

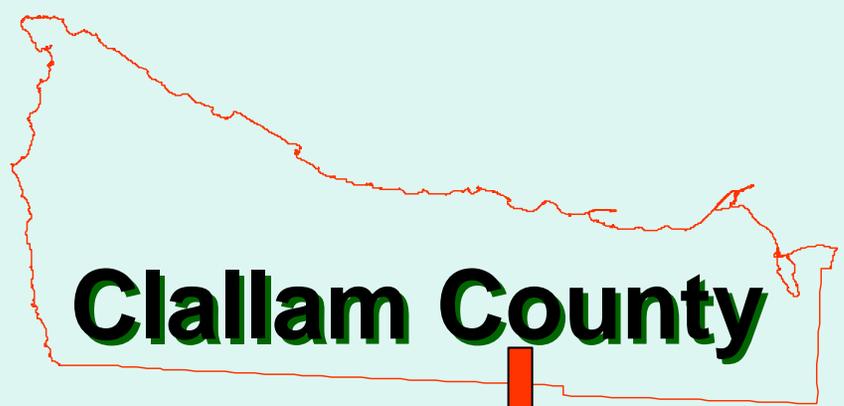
A Physical Habitat Index for Pacific Northwest Streams



Ed Chadd & Hannah Merrill, Streamkeepers Co-Managers

Streamkeepers of Clallam County

is a volunteer stream monitoring program of local government on the Olympic Peninsula in Washington state.





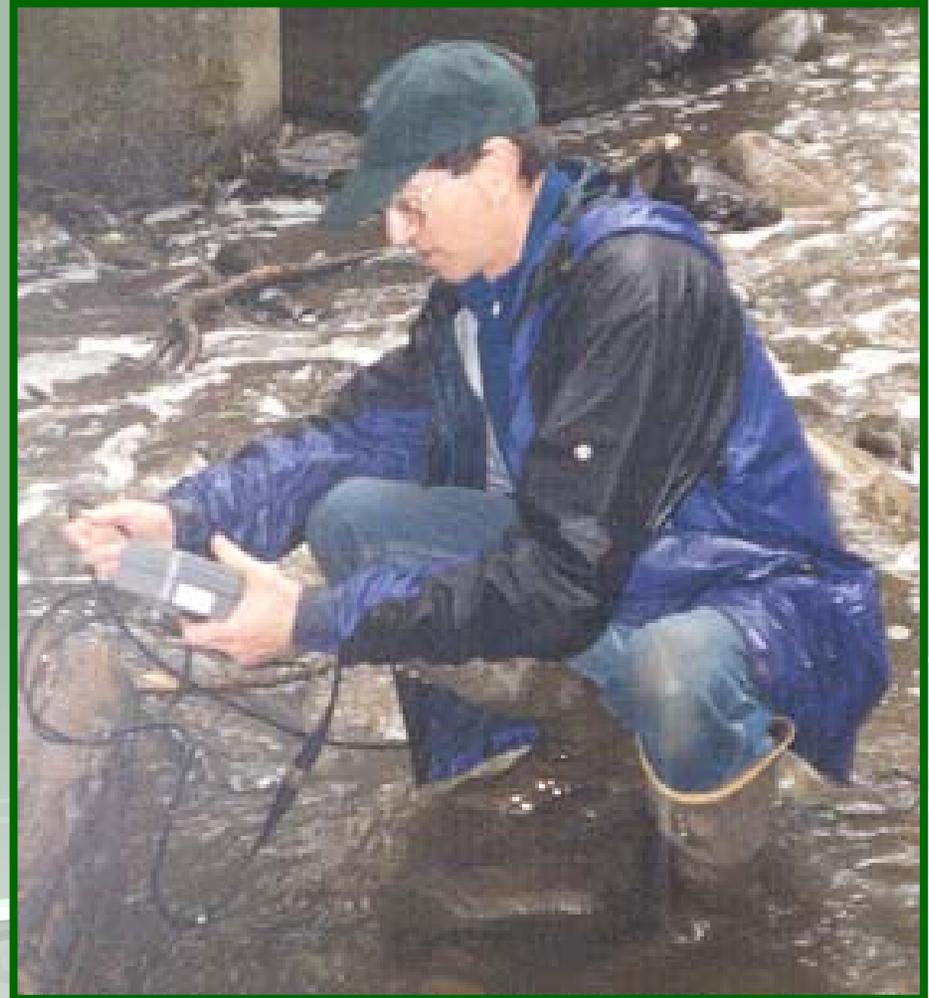
Purpose:

- **Monitor local streams**
- **Provide good data to guide management decisions**
- **Encourage watershed stewardship**

AMBIENT MONITORING

Types of parameters we monitor:

- **Biological**
- **Chemical**
- **Physical**



EXISTING INDICES:



- ◆ **Benthic Index of Biological Integrity (B-IBI):**
measures biological integrity based on benthic macroinvertebrate population.
- ◆ **Water Quality Index (WQI):**
measures quality of water column.

