Ecological Indicators Linking Ecosystems and Human Wellbeing:
Research Questions

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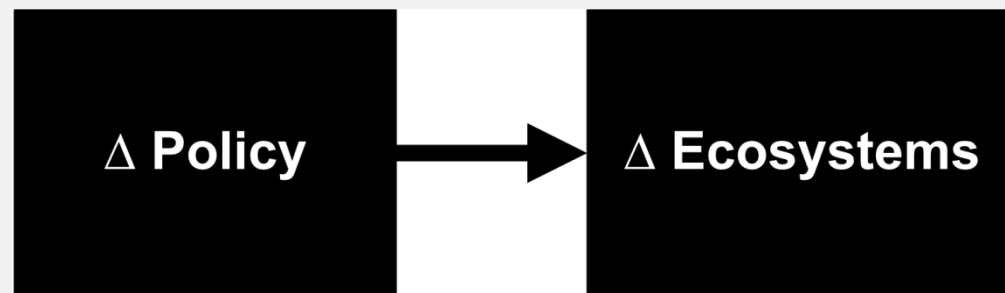
[1] *US EPA, ORD, Western Ecology Division*
[2] *Resources for the Future*
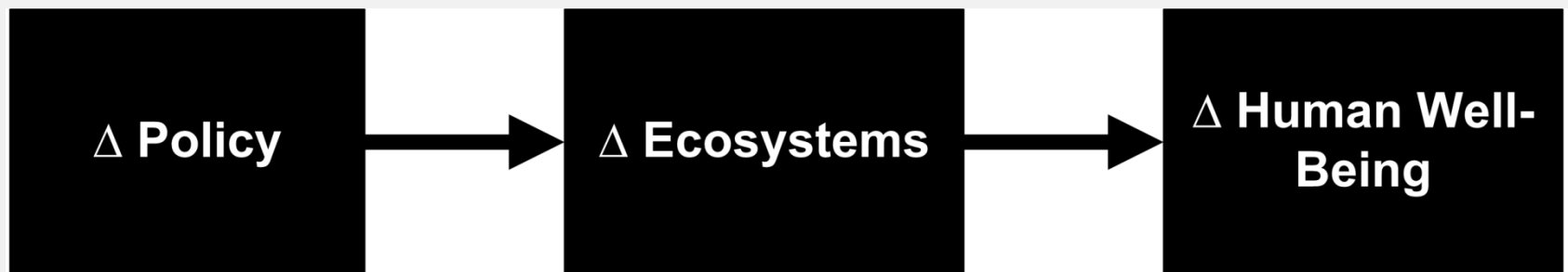[3] *George Perkins Marsh Institute, Clark University*
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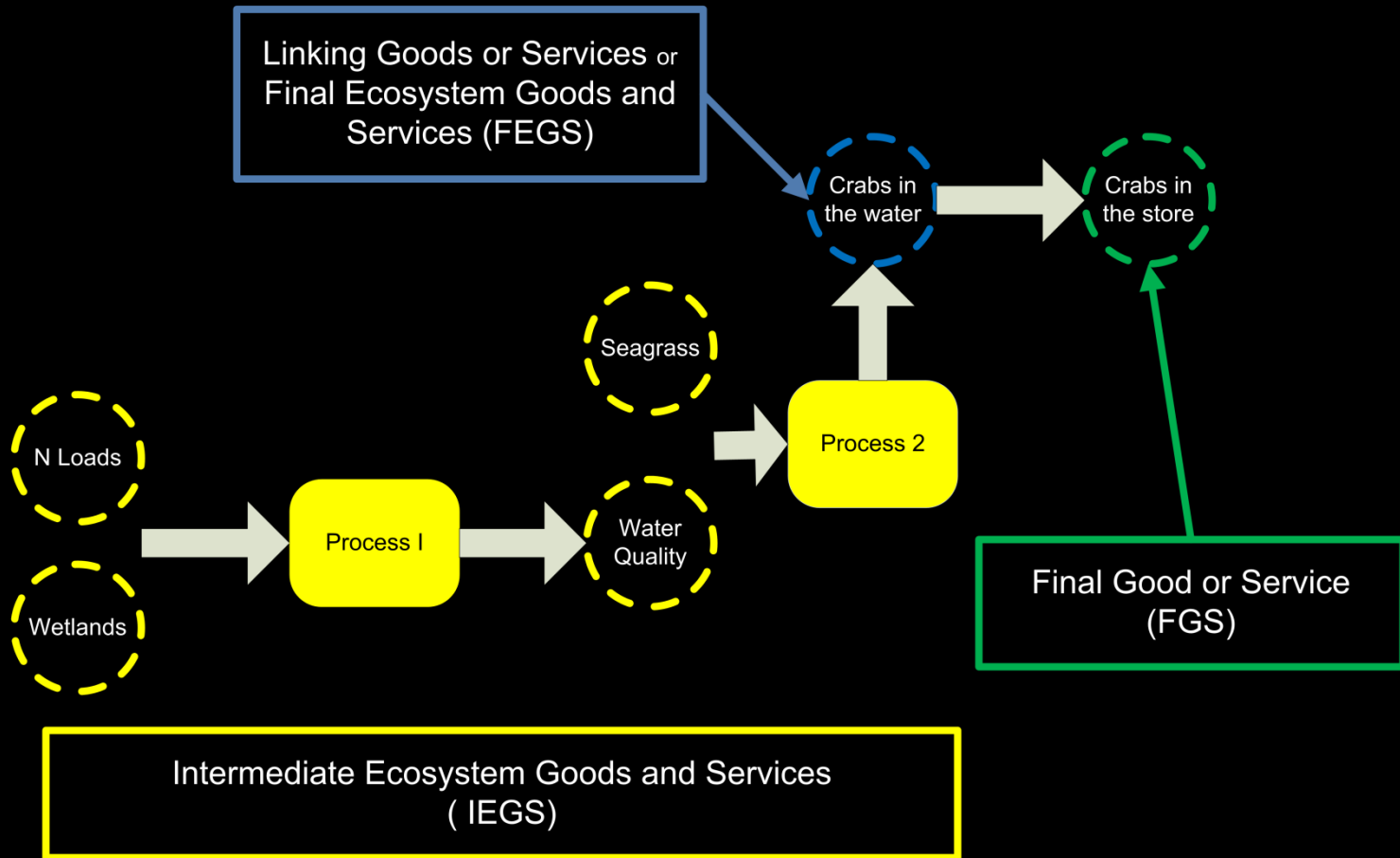
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Applied Ecology Addresses This Issue:

