

10: Community Monitoring

- 1. Distinguish strengths and weaknesses of univariate and multivariate monitoring approaches
- 2. Identify three alternatives to multivariate monitoring
- 3. Describe resources for implementing multivariate monitoring



What is a Community?

The naturally occurring assemblage of populations living in the same general place and time. Community may refer to all species in the assemblage or a subset, such as the plant community (e.g., spruce-fir forest) or the neotropical bird community. – Noss et al. 1997

What is a Community?

The ensemble of species in some area whose limits are determined by the practical extent of energy flow. The key to determining community limits is to identify boundaries, manifest as interspecific interactions broadly defined, by documenting where the population dynamics of a species in an ensemble (including indirect and cascading effects) are unaffected by each other.... Such a definition may include a large number of species, so much so that critics might plead unwieldy complexity. However, *nature proceeds without regard to human logistical and analytical sophistication.* – Drake 1990

Managing Communities (examples)

restore the native plant communities typically found in an undisturbed riparian corridor

with prescribed burning, maintain a natural tallgrass prairie plant assemblage

Monitoring Communities is *Generally* Hard to Do

- Identifying boundaries can be difficult
- Community classifications are heavily scale-dependent
- Community classification schemes are often based on subjective thresholds
- Developing a ecological model for an entire community is difficult-to-impossible

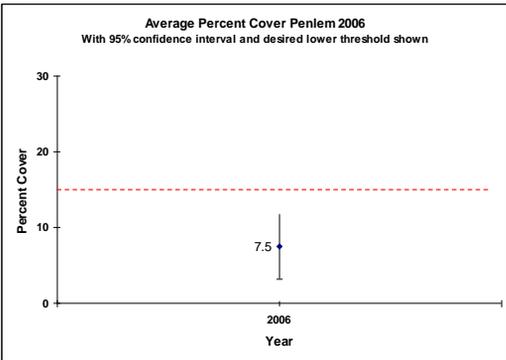


Univariate Dataset

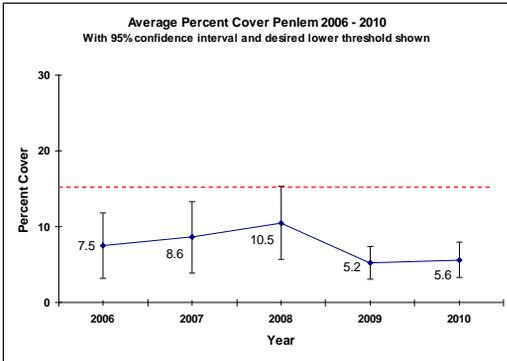
2006 Data

Quadrat	1	2	3	4	5	6	7	8	9	10
Penlem Cover	0.5	10	3	15	5	20	15	0.5	3	3

Univariate Dataset



Univariate Dataset

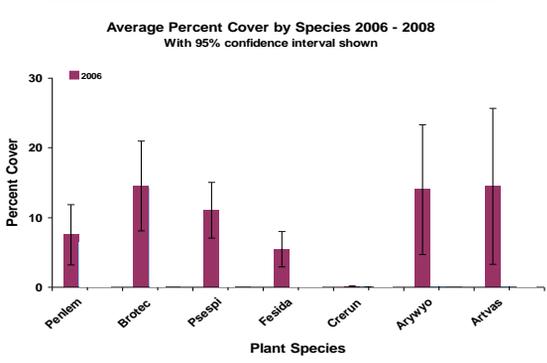


Multivariate Dataset

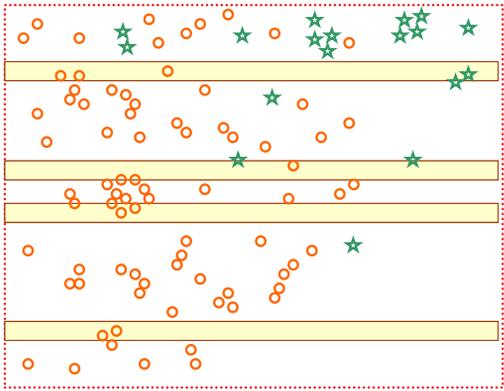
2006 Data

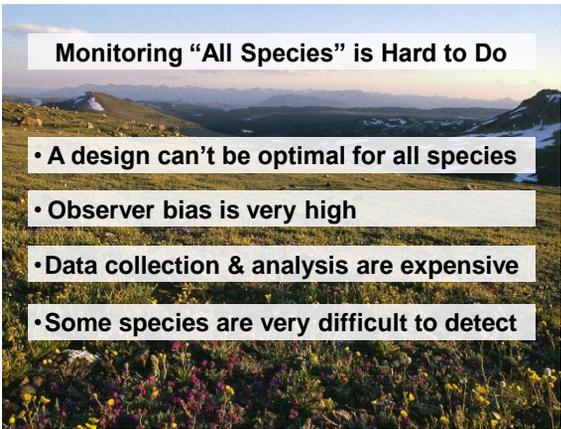
Quadrat	1	2	3	4	5	6	7	8	9	10
Penlem Cover	0.5	10	3	15	5	20	15	0.5	3	3

