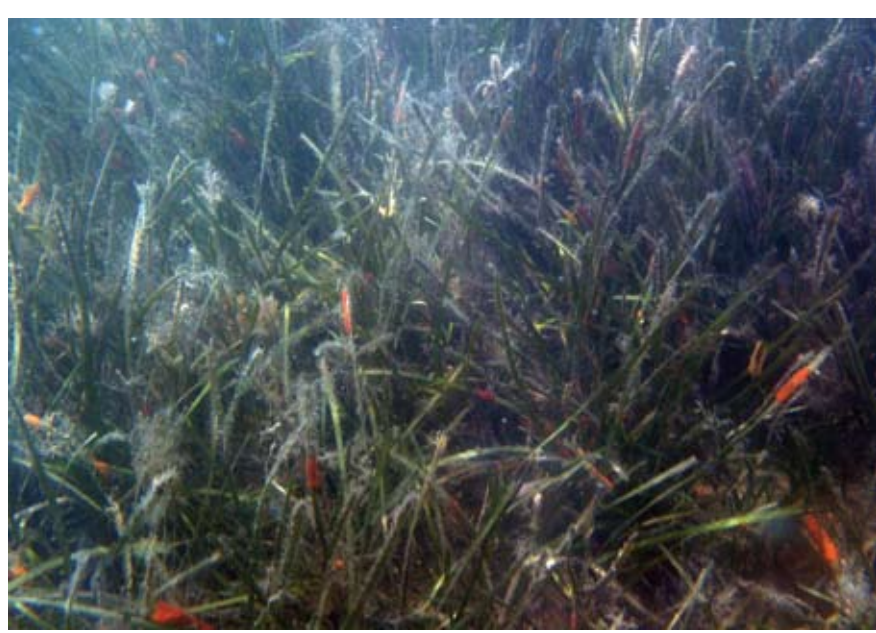
The integration of management, monitoring, and science is required to solve the major environmental problems that are occurring in coastal zones around the world. Effective monitoring requires a significant investment of resources. Field work is expensive, data analysis is time-intensive, data integration requires high level scientific input, and recurring costs are subject to inflationary pressures. Integrated ecological assessment provides feedback on these monitoring investments by measuring the effectiveness of management actions. Societal momentum can then be created by successes in assessment and communication.

Effective integrated assessment of ecosystem health must: be hypothesis-driven; be spatially and temporally explicit; be adaptable to changing management needs and research findings; be linked to a communication program; have timely outputs; and be highly visible to stakeholders.

This poster presents processes and approaches to performing integrated ecological assessments, using an example from the Coastal Bays of Maryland, U.S.A.



What is ecosystem health and ecosystem health assessment?



Healthy seagrass beds are an indicator of good water quality.



Shellfish are an important living resource.



