

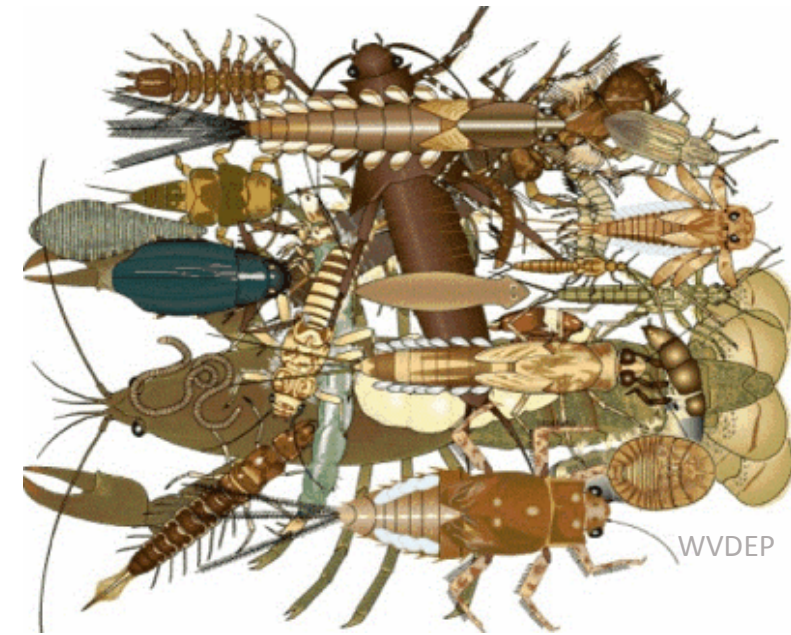
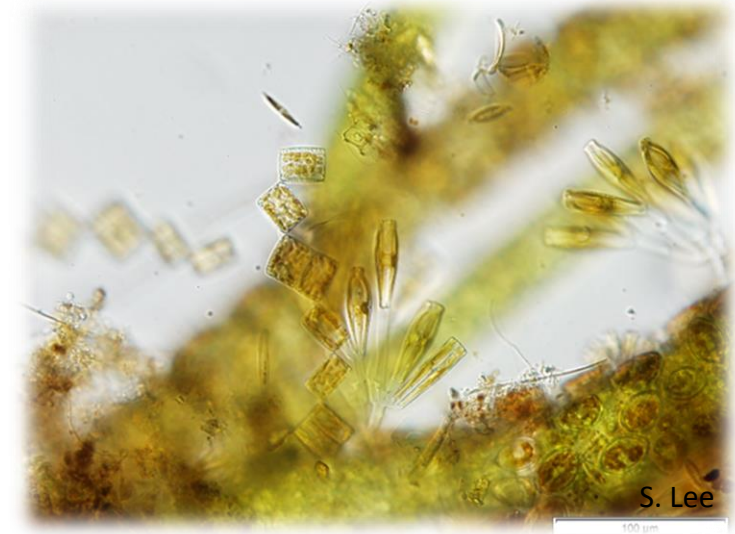
Literature-based synthesis of nutrient stressor-response relationships to inform assessment, monitoring, and criteria development in rivers and streams

Micah Bennett, Kate Schofield, Sylvia Lee, Sue Norton, Caroline Ridley, and David Gibbs