PHYSICAL HABITAT INDEX (PHI)

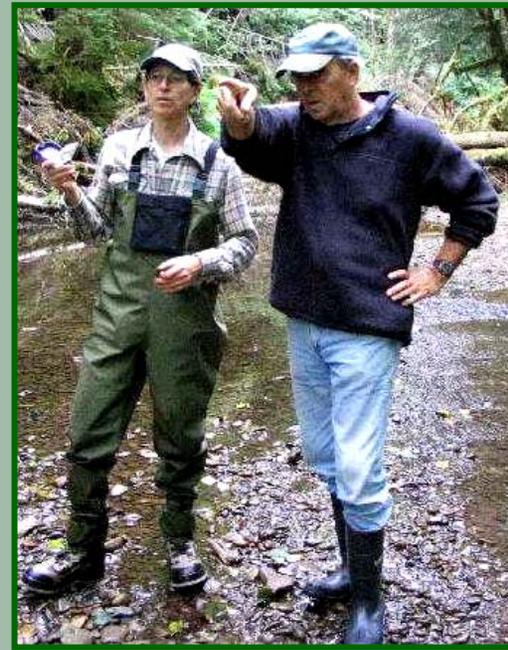
Streamkeepers is developing a multi-metric Physical Habitat for Salmonids Index (**PHI**).

This presentation will explore the PHI development as a work-in-progress.



WHY A PHI?

- ➔ **Our Technical Advisory Committee asked us to monitor physical habitat parameters.**
- ➔ **However, that data was rarely analyzed...**
- ➔ **...in proportion to the huge effort required to collect it!***
- *Volunteer management rule #1:
Make sure the volunteers' time really counts!**



PHI PROVIDES A “WINDOW INTO THE DATA”