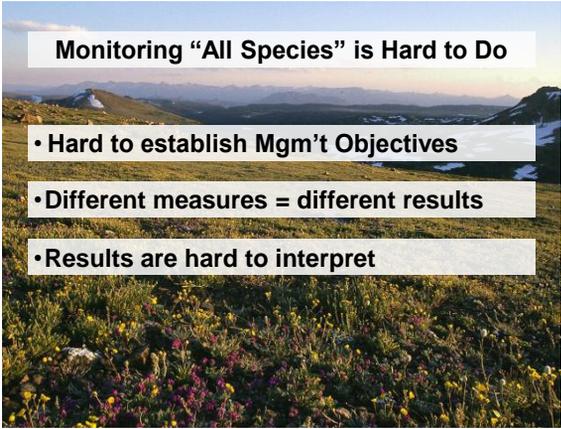
Multivariate Dataset





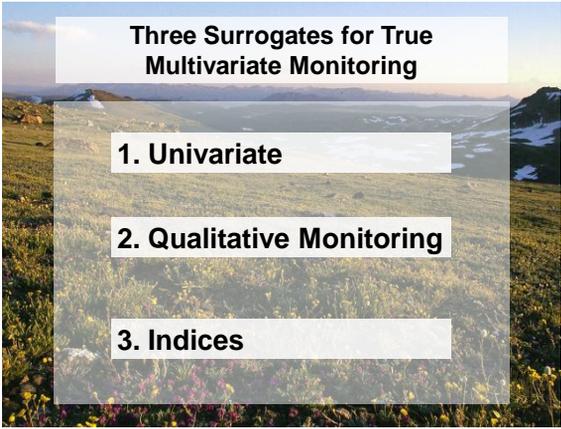






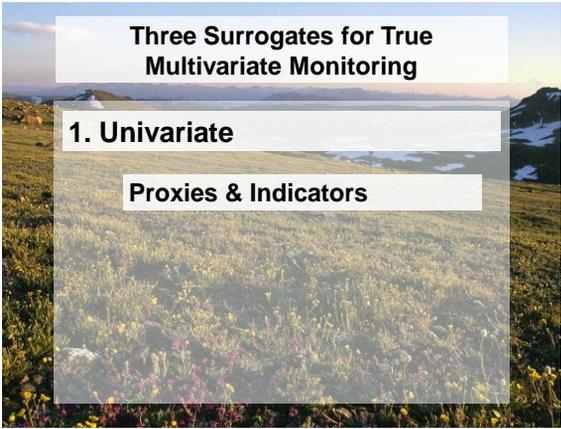
Monitoring "All Species" is Hard to Do

- Hard to establish Mgm't Objectives
- Different measures = different results
- Results are hard to interpret



Three Surrogates for True Multivariate Monitoring

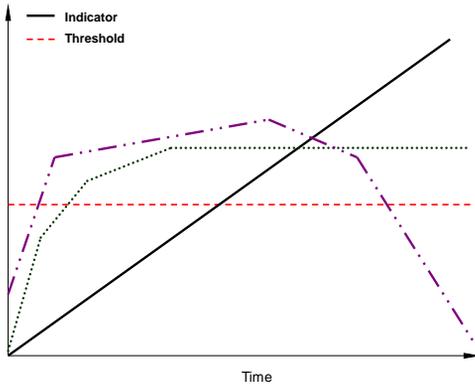
1. Univariate
2. Qualitative Monitoring
3. Indices



