

Ecological Significance of Diminished Spring Freshets

National Water-Quality Assessment
US Geological Survey

The Quality of Our Nation's Waters

Flow Modification in the Nation's Streams and Rivers



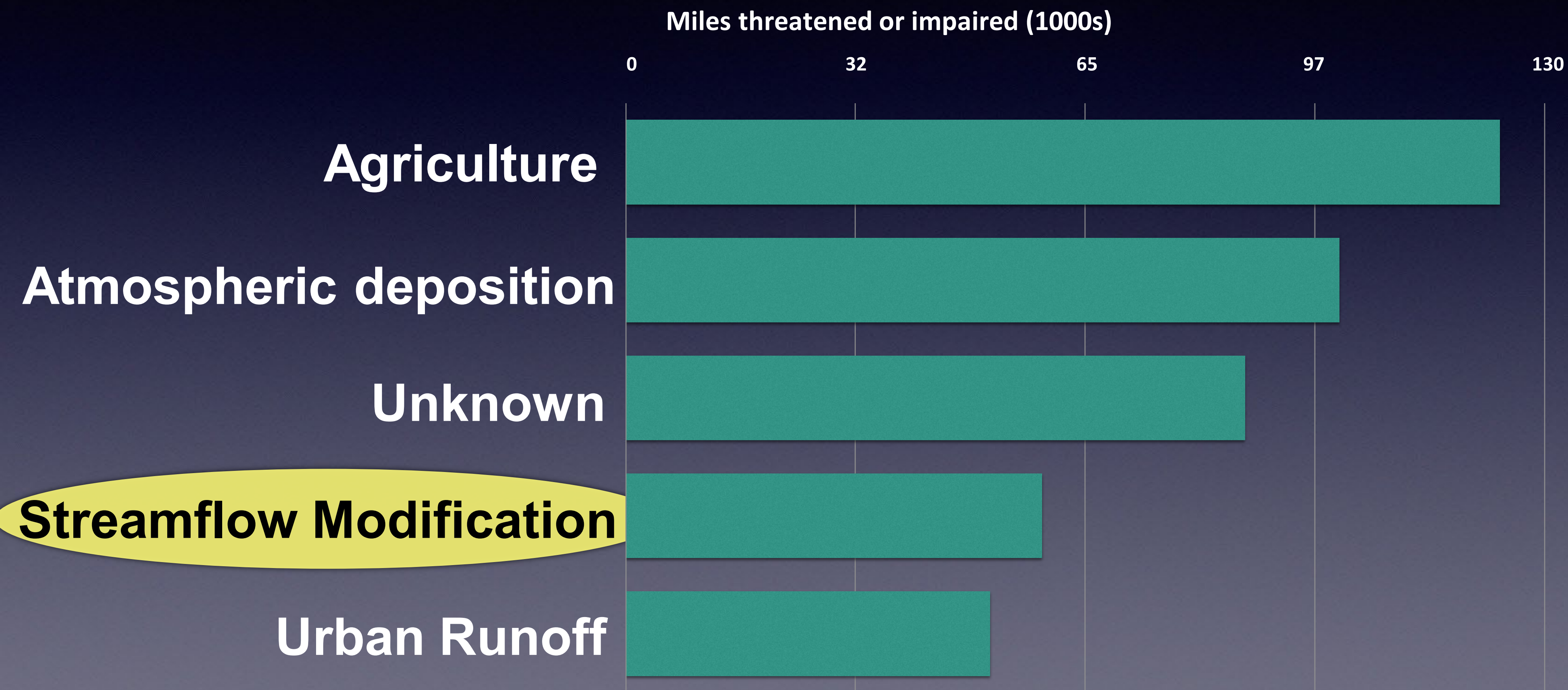
National Water-Quality Program
National Water-Quality Assessment Project