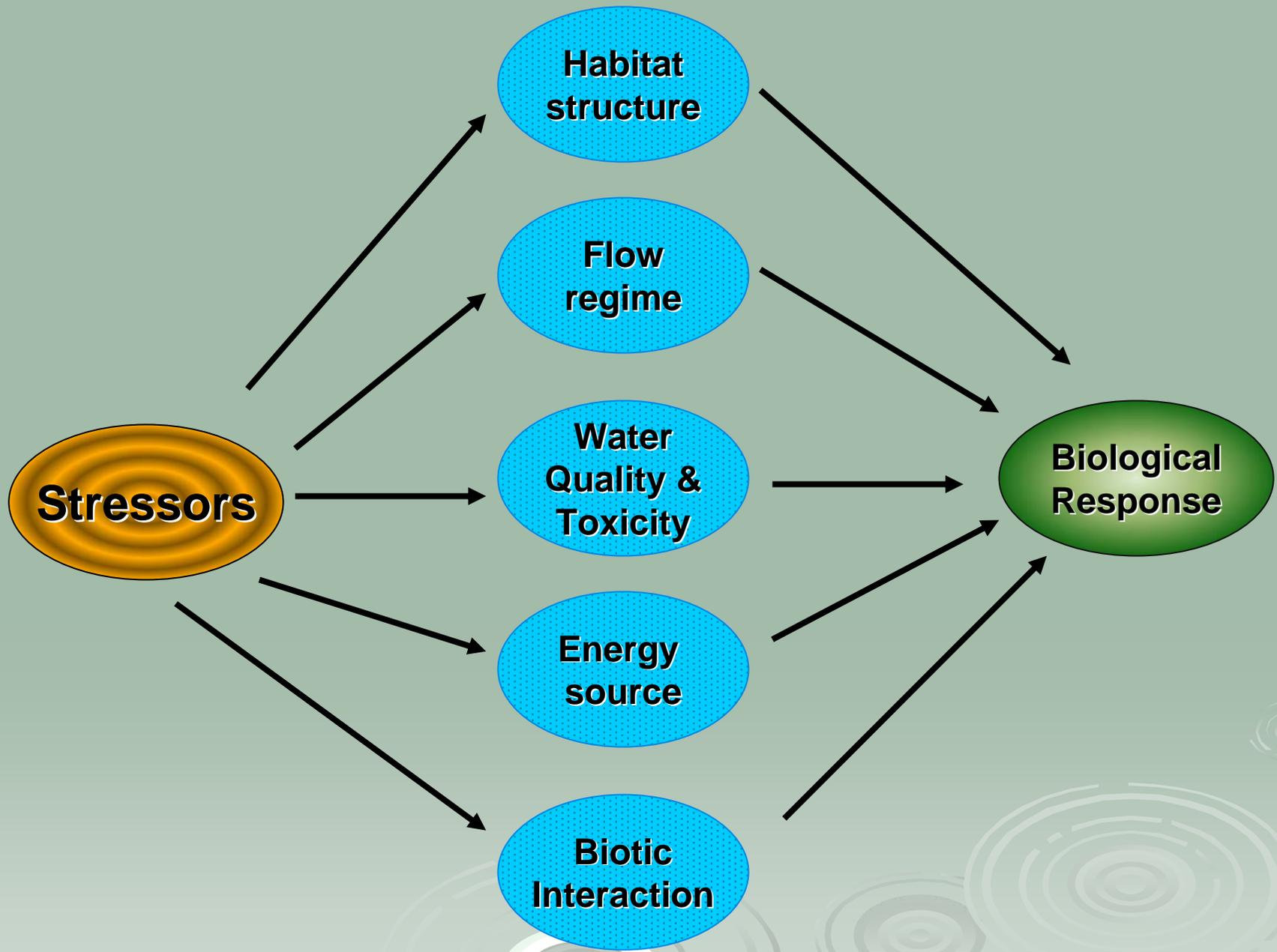


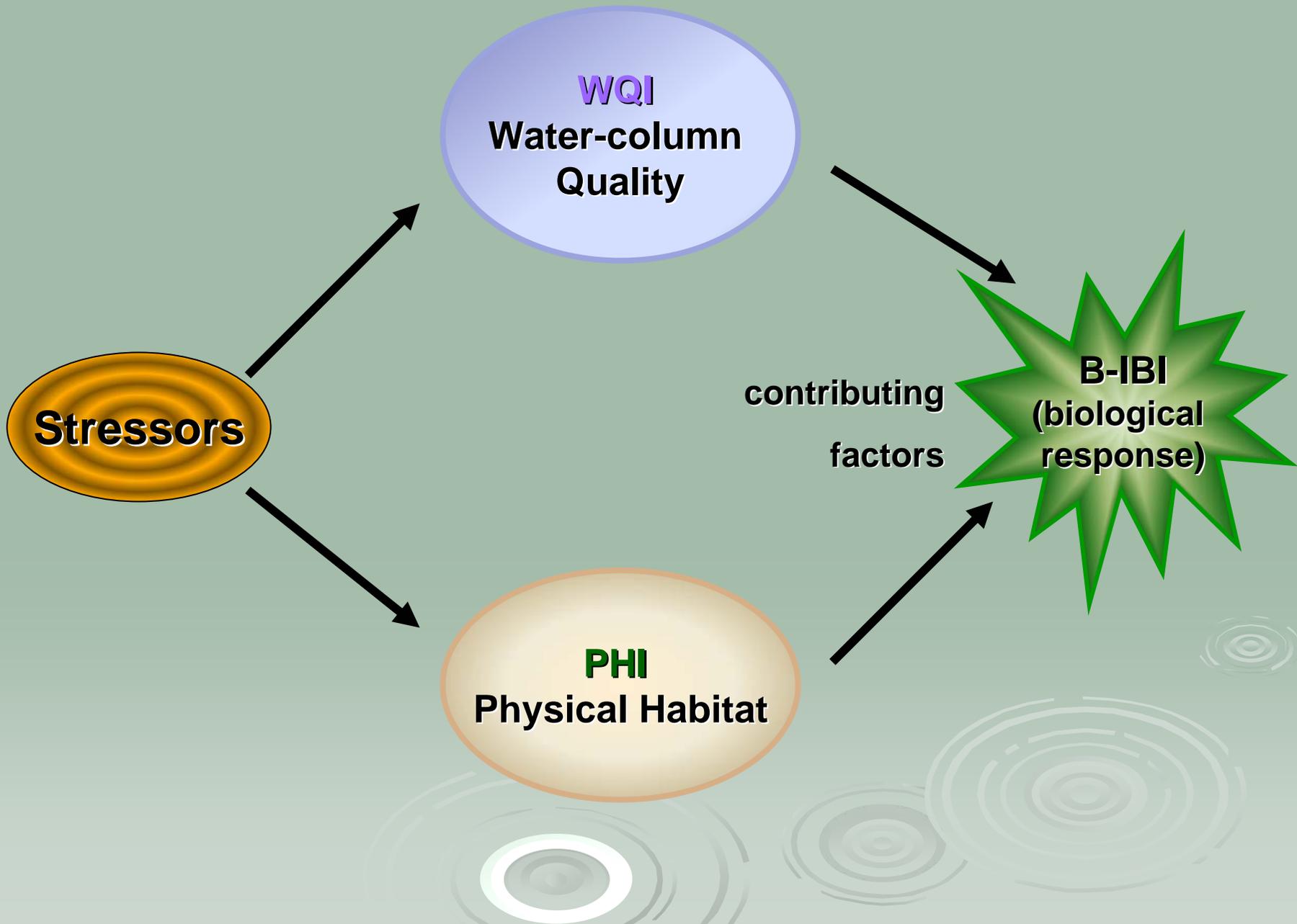
- ★ Quick summary of data.
- ★ Quick evaluation of good/bad.
- ★ Invitation to further investigation.

