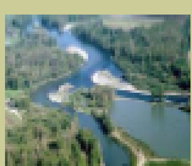
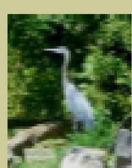
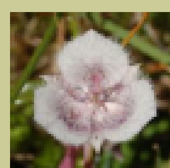
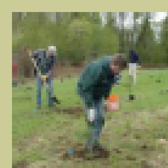
Measuring Up:
Synchronizing Biodiversity Measurement Systems for Markets and Other Incentive Programs









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Missing elements of biodiversity metrics may have little to do with the science itself, but more with validating their efficacy over time.

Robust validation was a gap in most of the 25 measurement systems reviewed.

In a world of invasive species, land conversion, and climate change, long-term viability of a particular project is paramount.

Tradeoffs

Ecosystem complexity vs. My brain's capacity

How do we build metrics: Fusion or Fission

Appropriate scales of measurement

Which proxy messes us up the least?

Why are you measuring *that*?

Do metrics even matter? YES

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A good biodiversity metric:

A. Incorporates the landscape context of the site (e.g. location in a priority conservation area, potential threats, connectivity, patch size);

B. Is valid (e.g. repeatable, sensitive, accurate, and transparent);

C. Is practical, economical, and easy to use by multiple incentive programs; and

D. Can be applied at different scales (e.g. can be used on 10,000 acres just as well as 1 acre).

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Typology

Type	Method	Assumption	Example
Vegetation	Reference state or Benchmark site	Natural/historical vegetation will sustain native species	*BioBanking, Habitat Hectares, Ecosystem Mitigation Approach*
Species	Optimum habitat conditions for one or more species	Pre-defined habitat conditions will sustain species	*Gopher Tortoise, Bog Turtle, Utah Prairie Dog, HSI*
Functions	Ecological processes necessary to support habitat or biodiversity	Visual estimates of indicators can be transformed into functions	*EcoMetrix, UMAM, Prairie, ORWAP*
Practice	Prescribed practice	Practices will yield environmental benefits	*WHIP, Conservation Banking*

Strengths

1) Mostly **outcome**-based
2) Most methods are **rapid visual assessments**
3) Require **on-the-ground** data collection
4) Metrics housed within **standardized protocols**
5) Target **users** are conservation professionals
6) Using **targets or performance** standards
7) Working at the **site and landscape** level
8) F**unctions**-based assessments gaining ground

Weaknesses

1) Lack of independent validation
2) Assumptions not tested
3) Costs and cost-effectiveness
4) Lack of national land classification system
5) Absence of best practices
6) Limited monitoring & adaptive management

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Our view of metrics

- Sound & Practical (trained professional in a day)
- Transparent, Sensitive, & Repeatable
- Incorporates Context and Works across scales
- Feeds into adaptive management over time
- Aims at outcomes
- Can talk about ecosystems as wholes and parts

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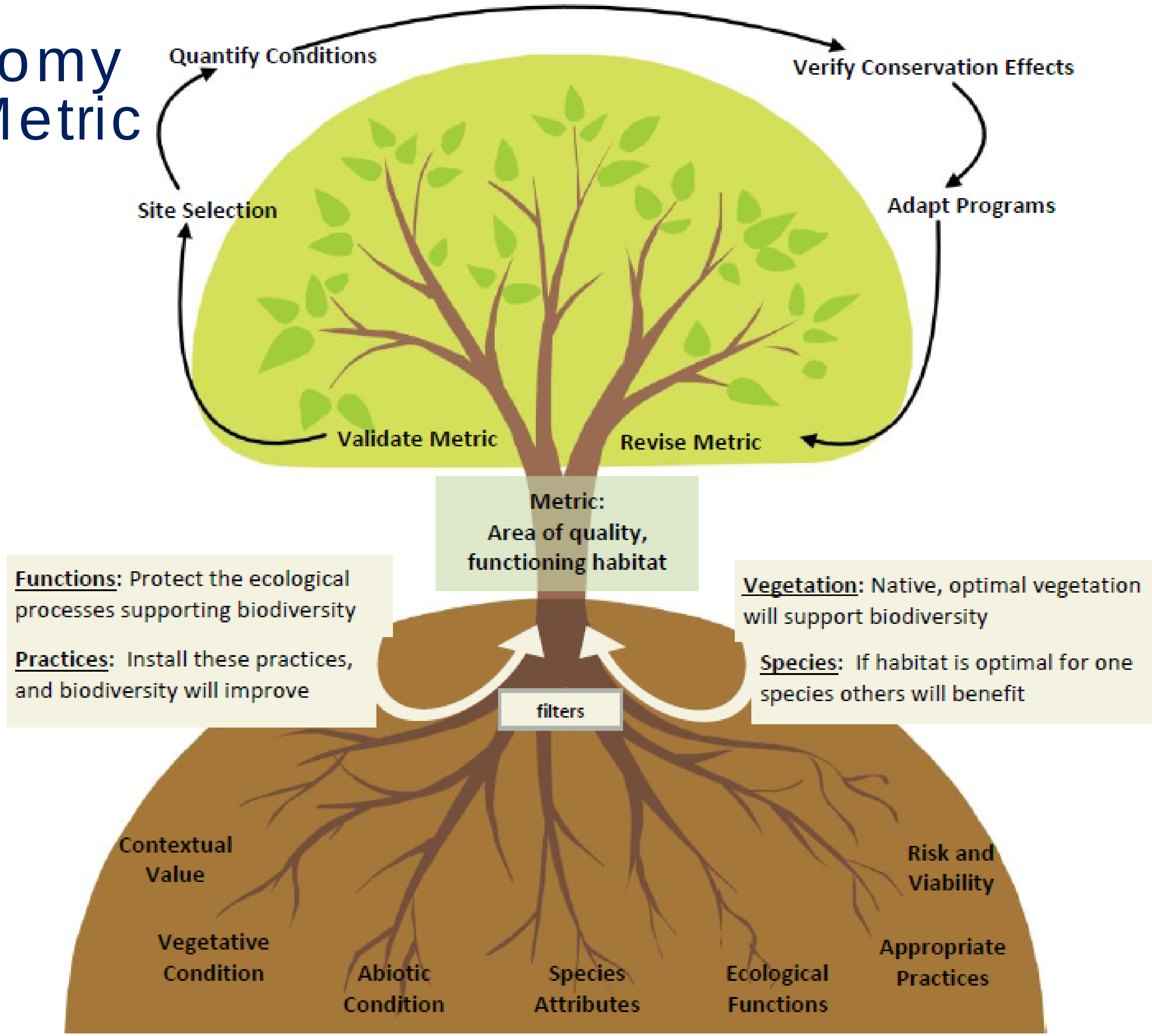
Anatomy of a Metric