Circular 1461

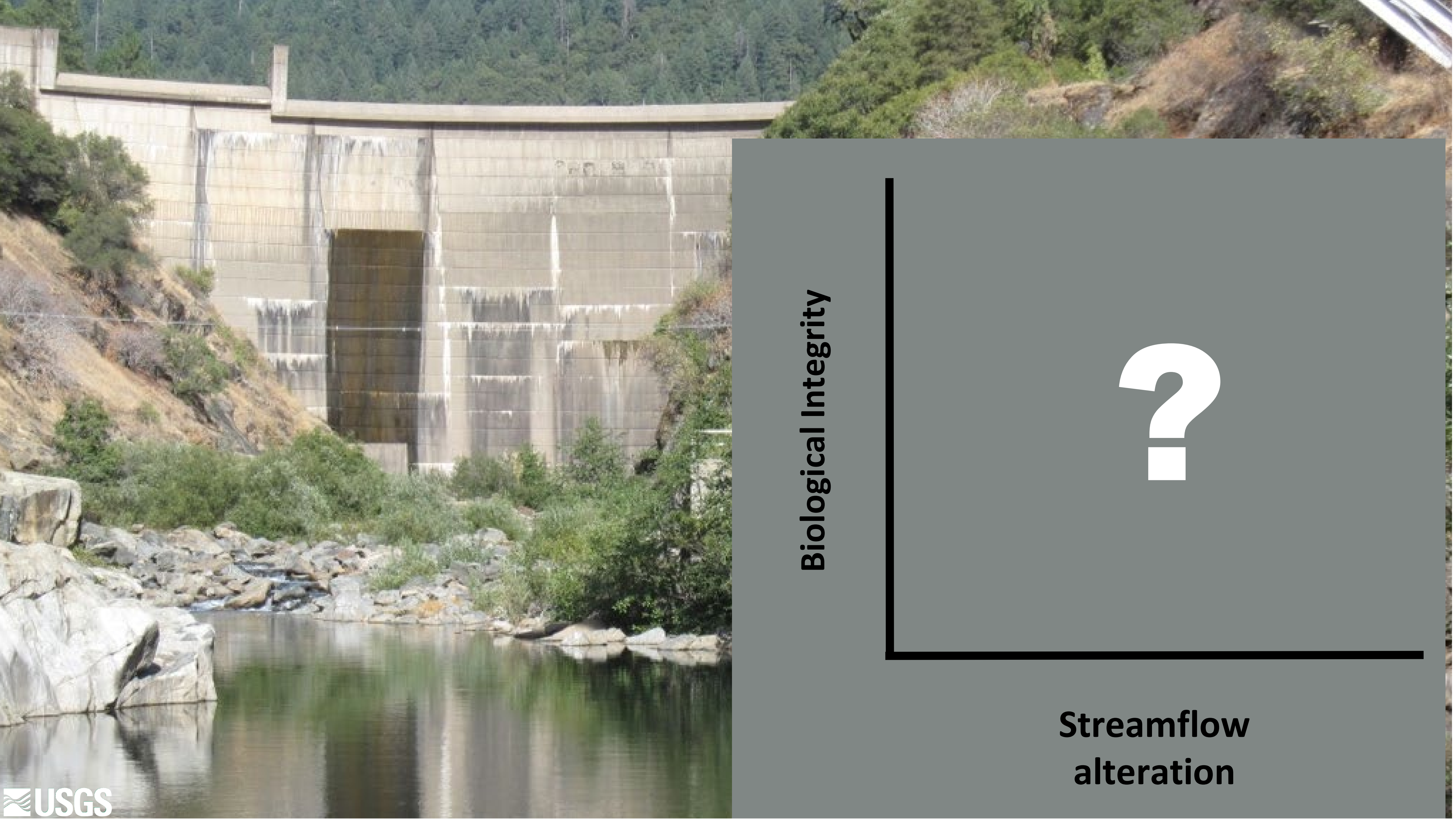
U.S. Department of the Interior
U.S. Geological Survey

USGS Circular 1461

SOURCES OF STREAM IMPAIRMENT:
As Summarized by the States



SOURCE: http://ofmpub.epa.gov/tmdl_waters10/attains_nation_cy.control



Biological Integrity

?