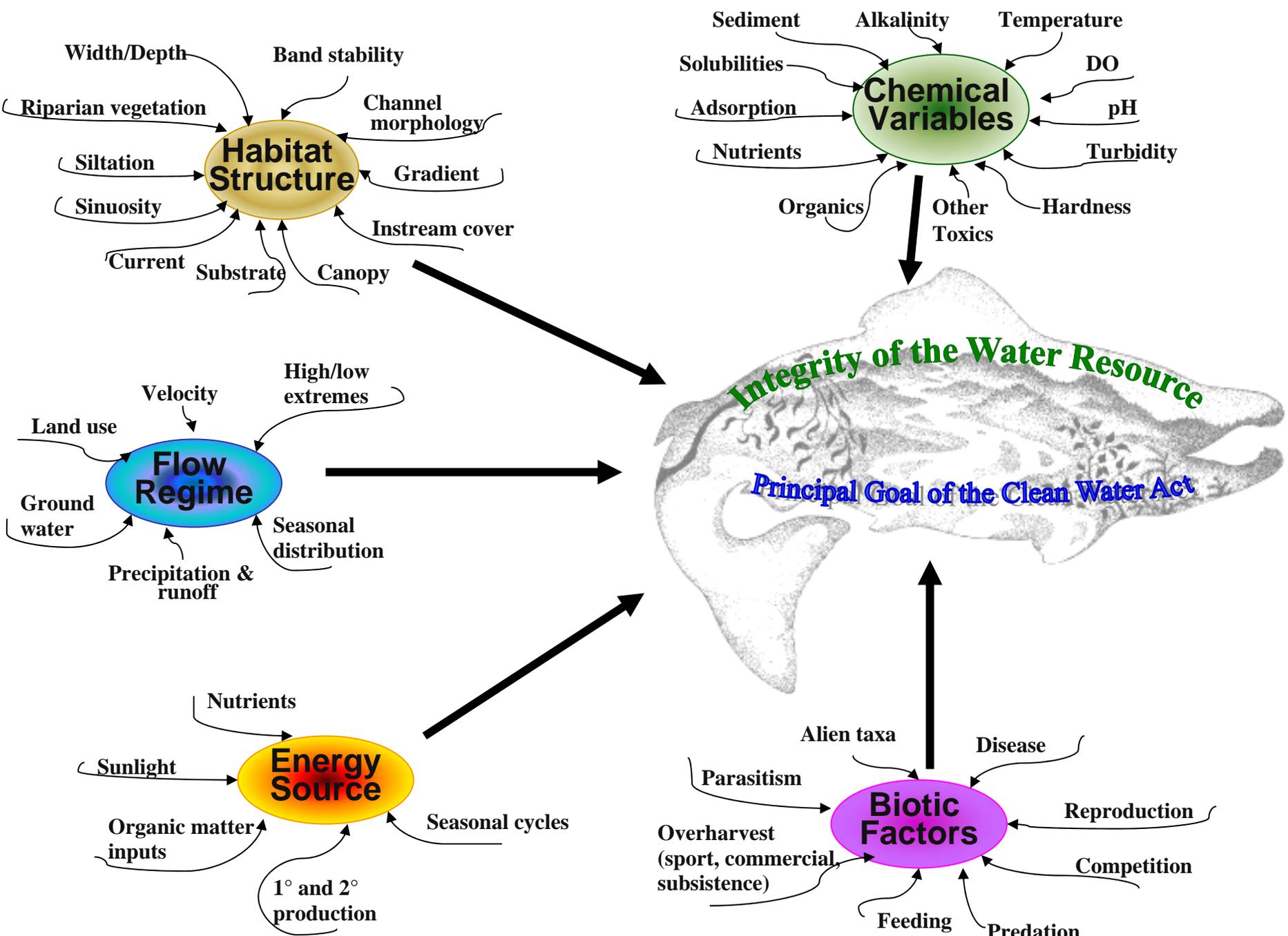
PHI USES

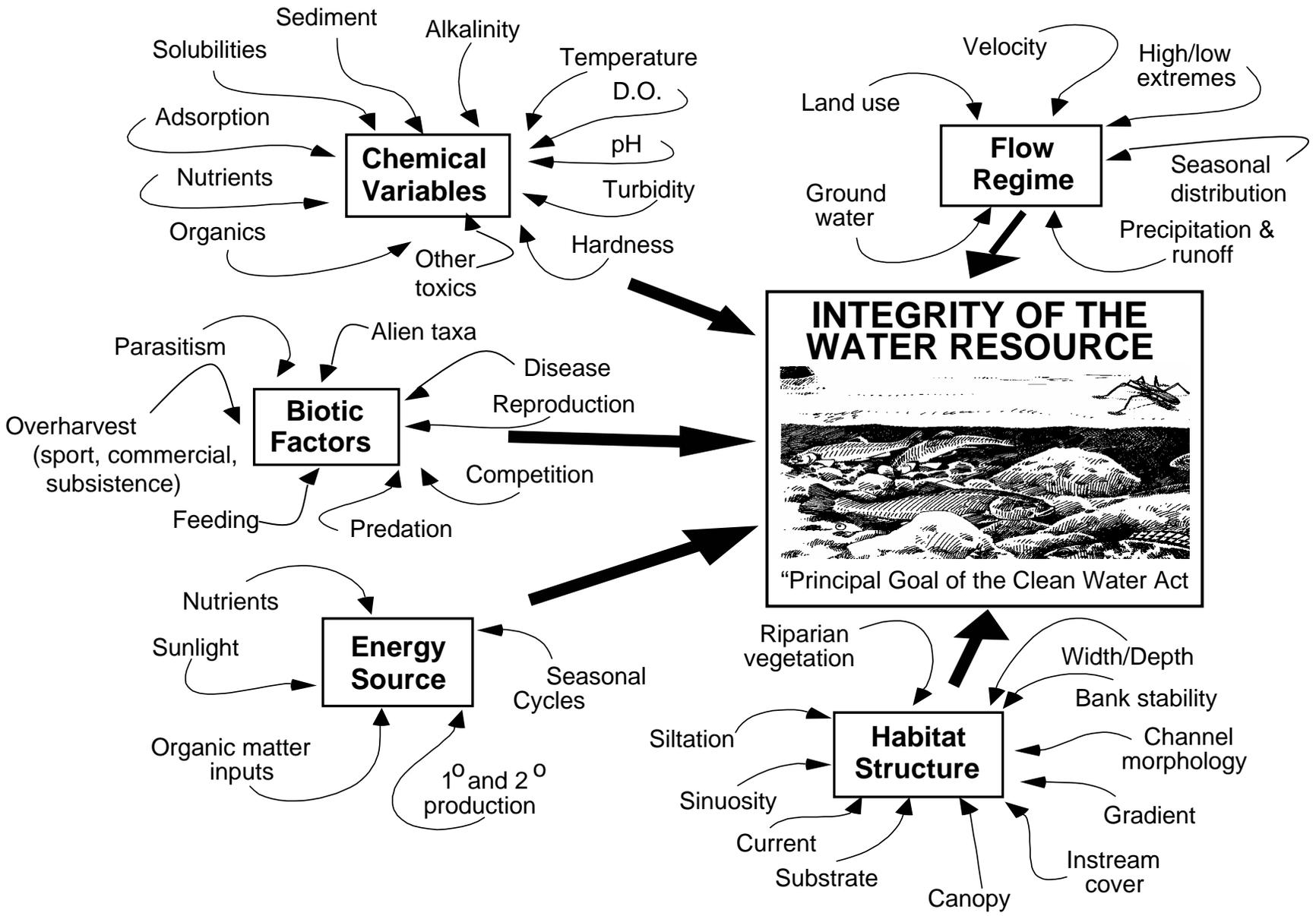
1. **Snapshot of habitat at a specific spot—especially where data is lacking.**
2. **Educational tool—help underscore the importance of habitat.**
3. **Establish baseline for trend analysis.**
4. **Help direct restoration & protection efforts.**