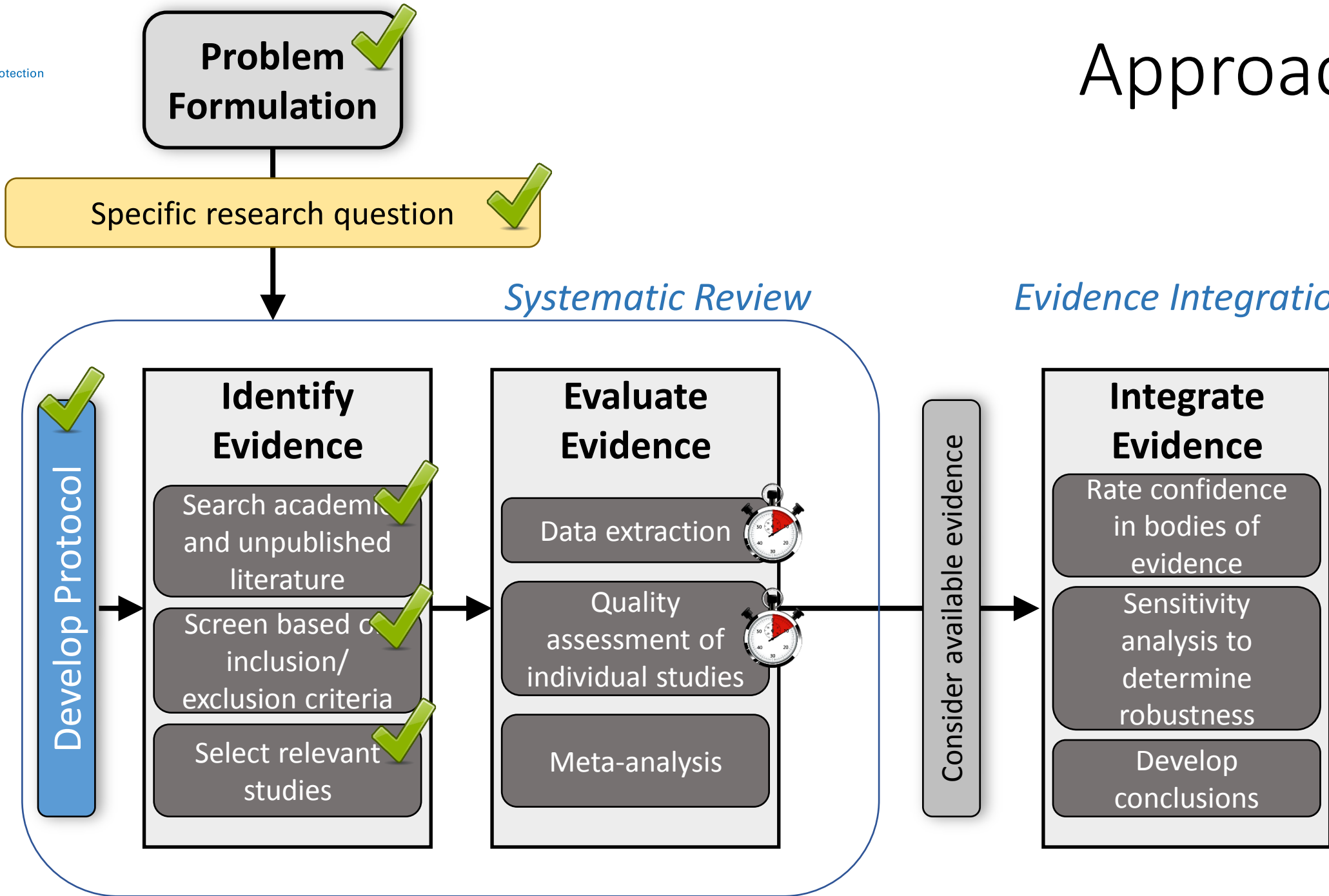
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Scope

- Determined by considering relevance to state monitoring and nutrient criteria development
 - Lotic systems, total nutrients, 3 biotic endpoints
- Targeted research questions:
 1. In lotic systems, what is the evidence of the relationships between water column nutrients (TN and/or TP) and:
 - chlorophyll-a?
 - diatoms?
 - macroinvertebrates?
 2. How are these relationships affected by other factors?



Approach



Search

ProQuest ES Scopus JSTOR CAB Wiley BioOne
Ingenta
ScienceDirect
Greenfile
AGRICOLA Web of Science ProQuest D&T AGRIS

22,488
from academic databases

3,398
from 'snowball' searches

State/fed/int'l env agencies Google
NGOs OpenGrey NTRL DART

691
from website searches

ResearchGate Twitter ECOLOG-L

83
from expert requests

TOTAL INPUT = 26,660 citations

Screen

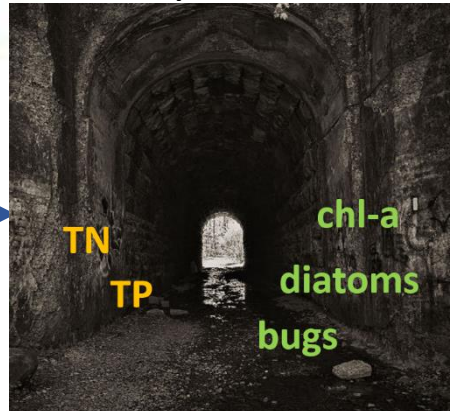
>25,000
excluded

1,025
w/ no clear
effect size

Extract &
Synthesize

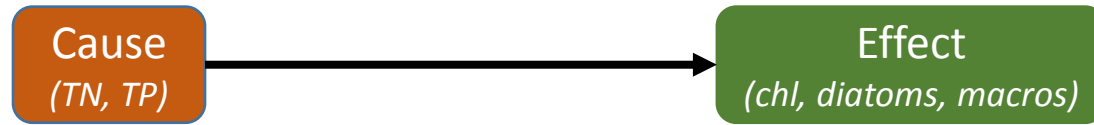
281*
Full-text articles w/ effect
sizes for data extraction &
quality evaluation