**Streamflow
alteration**

Probability of impairment*

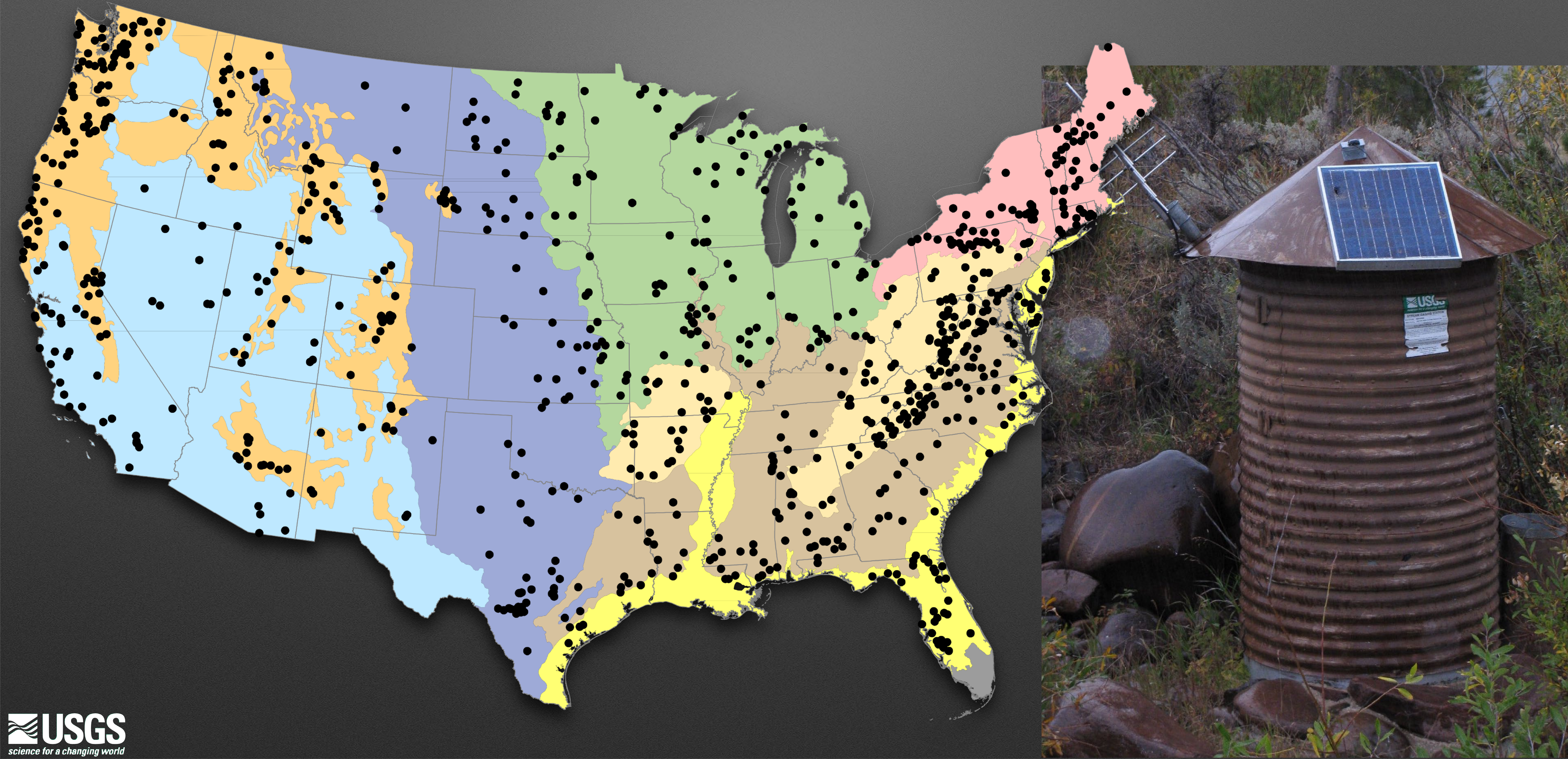
Biological Integrity



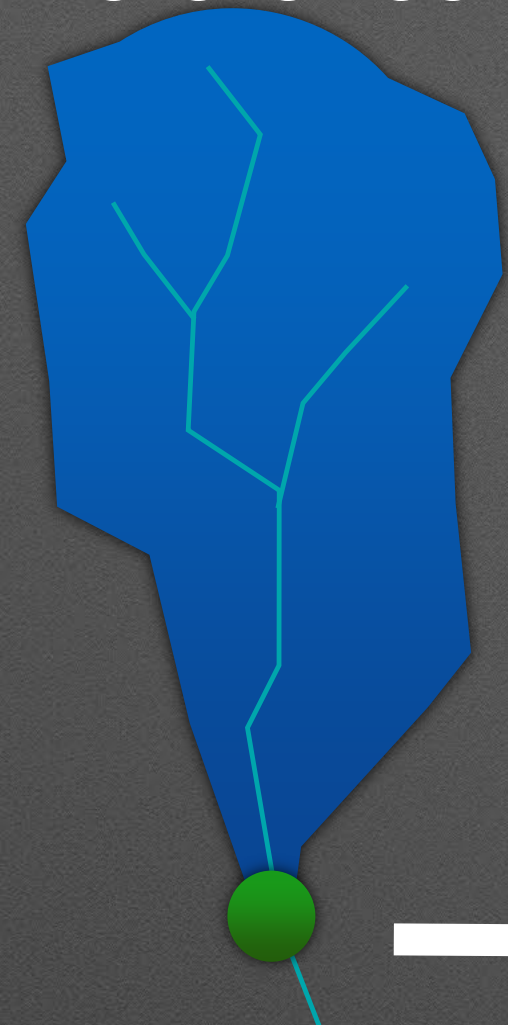
Streamflow
alteration