Three Surrogates for True Multivariate Monitoring

1. Univariate

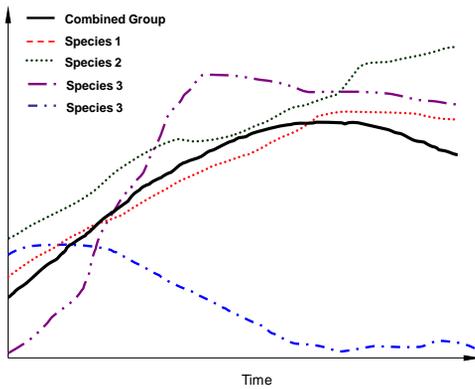
Proxies & Indicators

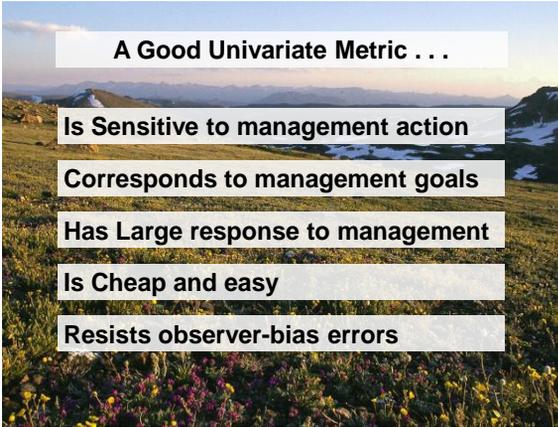


Three Surrogates for True Multivariate Monitoring

1. Univariate

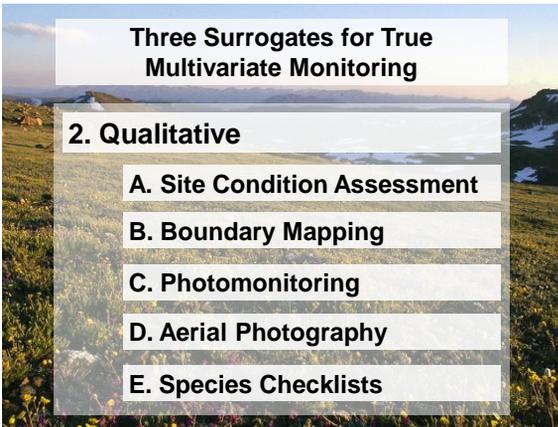
- A. Proxies & Indicators**
- B. Structural Characteristics**
- C. Guilds & Functional Groups**





A Good Univariate Metric . . .

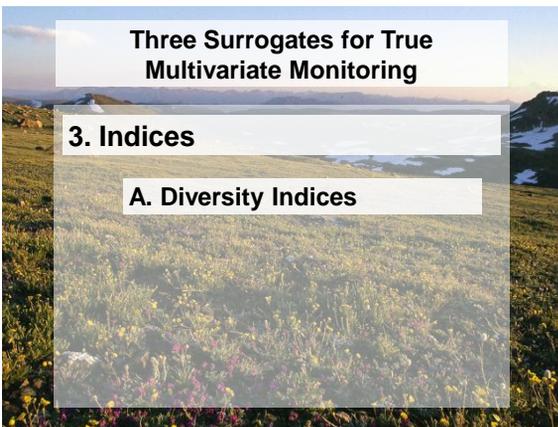
- Is Sensitive to management action**
- Corresponds to management goals**
- Has Large response to management**
- Is Cheap and easy**
- Resists observer-bias errors**



Three Surrogates for True Multivariate Monitoring

2. Qualitative

- A. Site Condition Assessment**
- B. Boundary Mapping**
- C. Photomonitoring**
- D. Aerial Photography**
- E. Species Checklists**

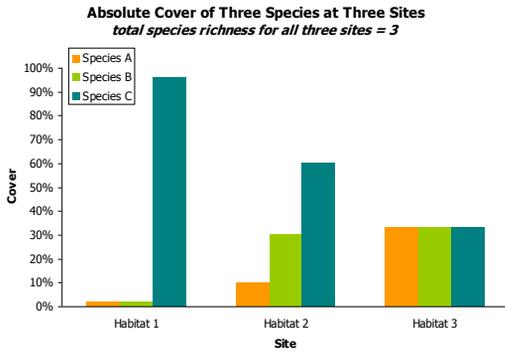


Three Surrogates for True Multivariate Monitoring

3. Indices

- A. Diversity Indices**

Richness vs. Evenness



Three Surrogates for True Multivariate Monitoring

3. Indices

A. Diversity Indices

B. Special Interest Indices

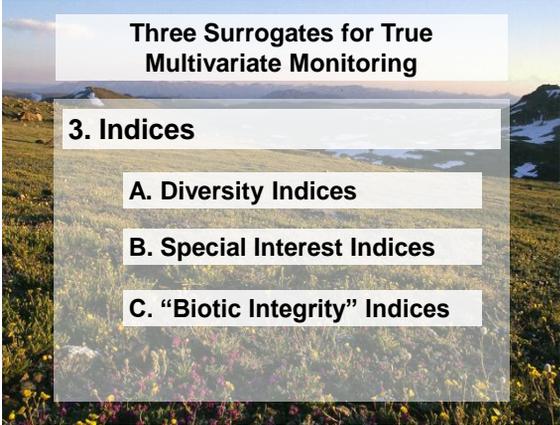
Native Species Index

**NSI = number of native species/
 total species count**

Wetland Indicator Classification

OBL	Obligate	>99%
FACW	Facultative-Wet	75%
FAC	Facultative	50%
FACU	Facultative-Upland	25%
UPL	Upland	0