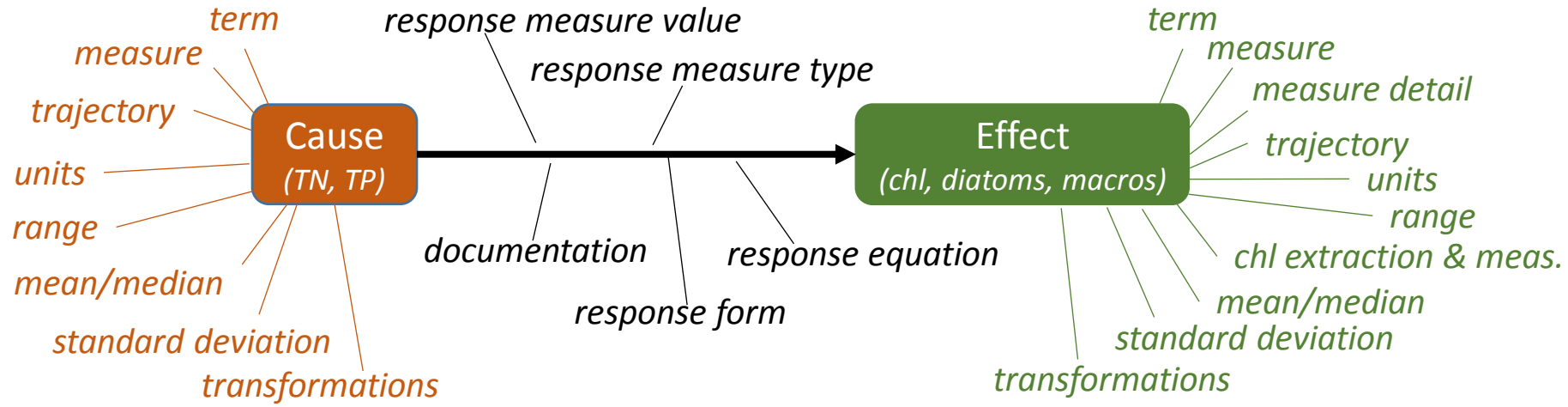
Data extraction
Quality evaluation



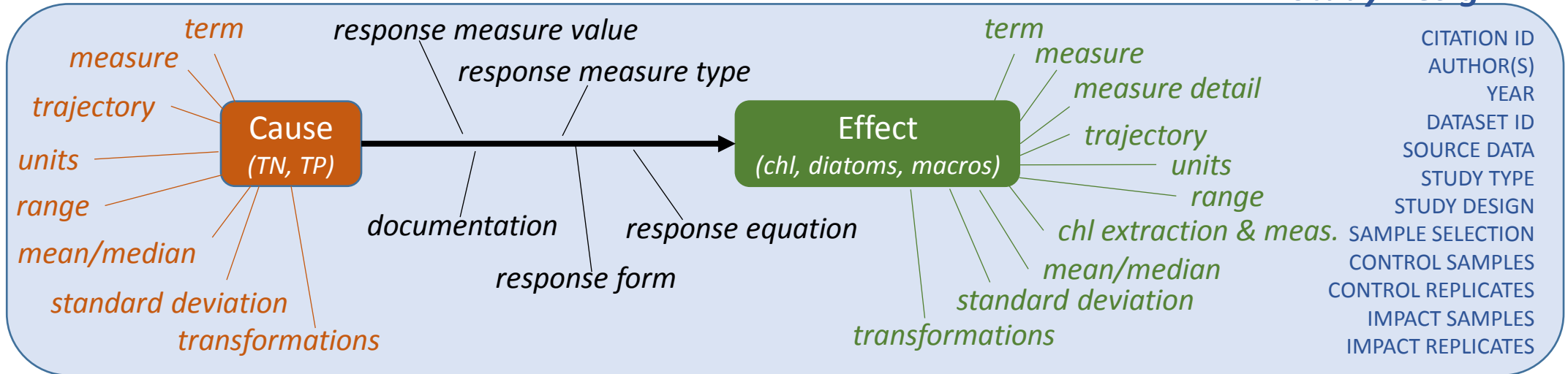
Meta-analysis
Synthesis

*does not consider an additional 135 articles with no PDF or translation issues

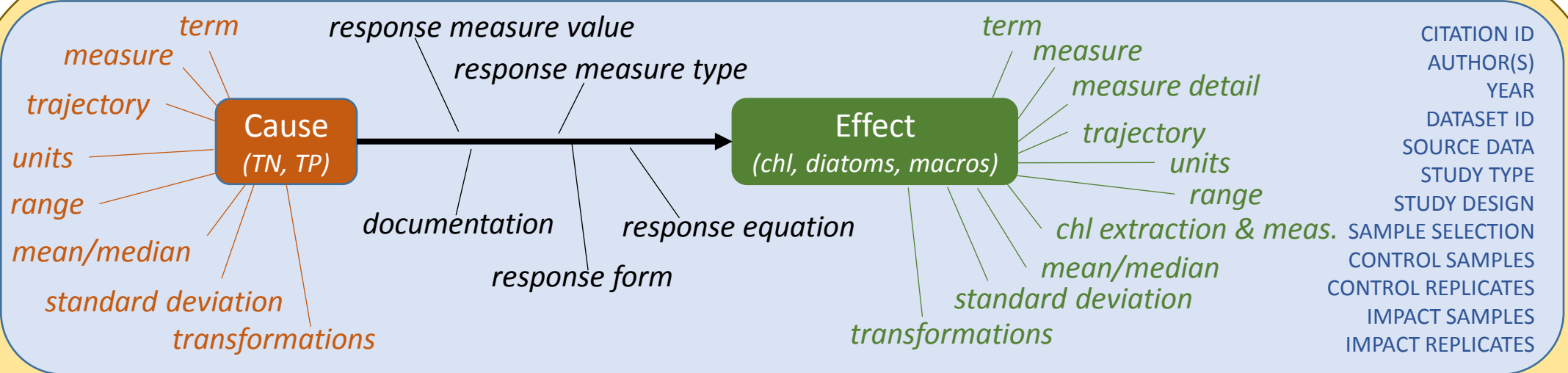




Study Design



Study Design



In-stream factors

pH	light
sediment load	canopy cover
suspended sediment	conductivity
temperature	elevation
alkalinity	habitat
discharge	dominant substrata
flow permanence	channel width
velocity	DOC
	water depth