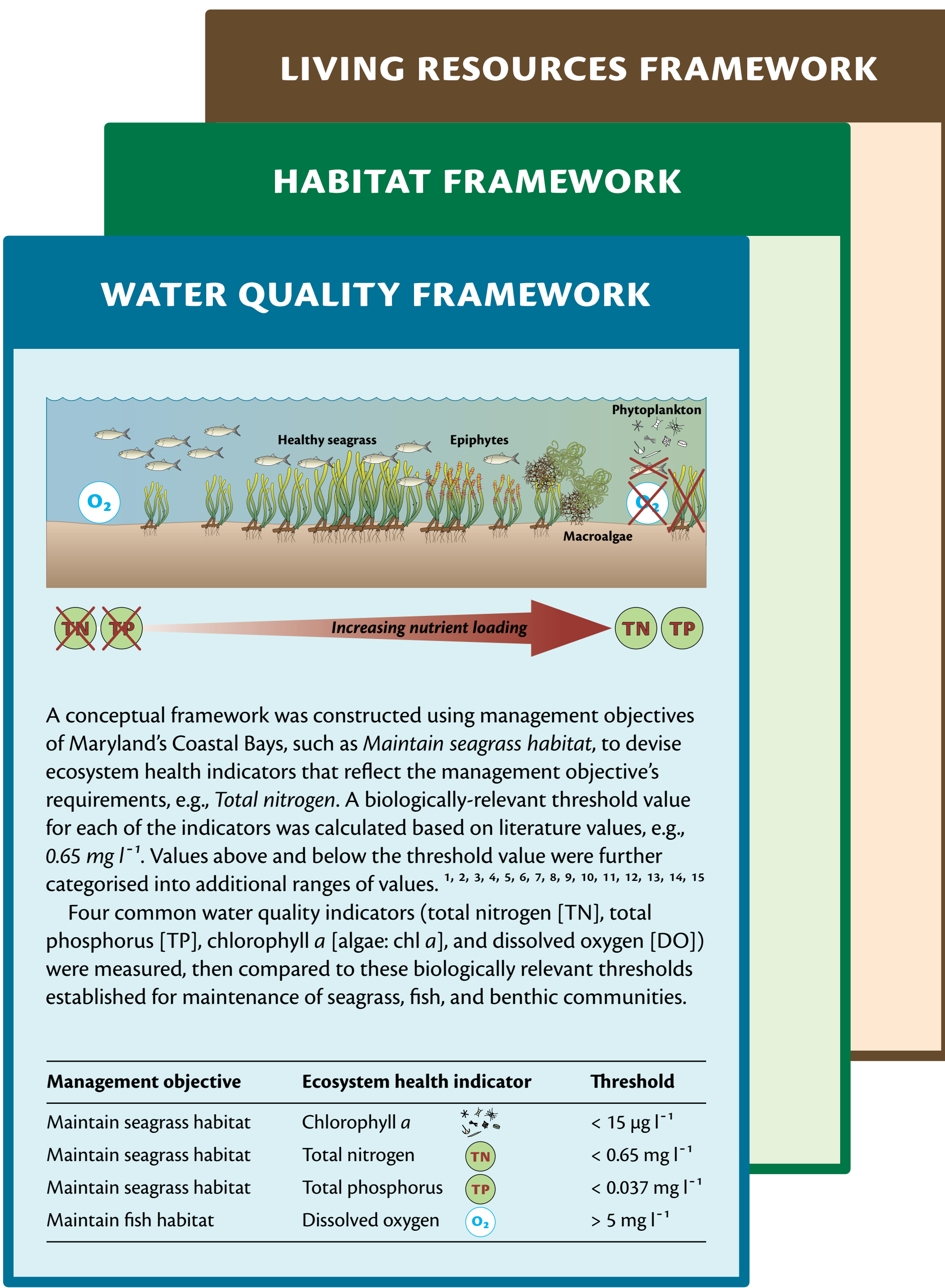
Hardwood forests are important habitat for many species.

'Ecosystem health' is a term that is often used, however, it can be quite an intangible concept. We all have an idea of what constitutes ecosystem health. Good water quality, intact habitat, and vigorous living resources are some indicators of a healthy ecosystem. For resource managers of ecosystem health, pertinent questions might include: How can ecosystem health be measured? What should be measured? How should those measurements be analysed?

Features of indicators and assessments

- Hypothesis-driven
- Explicit—temporally and spatially
- Adaptable to changing management needs and research findings
- Linked to a communication program
- Timely outputs
- Highly visible to stakeholders

A conceptual framework was developed



Indicators were measured, then categorised relative to biologically-relevant thresholds