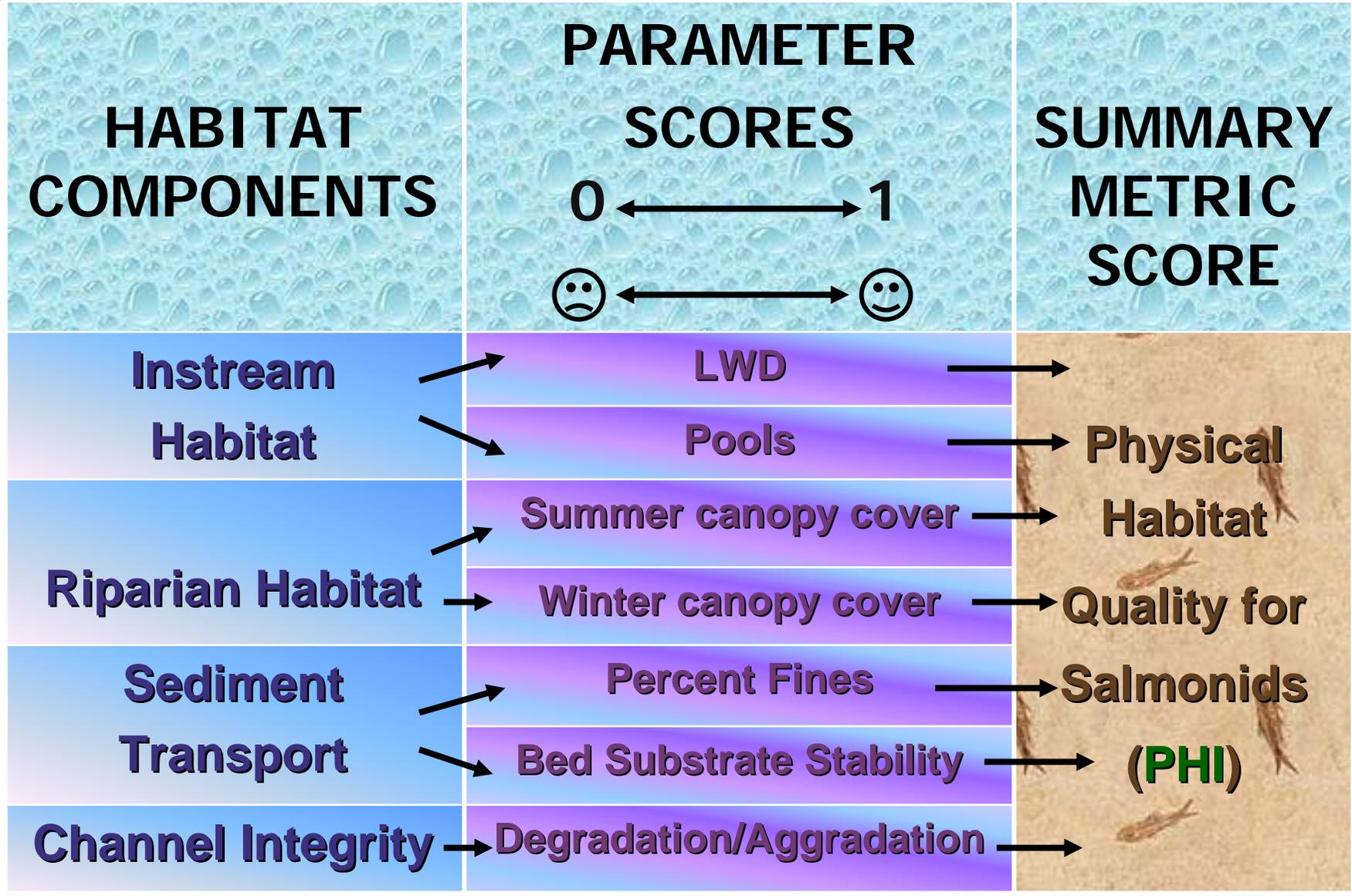




PHI DEVELOPMENT

- 1. Searched relevant literature.**
- 2. Compared our data to “reference” or “target” values.**
- 3. Devised scoring formulas for each parameter.**





CHANGES FROM ORIGINAL PAPER

- ✓ Metric derived directly from parameters.
- ✓ Some parameter formulas have changed.
- ✓ One parameter dropped.
- ✓ Still under construction!