Things to Measure

Measurement systems need to answer the question, "What did I actually get for my investment?"

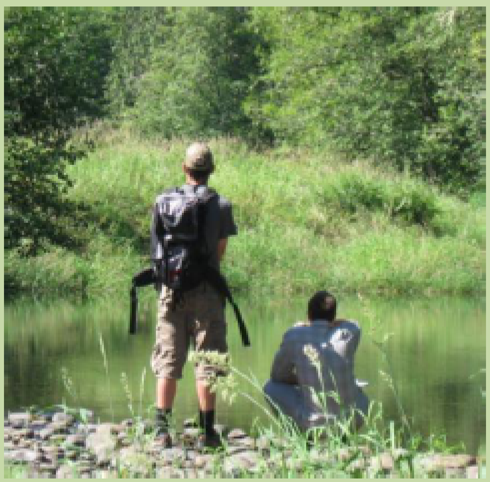


Table 2.2.1. Sample measurements for indicator classes

Indicator Class	Sample Measurement (s)
CONTEXT	
Connectivity	Proximity index; Historic and current vegetation maps
Priority	In a mapped priority (e.g. State Wildlife Action Plan, Ecoregional Plan)
Surrounding land use	Distance to each surrounding land use type
VEGETATION	
Natives	Terrestrial: % cover by strata or species, age classes, stem counts/density, species richness, target plant species presence Aquatic: % cover emergent/submergent/floating/other vegetation
Non-natives	% cover, invasive species presence
Bare ground	% cover
ABIOTIC	
Hydrology	Flow, depth/period of inundation, stream morphology, special features (e.g. springs, vernal pools, groundwater, open water/ponded)
Soil	Type, litter/duff layer depth, texture, drainage, erodability, stream
Geographic Features	Elevation, aspect, slope, microtopography
Disturbance	Fire return interval, wind regime, disease, flood regime
Climate	Precipitation
SPECIES	
Targets	Richness, presence, species counts, access to the site
Features	Sage, nests/dens, large wood, boulders
PRACTICE	
Crops	Irrigated/non-irrigation, type and rotation, soil conditioning
Inputs	Water, fertilizer, pesticide, phosphorous index/corn stalk nitrate
BMPs	List of practice implemented
Human Disturbance	Use, fragmentation, pollution
RISK	
Threats	Predators, invasive plants and animals, roads
Stewardship	Legal protection/ownership, existing use, ability to burn/flood

Process for Building a Measurement System

- Define conservation goals and uses.
- Engage experts to target ecosystem functions and define indicators.
- Review existing systems, and develop a draft metric.
- Validate metric for accuracy, repeatability, sensitivity and cost.
- Finalize the metric, documented assumptions, and program design.
- Revisit measurement system after two years for potential revisions.

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Counting on the Environment Metrics

Upland Habitat: Upland Prairie; Oak; Sagebrush; Floodplain

Aquatic Habitat: Floodplain; Wetlands; Salmon Streams

Water Quality: Temperature; Nutrients

Coming Soon: Stream Functional Assessment

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One of the major barriers keeping measurement systems from being more consistent is a lack of documentation and ongoing support to maintain metrics.

Ultimately, measurement systems should be constructed hierarchically, tiering different intensities of measurement to different program requirements.

Quantifying and verifying the biodiversity benefits of any one project or incentive program is nearly impossible to do directly.

Piles of data are collected on individual projects, but not in a way that adds up to a national picture of their effectiveness.

Next Steps

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Questions

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www. willamettepartnership.org/
Measuringup/measuringup.html