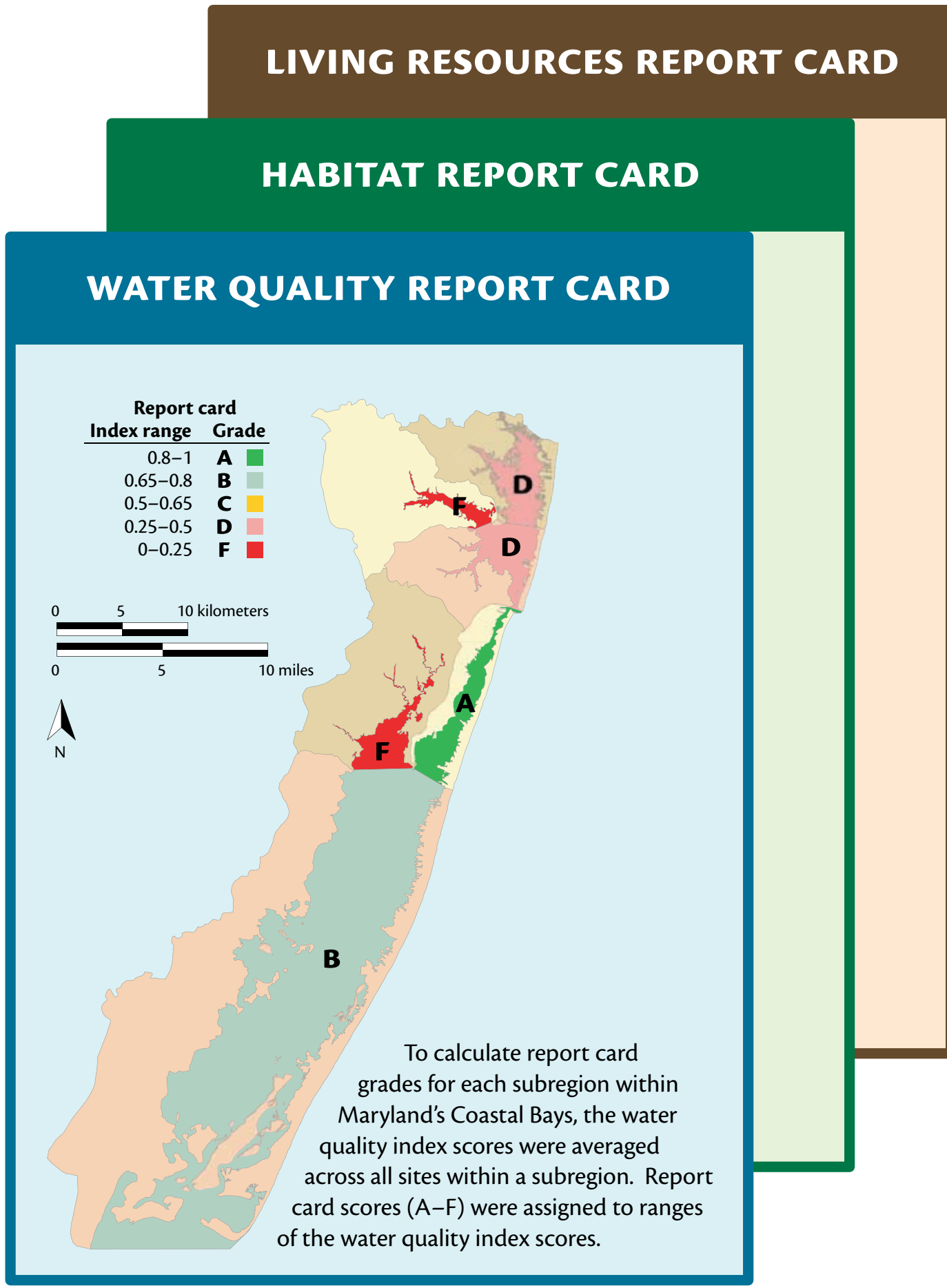
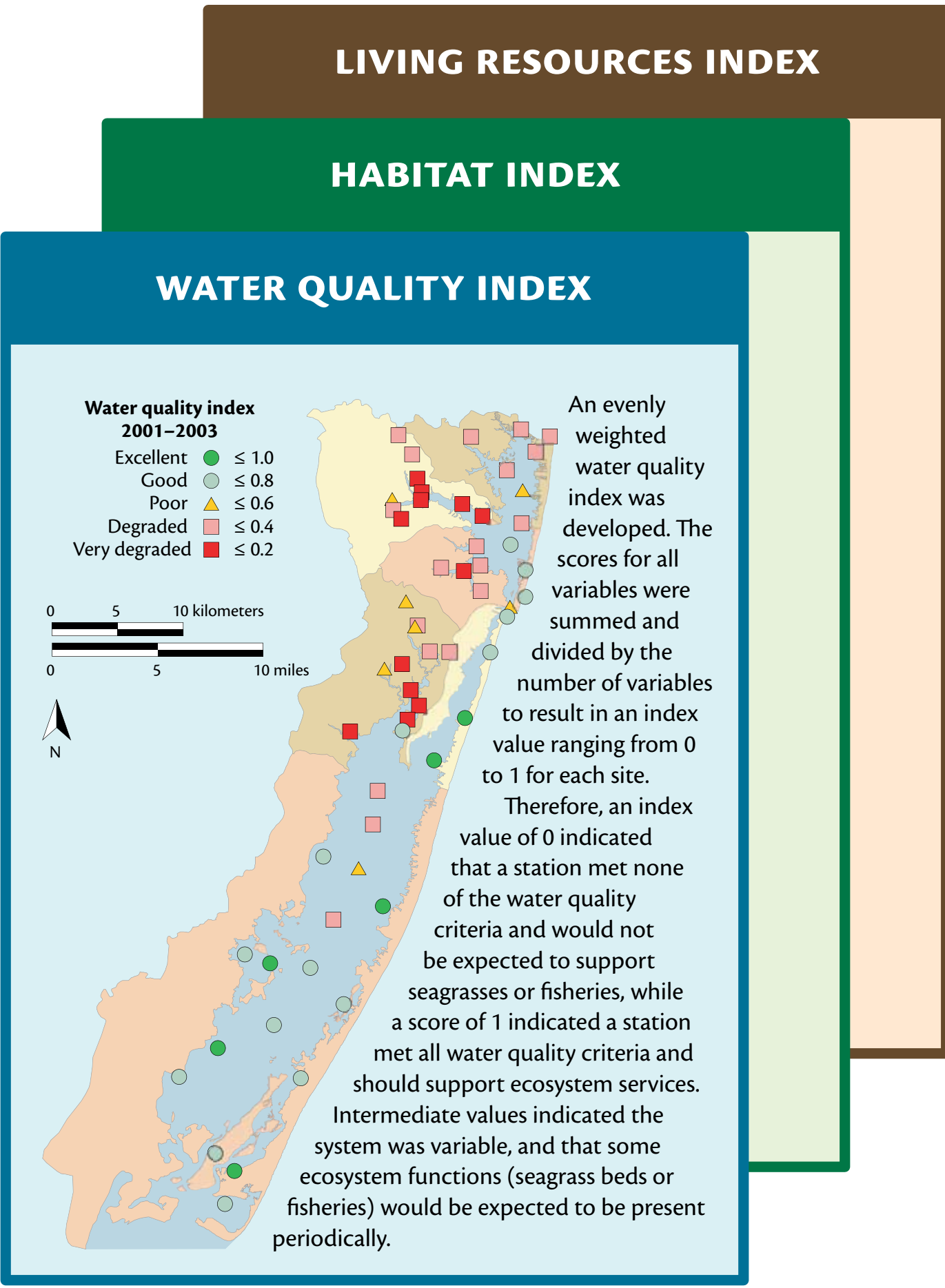