+ after the code indicates more wet tolerant
 - after the code indicates less wet tolerant



Three Surrogates for True Multivariate Monitoring

3. Indices

- A. Diversity Indices**
- B. Special Interest Indices**
- C. "Biotic Integrity" Indices**

Floristic Quality Assessment Index

Each species assigned a "Coefficient of Conservation"

Entire site receives an assessment of floristic quality based on the following formula:

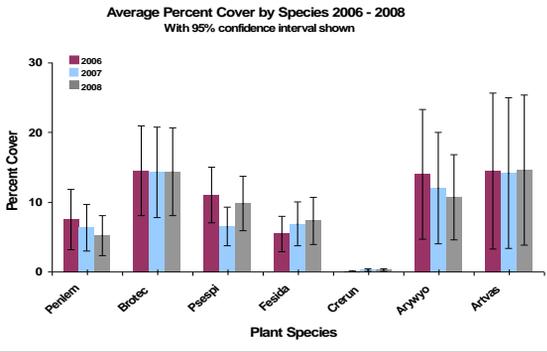
$$FQAI = \frac{\sum CC}{\sqrt{N}}$$

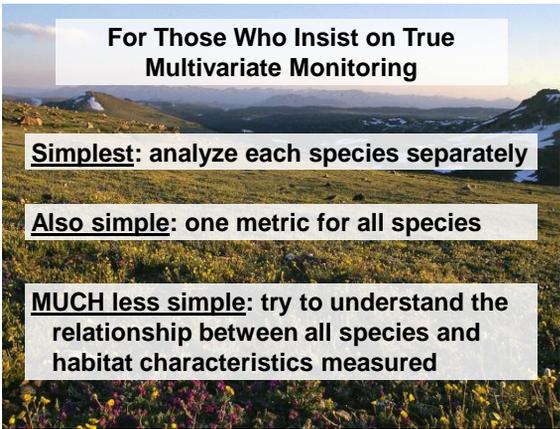


For Those Who Insist on True Multivariate Monitoring

Simplest: analyze each species separately

Multivariate Dataset

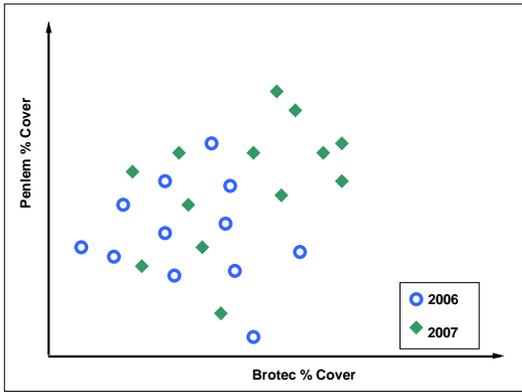


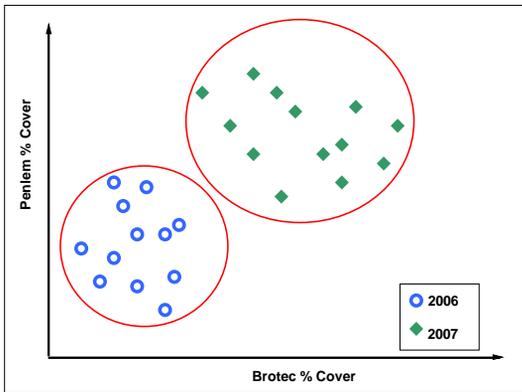


Multivariate Dataset

2006 - 2008 Data

	2006	2007	2008
Penlem Cover	7.5	6.4	5.2
Brotec Cover	14.5	14.3	14.4
Psespi Cover	11.1	6.5	9.8
Fesida Cover	5.5	6.9	7.3
Crerun Cover	0.1	0.3	.3
Arywo Cover	14.0	12.0	10.7
Artvas Cover	14.5	14.2	14.6
Shade	0	0	2
Soil Moisture	0	0	2





Cautions for those who insist on true multivariate monitoring

- Different ordination methods yield different results
- Defining a "significant" threshold difficult
- Sampling design: you're on your own
- Interpretation difficult



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