PARAMETER

BASIS FOR SCORING

LWD

Scientific literature

Pools

Published standards

Summer/Winter
Canopy Cover

Published standards

Percent Fines

Extrapolated from
scientific literature

Bed Substrate Stability

Scientific literature

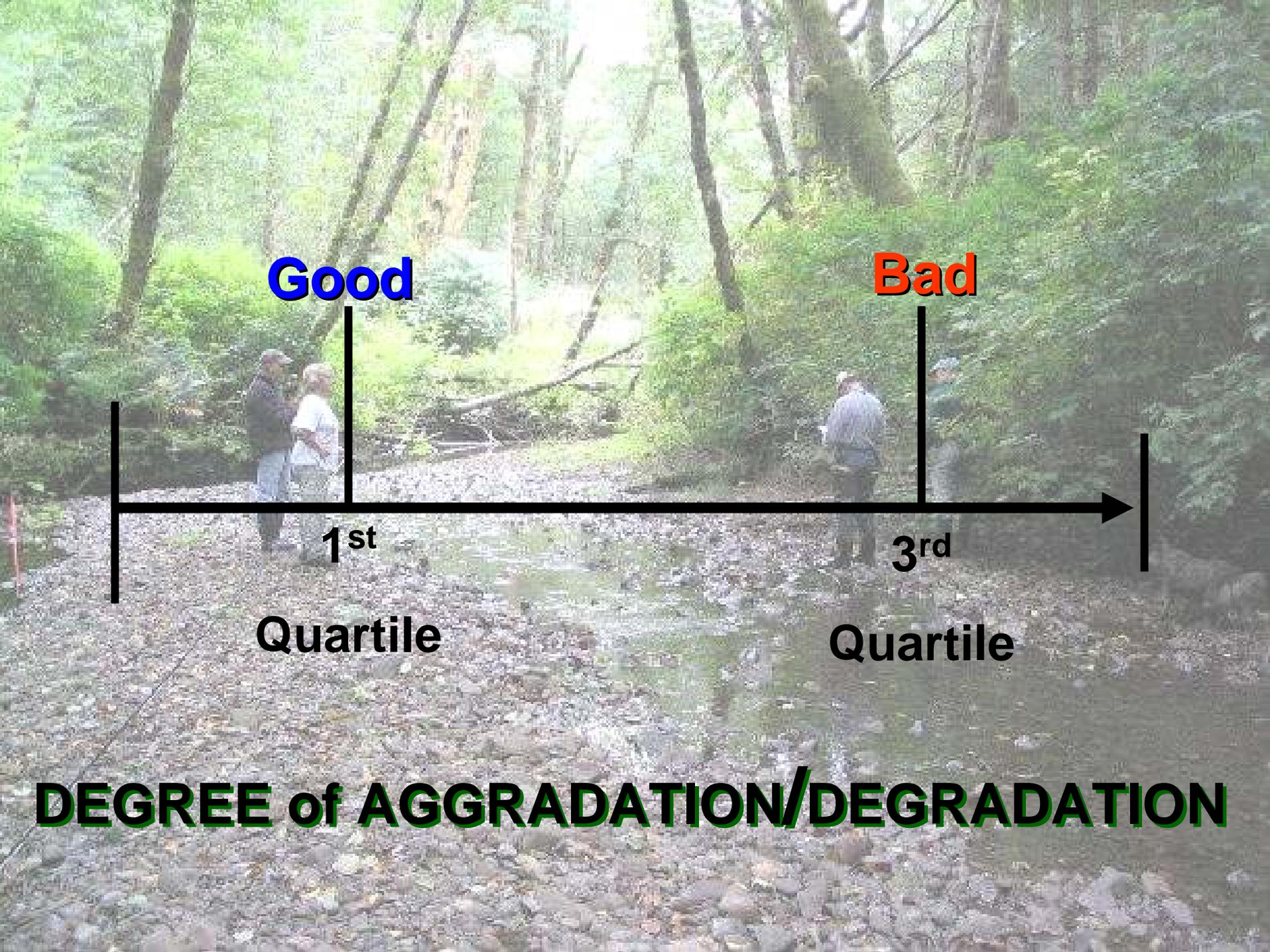
Degradation/Aggradation

Internal statistics

INTERNAL STATISTICAL ANALYSIS



**Where no standards existed,
we used the gradient
of Streamkeepers' own sites,
which range from federally
protected wilderness
to highly impacted urban streams.**