We can do more if we address this issue:

Ecological and Economic Systems are Linked

Key Terms and Issues

- FGS
  - <u>Not</u> ecosystem goods and services
    - Natural Capital + Human Capital
- FEGS
  - Ecosystem features most directly valued by people
- IEGS
  - Ecosystem features contributing to the creation or character of FEGS
  - Value derived from value of FEGS
  - Manage, monitor, model and map to understand and manage FEGS

Key Terms and Issues

- FGS ← Good data often available
  - <u>Not</u> ecosystem goods and services
    - Natural Capital + Human Capital
- FEGS
  - Ecosystem things most directly valued by people
- IEGS ← Good data less often available
  - Manage, monitor, model and map to understand and manage FEGS
  - Value derived from value of FEGS

FGS Data

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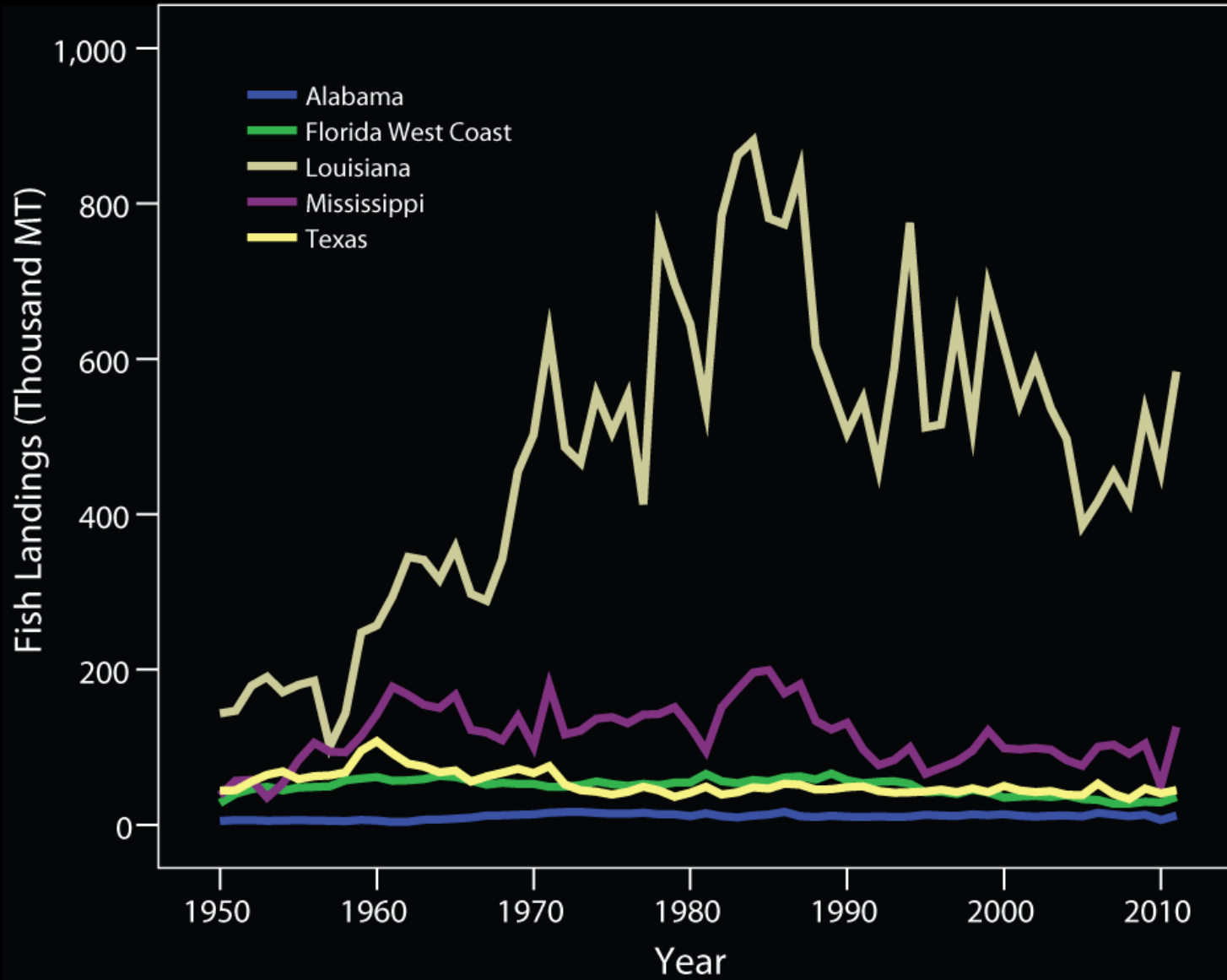
Overall Goal: Improve Capacity to Identify FEGS

- Identify Research Questions

- Describe Current Understanding of Questions

- Suggest Focused Research for Natural Science Social Science Partnerships

Here:

- Identify Research Questions
  - How we identify questions
  - List Questions
  - Illustrate importance to ecological research and management
    - Using data from survey of western streams
- Describe Current Understanding of Questions
- Suggest Focused Research for Natural Science Social Science Partnerships

Identify barriers to specification of indicators of FEGS

1. Properties of Ecological Indicators
    –   e.g. Jackson Kurtz and Fisher 2000, Dale and Beyeler 2001

2. Lessons from Prototype FEGS Indicator Development
    –   e.g. Ringold, Boyd, Landers and Weber 2013

3. Literature Review

Result -- Seven Key Questions and their significance to natural scientists

Q1. How do we know if metrics "work"?
Q2. Do linking indicators "work" better than indicators of IEGS?