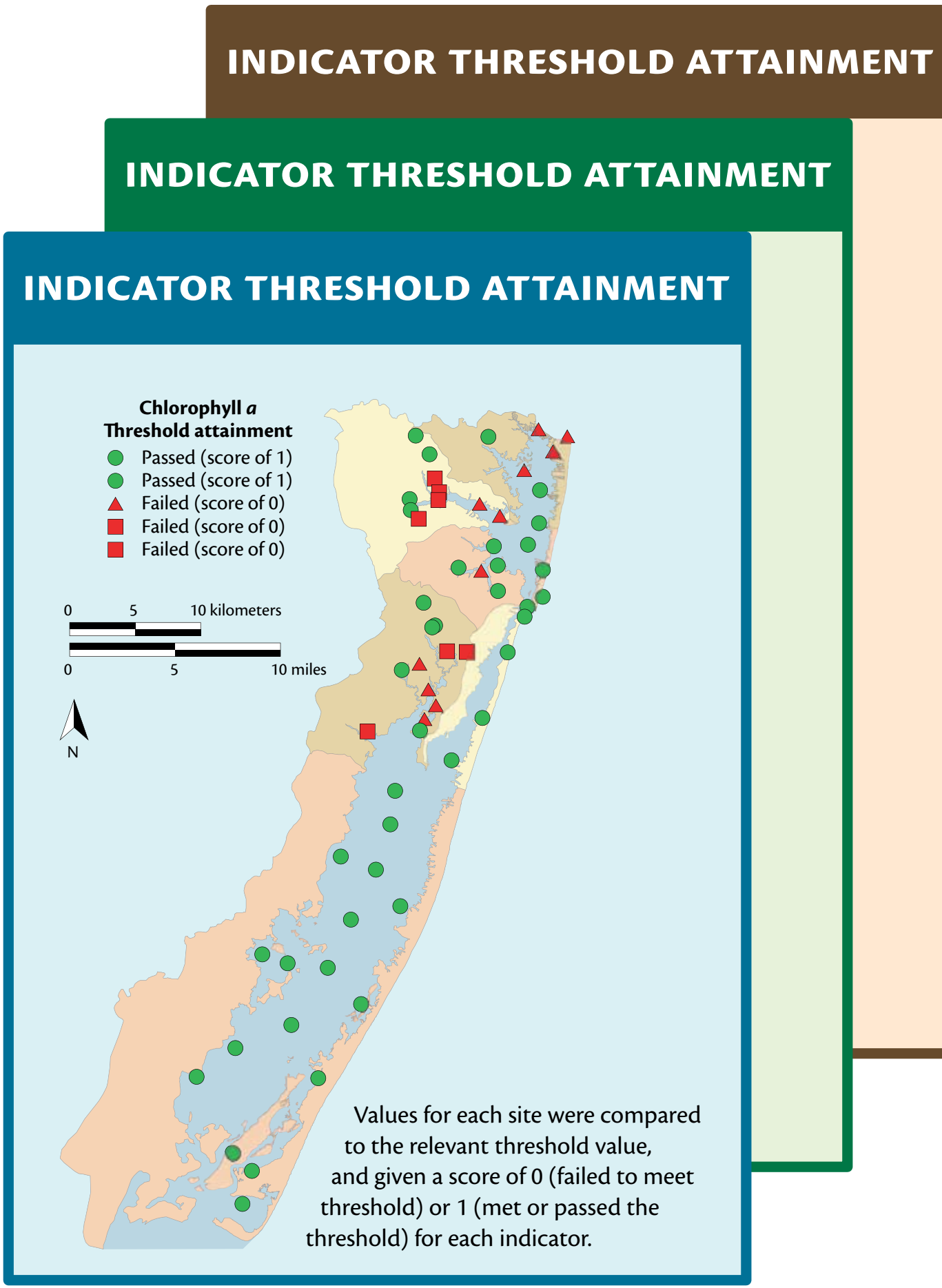
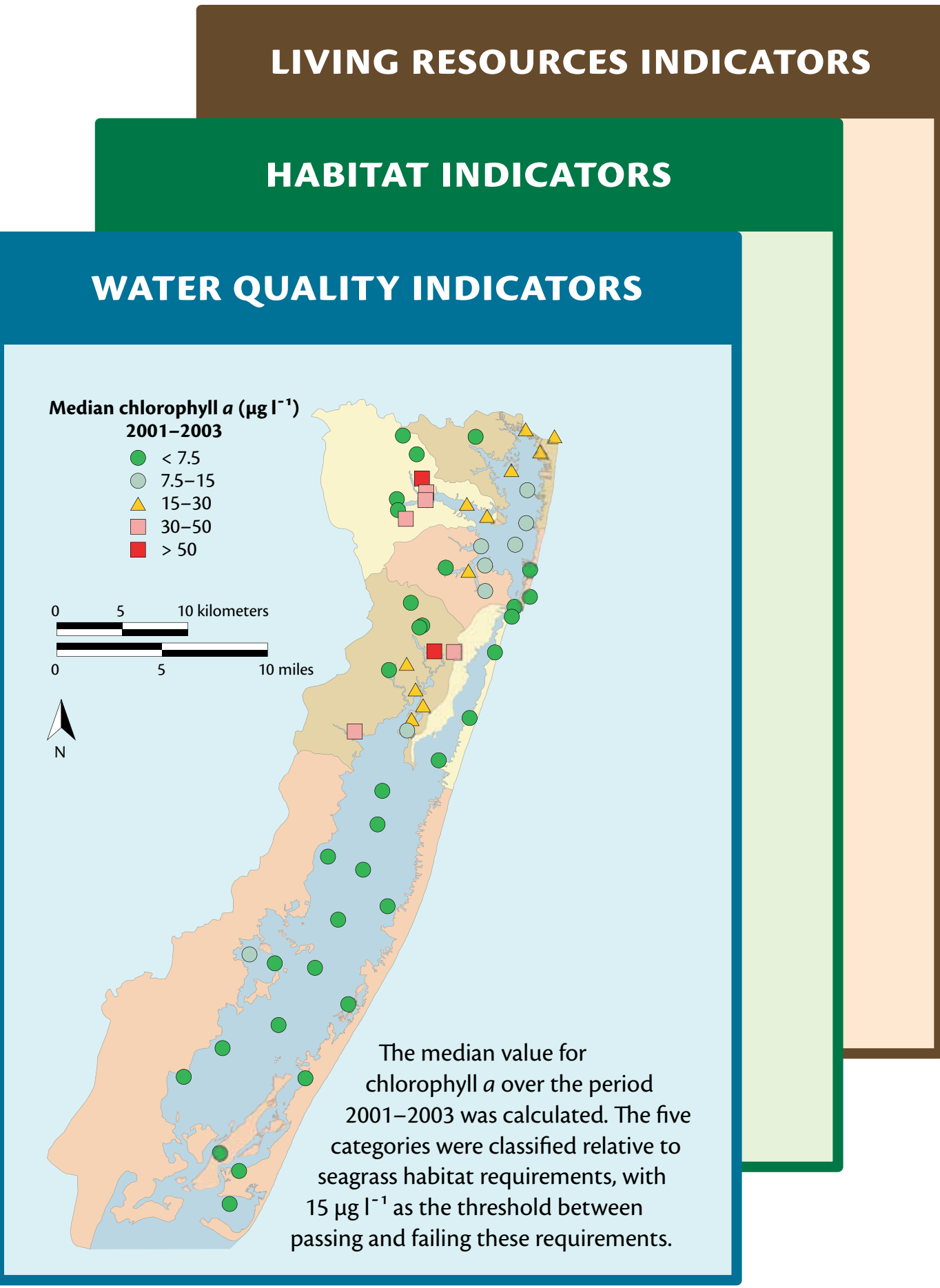
Indicators were measured, then assessed against thresholds, combined into various indices, and assigned report card grades