Good

Bad

1st

3rd

Quartile

Quartile

DEGREE of AGGRADATION/DEGRADATION

CAVEATS

PHI

INTERPRETATION

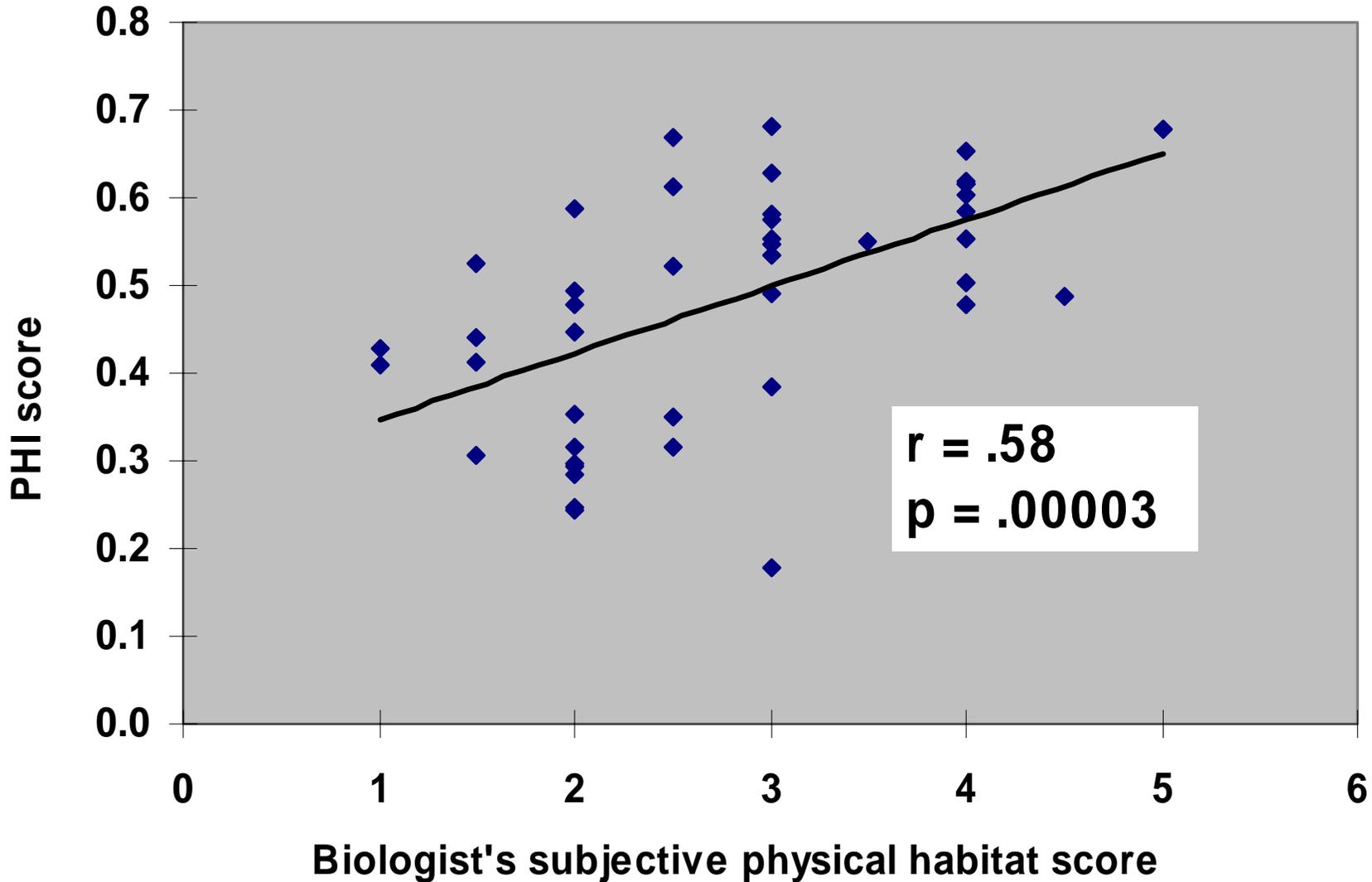
LIMITED

BY:

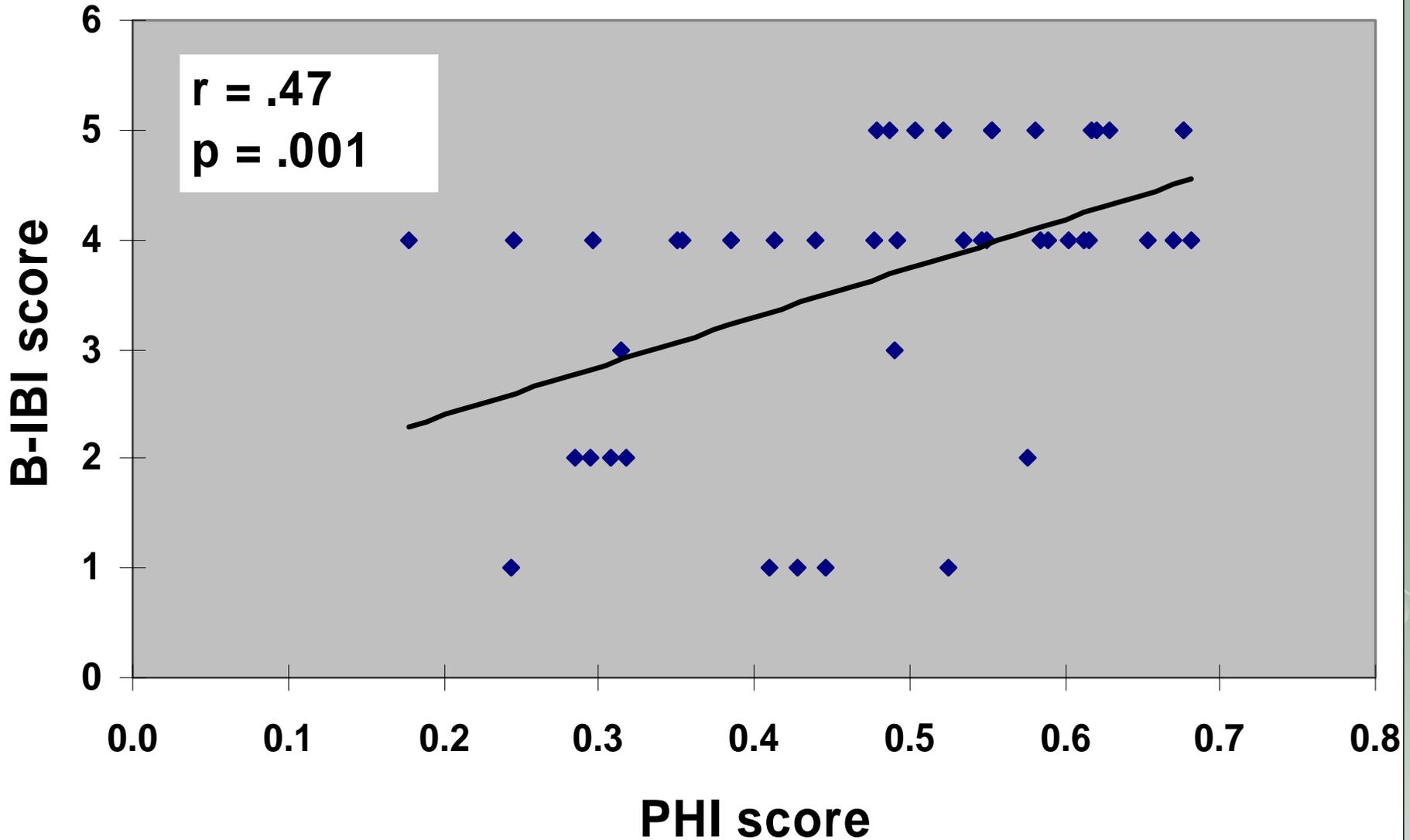
- ✓ **Reach size**
- ✓ **Reach location**
- ✓ **Monitoring–point location**
- ✓ **Insufficient data set (agg/deg)**



GRAPH OF PHI SCORES AGAINST HABITAT QUALITY RATING OF LOCAL BIOLOGIST



PHI CORRELATED W/ B-IBI



B-IBI VS. PHI & WQI

MULTIPLE REGRESSION: B-IBI VS. PHI & WQI

Regression Statistics

Multiple R	0.64
R Square	0.40
Adjusted R Square	0.38
Standard Error	1.02
Observations	45

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	29.93	14.96	14.26	0.00002
Residual	42	44.07	1.05		
Total	44	74			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-1.37	0.98	-1.40	0.17
PHI score	2.66	1.24	2.14	0.04
WQI score	0.94	0.26	3.60	0.0008

PHI FURTHER STUDY

 **Correlate PHI to land uses:**

- ▶ **Impervious surface in contributing basin.**
- ▶ **Nearby riparian disturbance.**
- ▶ **Proximity to road crossings.**

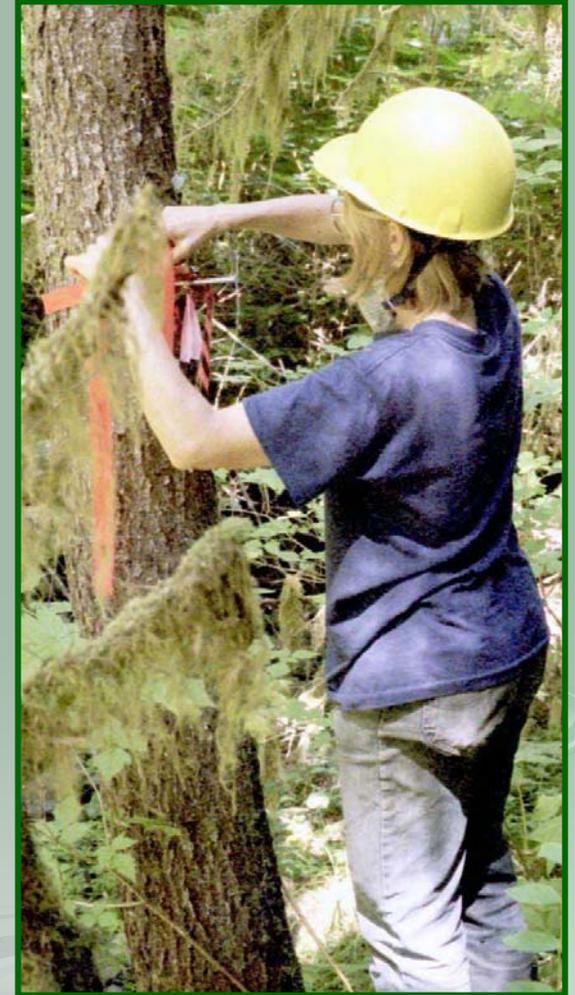
 **Add parameters:**

- ▶ **Aquatic invasive weeds.**



ADDITIONAL INDICES

- **Hydrologic “flashiness”**
- **Future physical habitat**
 - **Conifer density**
 - **LWD recruitment**
 - **Riparian invasive weeds**



ACKNOWLEDGEMENTS



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