- **Establish a conceptual foundation for indicator identification**
- **Establish a method to evaluate alternative indicators**
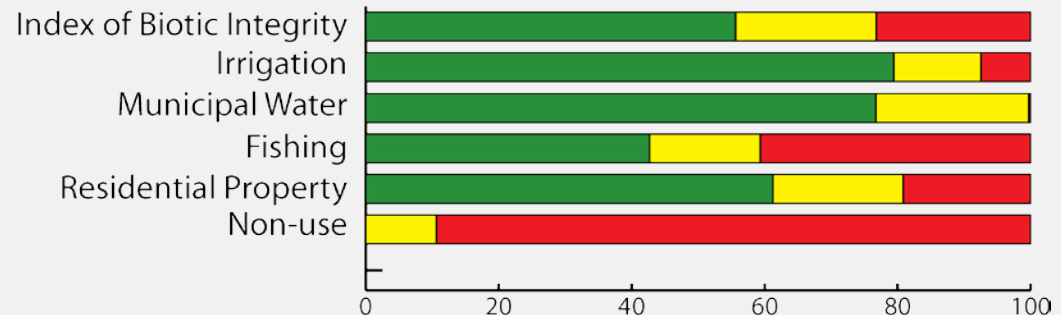
Q3. Do we need to recognize different ways in which people benefit from ecosystems?

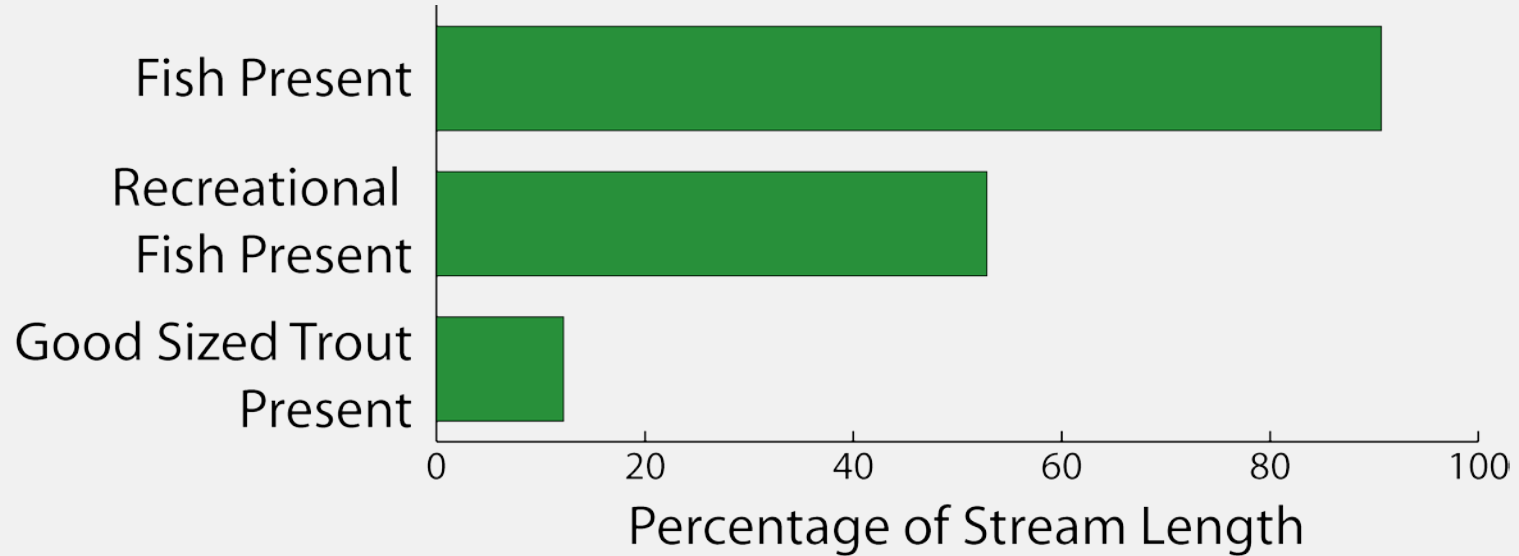- Represent ecosystems with one indicator or many?
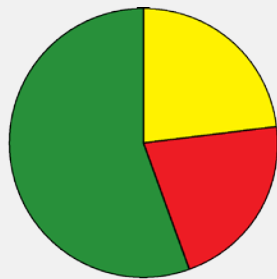
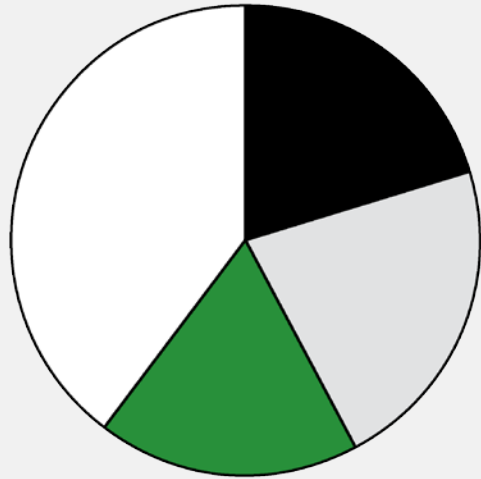