Departure from natural

USGS Gages in Hydrologically “Least Disturbed” Watersheds



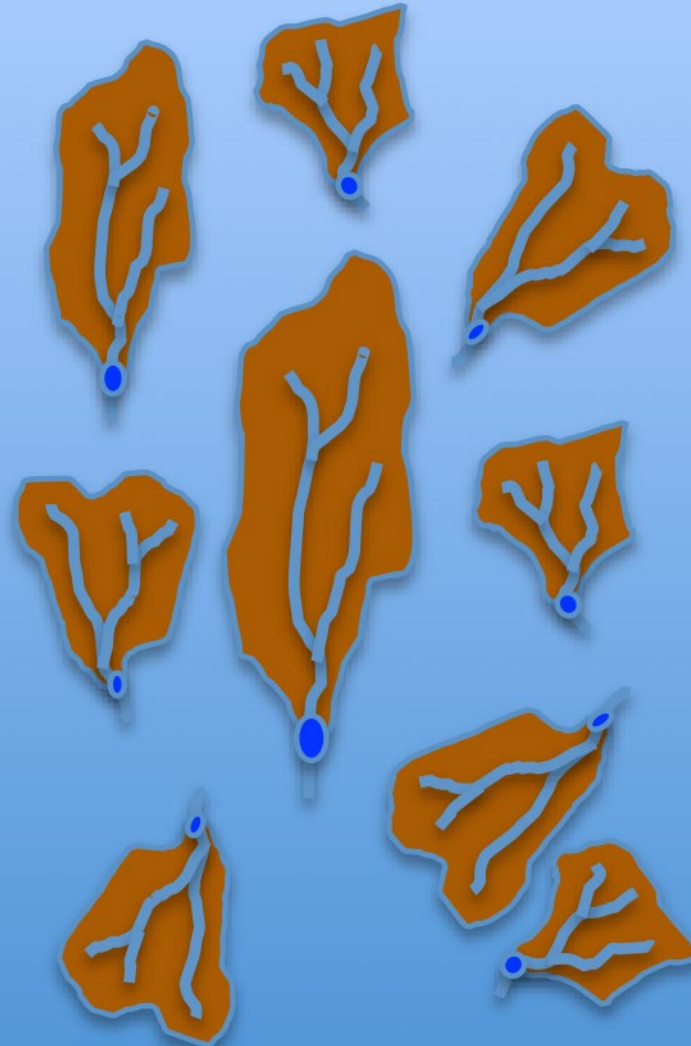
reference



climate
topography
soils
geology

magnitude
duration
etc.