Site	Chl <i>a</i> (µg l ⁻¹)	TN (mg l ⁻¹)	TP (mg l ⁻¹)	DO (mg l ⁻¹)
Site 1	15.213	0.820	0.072	4.60
...	...	...	...	...
Site 60	3.929	0.325	0.038	5.23

Site	Chl <i>a</i>	TN	TP	DO
Site 1	0	0	0	0
...	...	...	...	...
Site 60	1	1	0	1

Site	Water quality index (wqi)
Site 1	0.00
...	...
Site 60	0.75

Subregion	WQI score	Grade
Sinepuxent Bay	0.80	A
...	...	...
St. Martin River	0.11	F

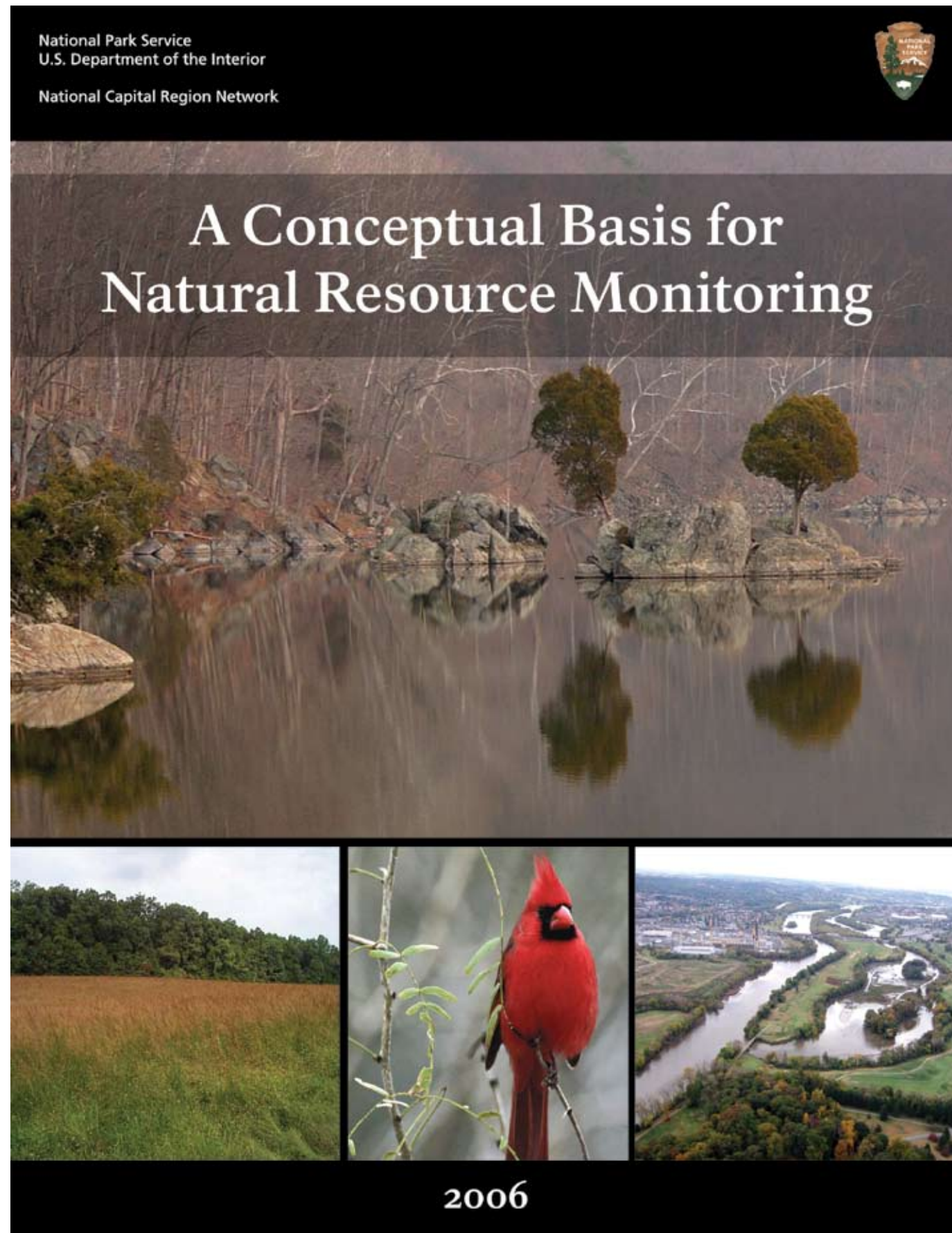
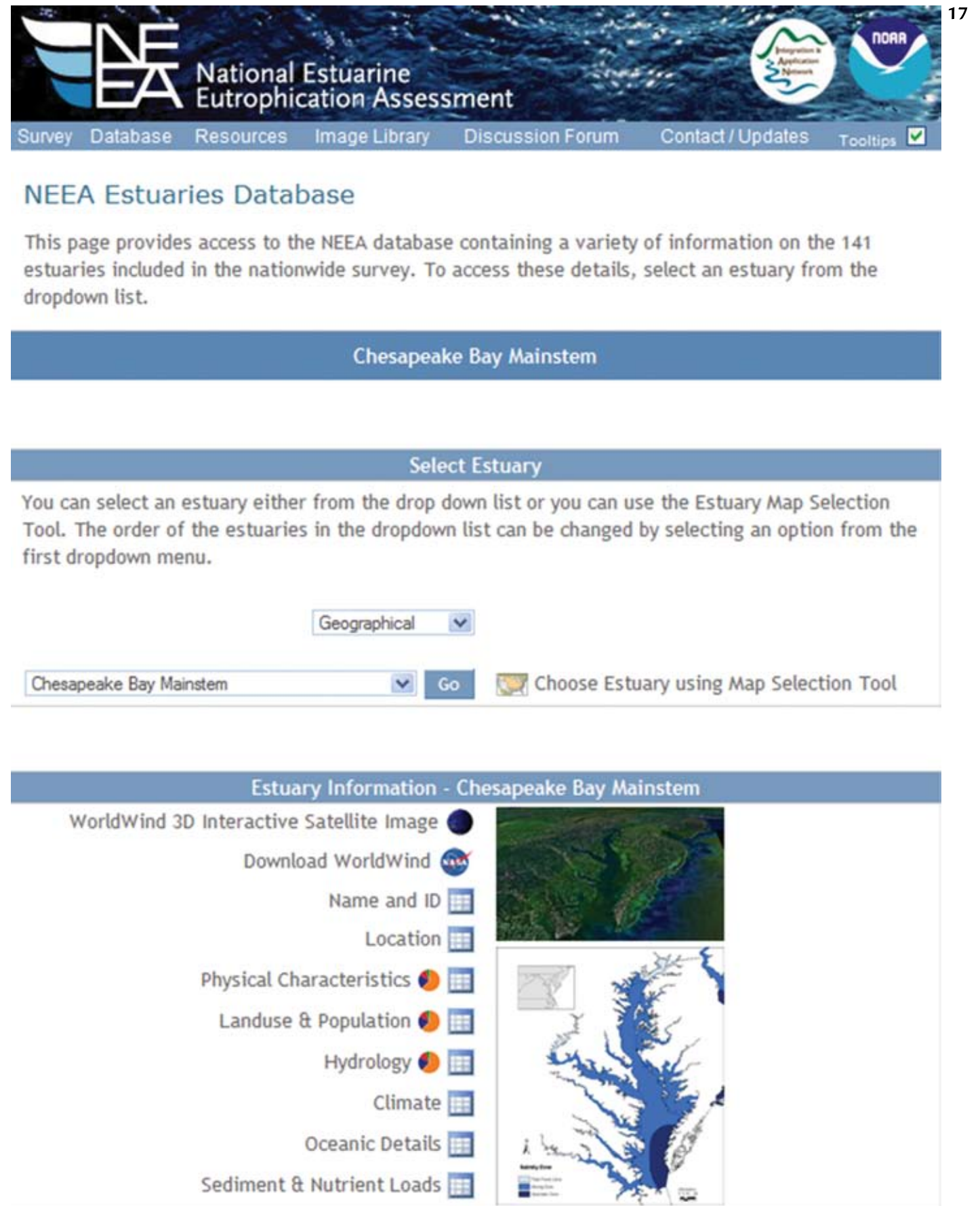


Ecosystem health assessments can be further integrated and used in a variety of communication products

Index	Score	Grade
Water quality index	0.47	C
Habitat index	0.45	C
Living resources index	0.63	B
ECOSYSTEM HEALTH INDEX	0.52	C

The approach used in calculating the water quality index can be applied to other indices, such as *Habitat* and *Living resources*. These indices can then be averaged to obtain an integrated index, or report card grade, for many aspects of ecosystem health.

Because these report card grades are derived from real data, they are scientifically defensible. Each step in the process is transparent, and can be tailored to suit individual programs. For example, this report card used indicators that are evenly weighted. A modification to this process could be to have certain indicators more heavily weighted, depending on characteristics of the ecosystem in question.



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