Regional/landscape factors

climate

dominant land use

latitude/longitude

stream order

watershed area

ecoregion

Other context

state/province

country

sample year

sample month

temporal extent

spatial extent

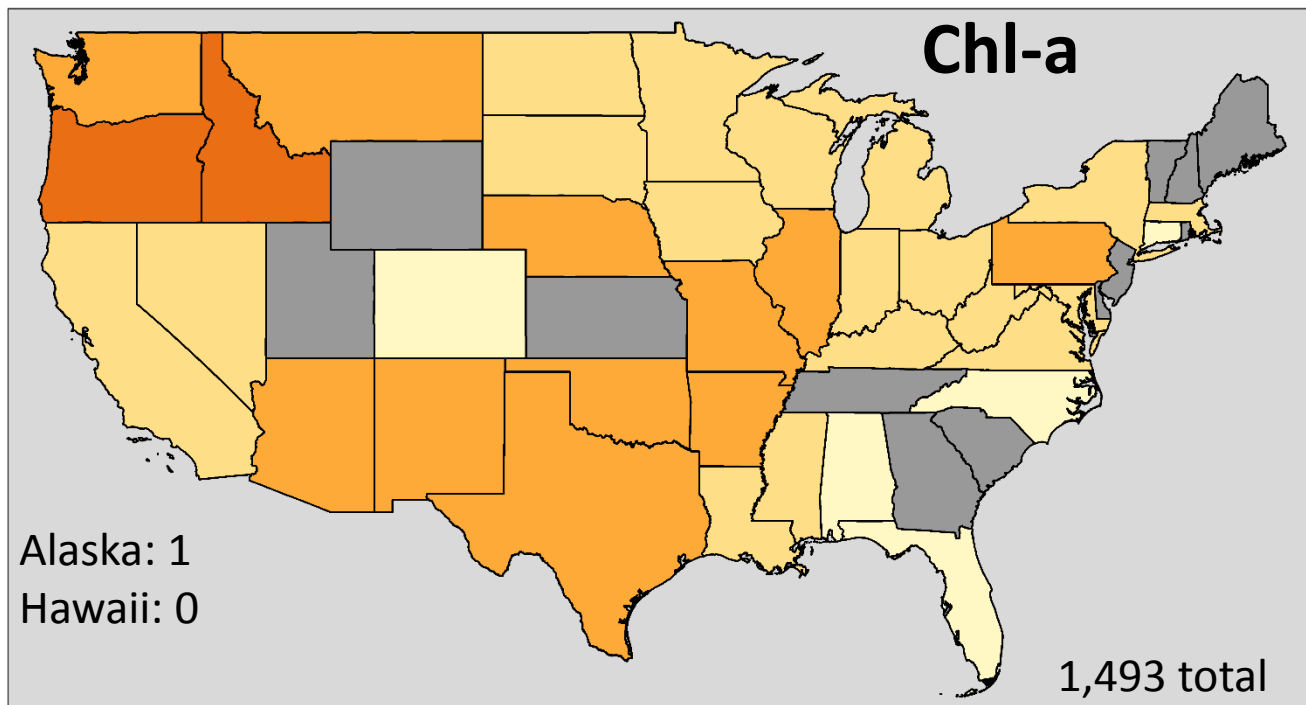
Modifying/confounding factors

Results*: Overview

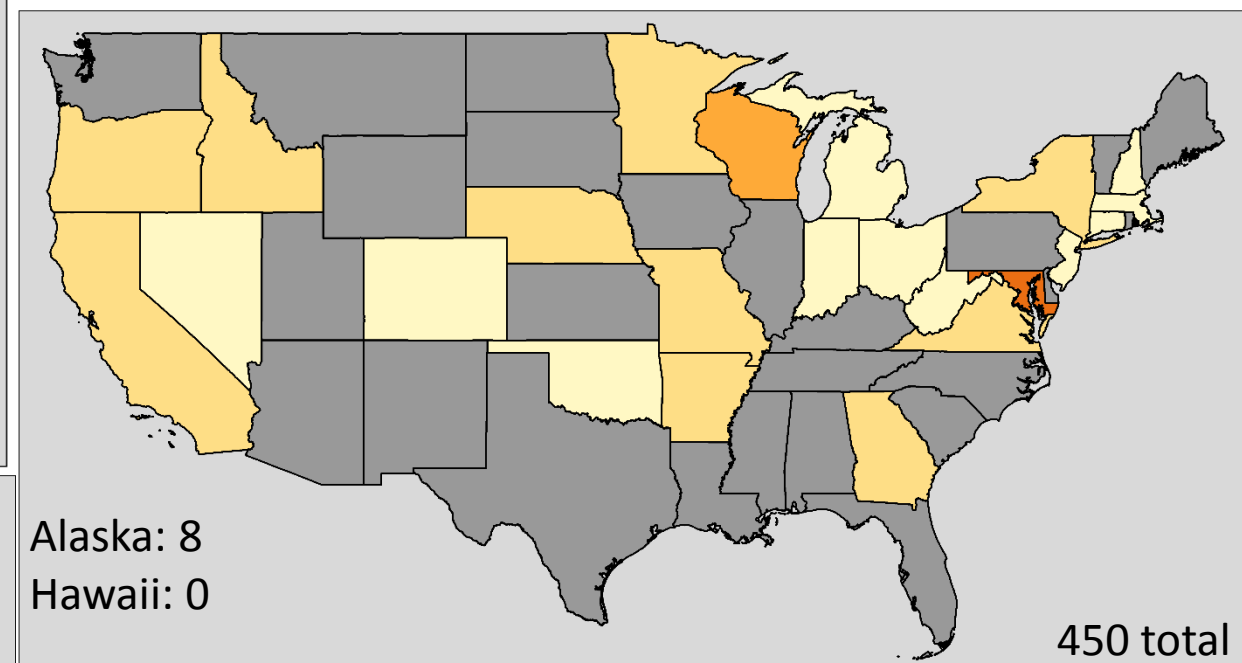
- TP had most relationships (almost double TN)
- Studies cover broad range of nutrient conditions
 - Mean TN ranged 0 – 16 mg/L (max 0.1 – 2654 mg/L)
 - Mean TP ranged 0 - 67 mg/L (max 0.04 – 163 mg/L)