100s reference sites



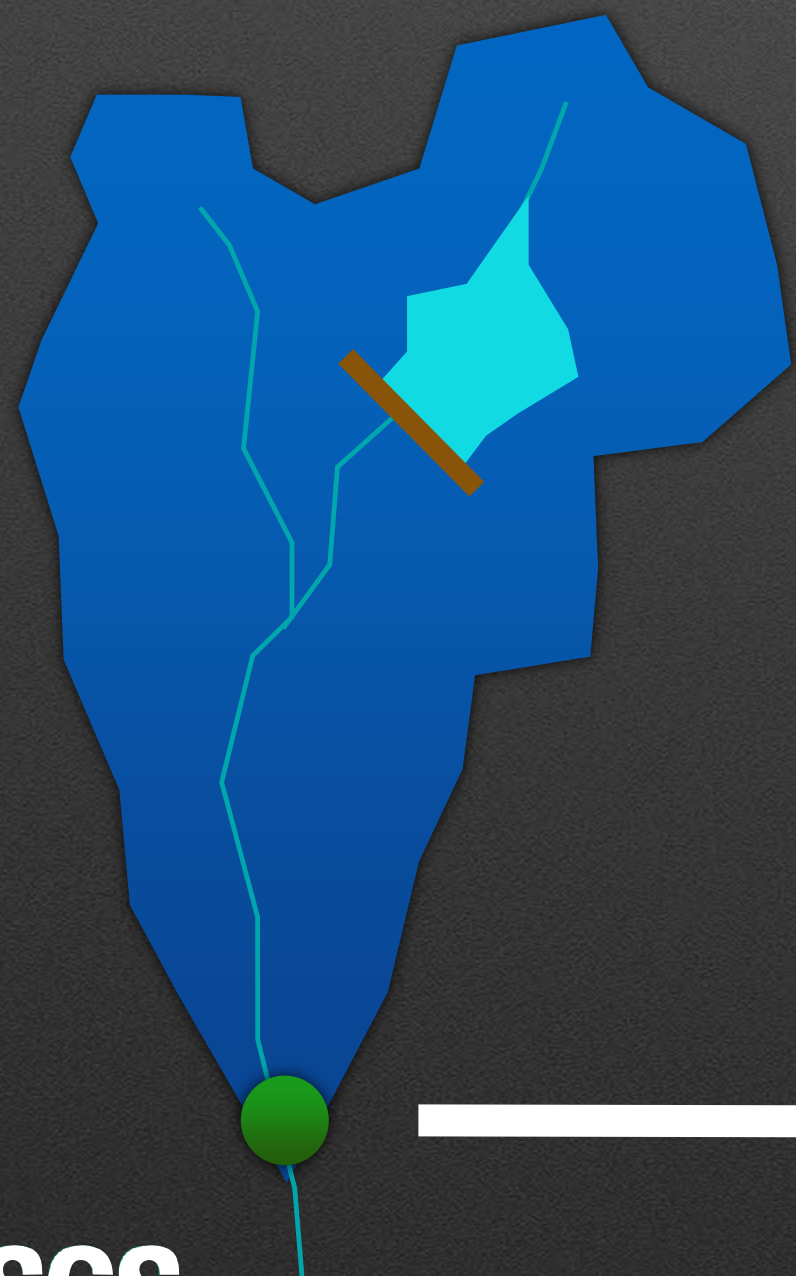
climate
topography
soils
geology

magnitude
duration
etc.