Index of Biotic Integrity

OR

Q4. Do more aggregate descriptions (e.g., fish) perform better than less aggregate descriptions (e.g., trout)?
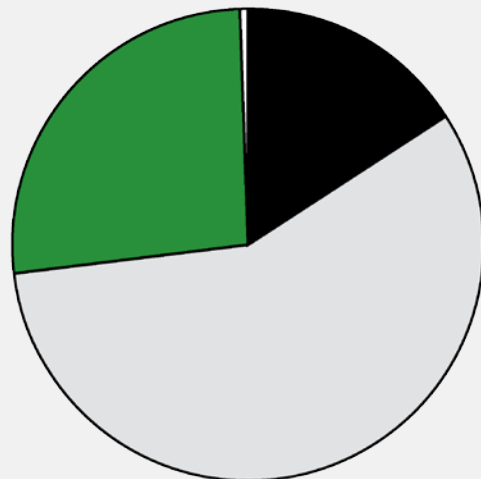
Q5. Do indicators that aggregate over multiple categories (e.g. a fishing quality index) perform better than indicators that focus on specific ecological components (e.g. fish and site appeal)?
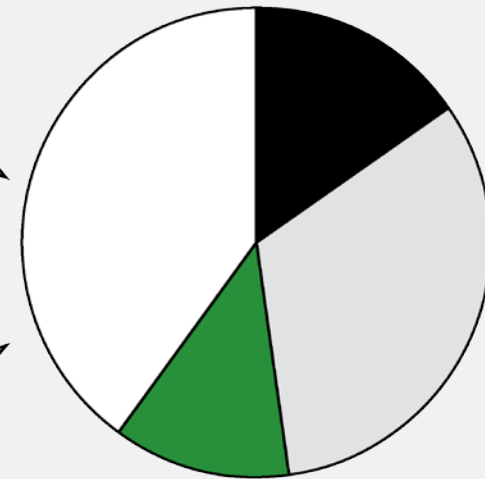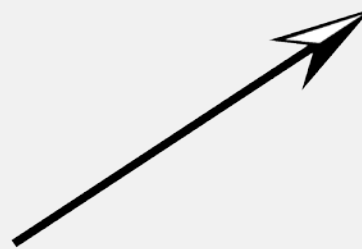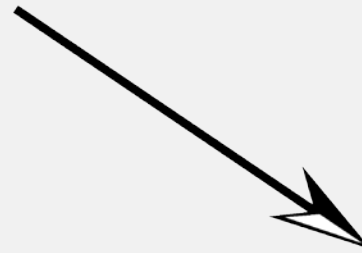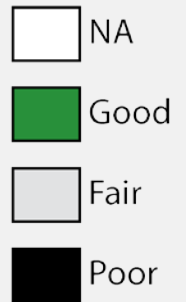
Components

Aggregate

Recreational Fish Abundance

Site Appeal

Fishing Quality

Or Both?

NA
Good
Fair
Poor

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Two More Key Questions

6. What are the temporal and spatial dimensions of indicators that matter to people?

7. Existence (or non-use) value vs use value?

Natural Scientists and Social Scientists working together can make ecological information more powerful

Look for a working paper on rff.org by the end January 2015.