*based on ~150 papers extracted
(>2,200 cause-effect pairs)

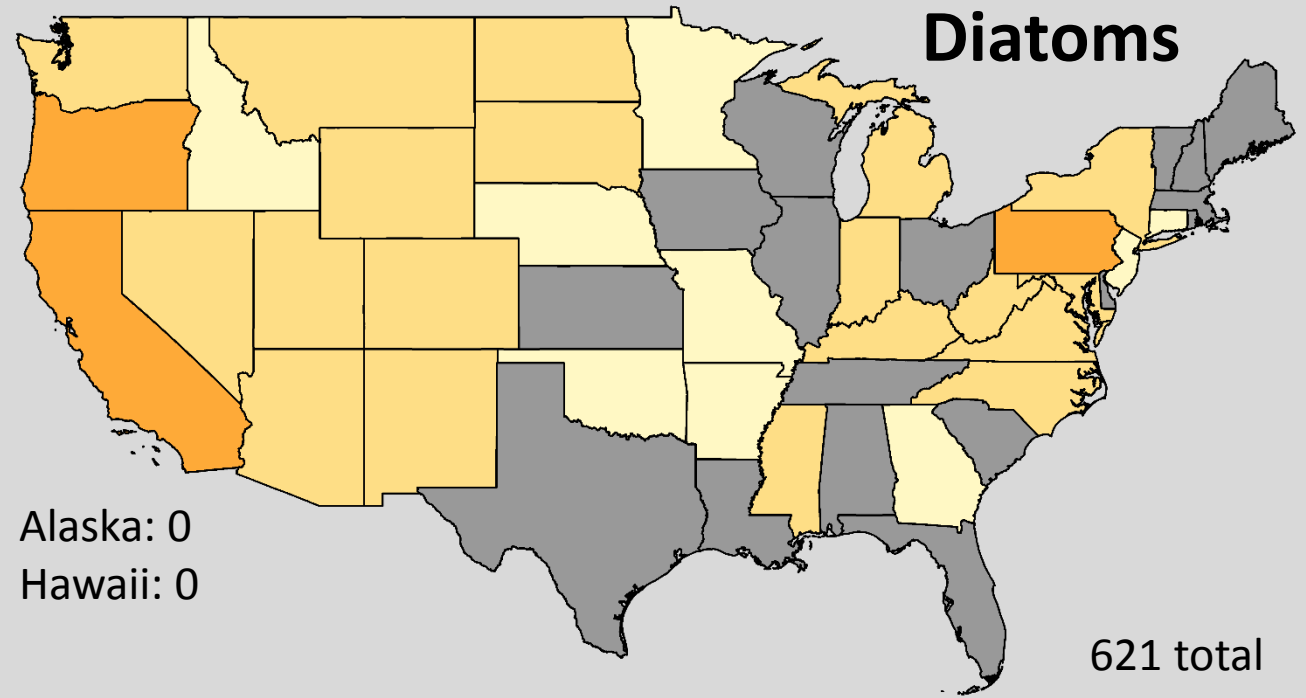
Chl-a



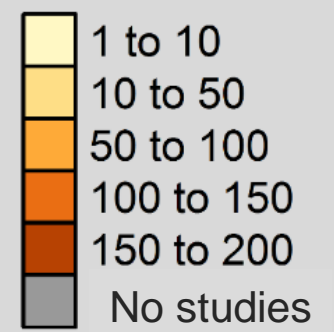
Macroinvertebrates



Diatoms

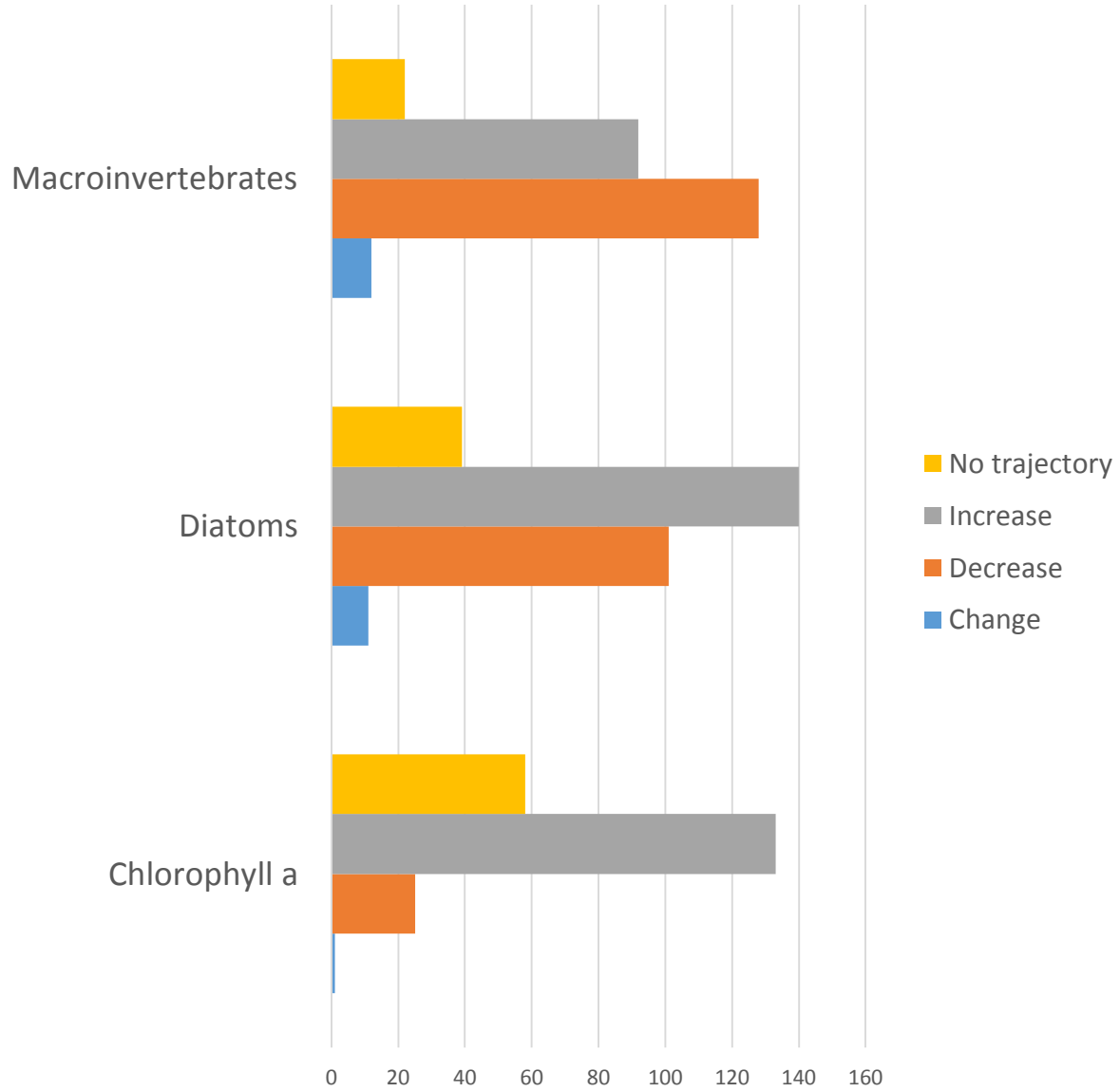


Cause-effect pairs

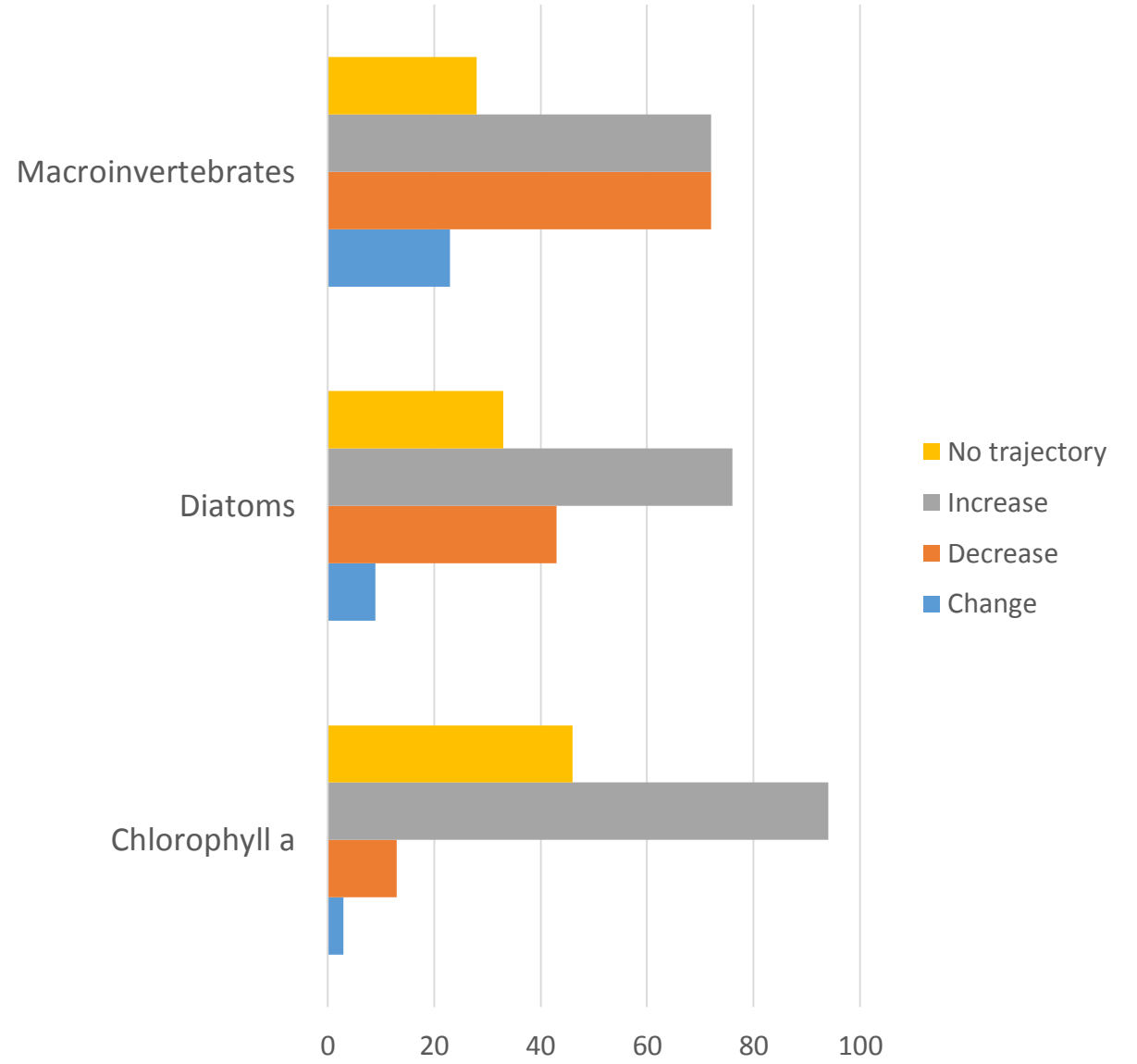


*based on ~150 papers extracted (>2,200 cause-effect pairs)

Total Phosphorus

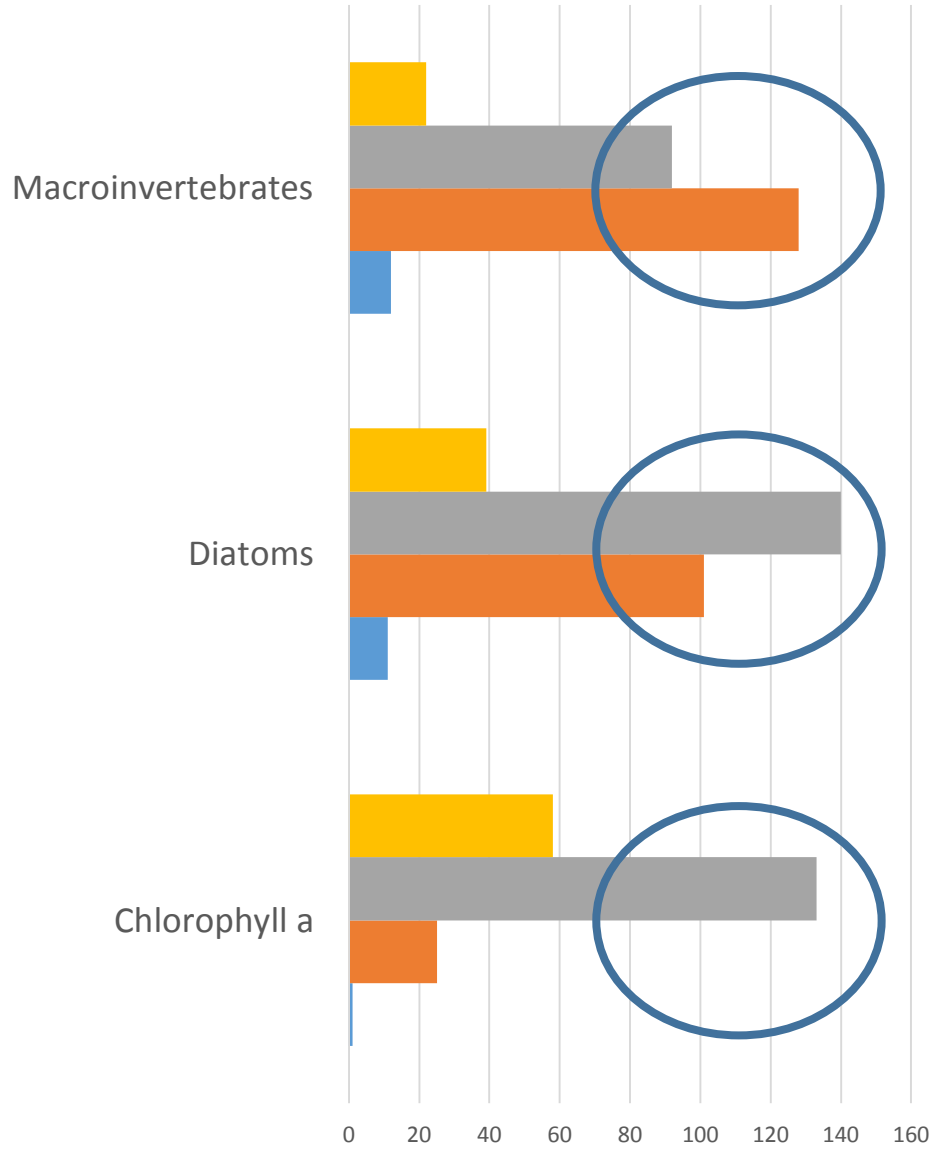


Total Nitrogen

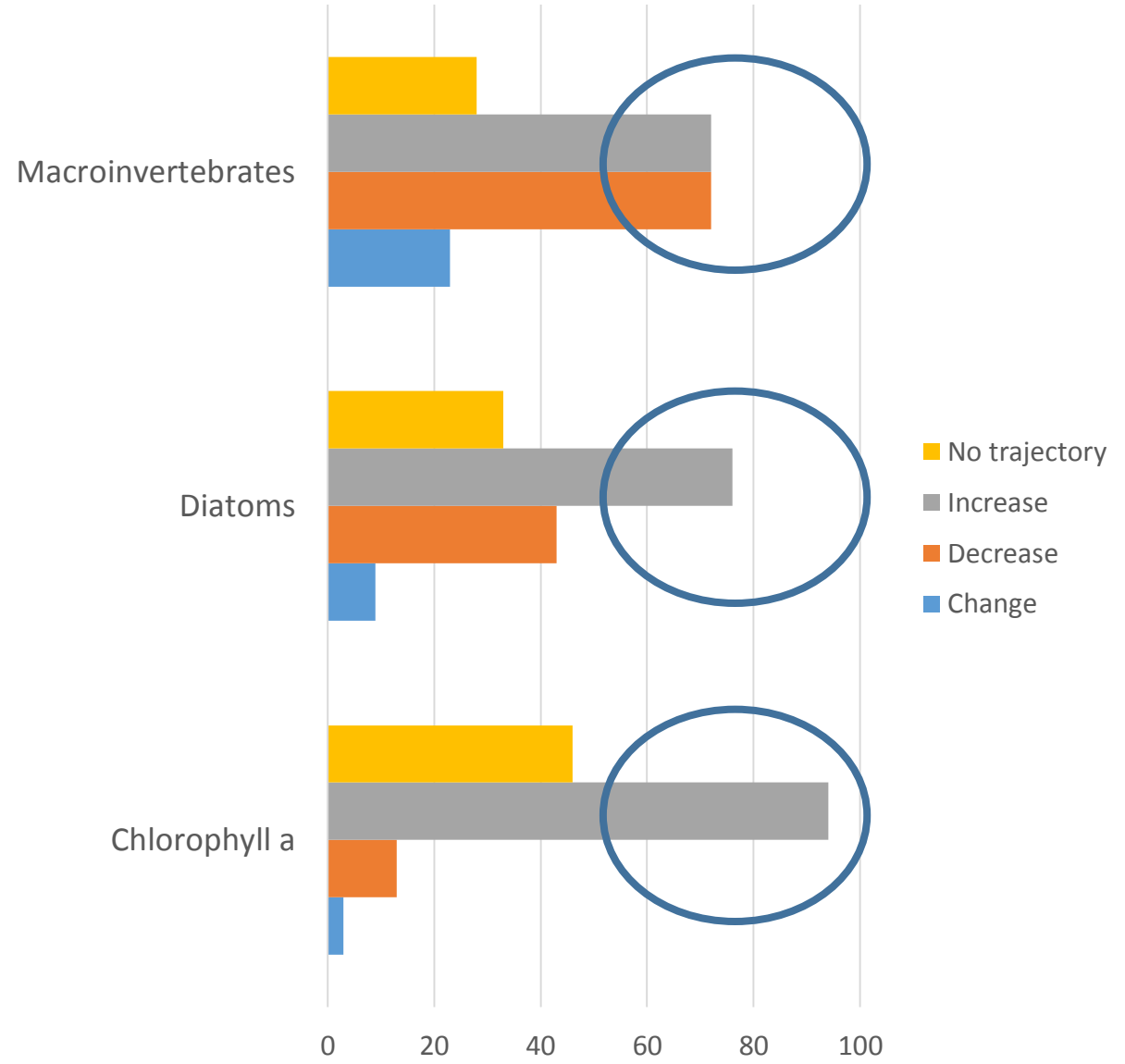


*based on ~150 papers extracted (>2,200 cause-effect pairs, excluding non-reported items)

Total Phosphorus



Total Nitrogen



*based on ~150 papers extracted (>2,200 cause-effect pairs, excluding non-reported items)

Questions for you

- Are these relationships (TN, TP vs. chl a, diatoms, macroinvertebrates) the most relevant for you?
- What “other” variables are you most interested in?
- What is the most useful way to make our extracted evidence available to you?
 - Accessing the evidence (e.g., via portals, spreadsheets)
 - Filtering the evidence (e.g., geographically, taxonomically)

Photo: Keith Bozeman

Contact Us

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