model



Example with June mean flow



climate
topography
soils
geology

model



Observed
mean June flow

O / E

Expected
Natural

mean June flow

Probability of impairment*

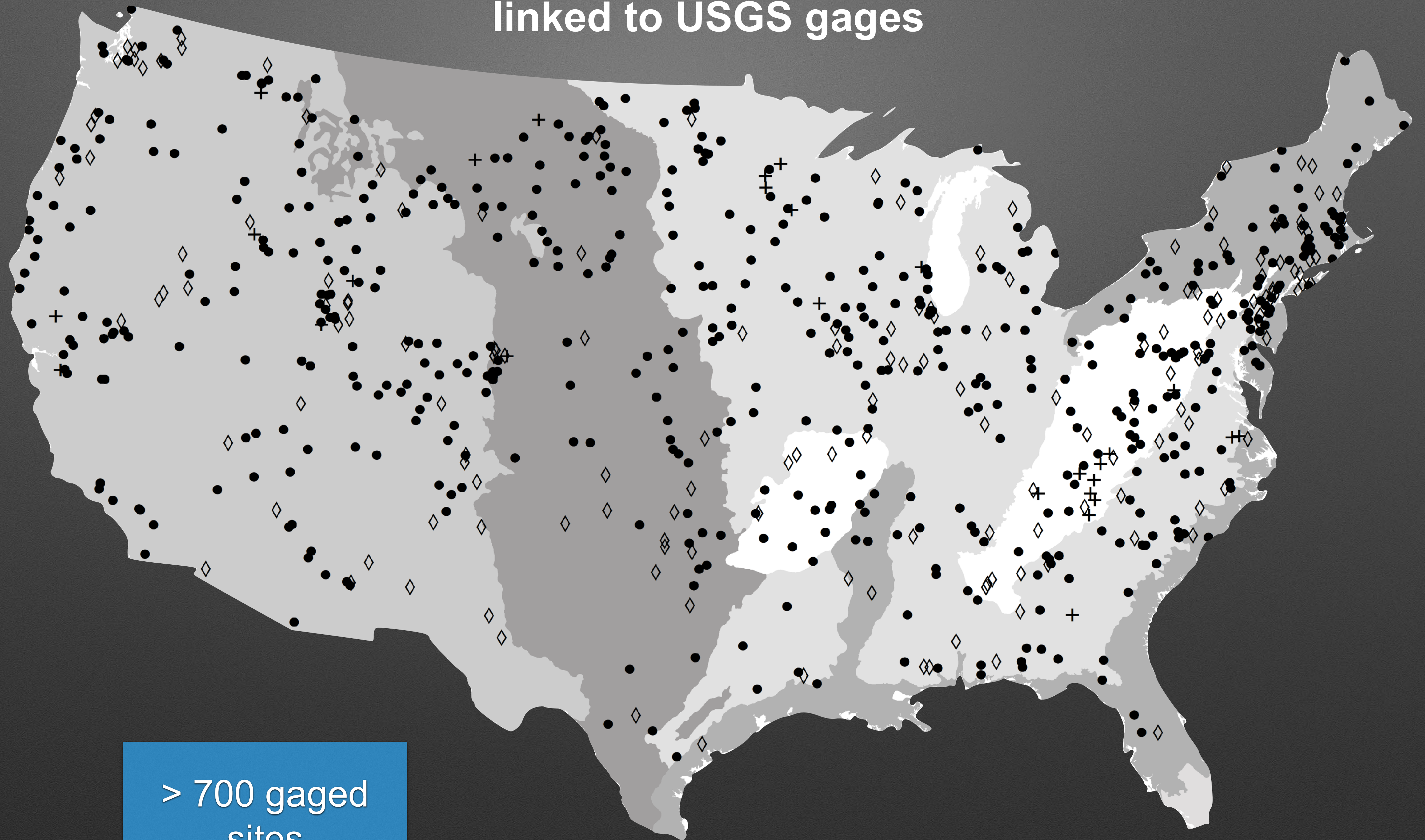
Biological Integrity



Streamflow
alteration

Departure from natural

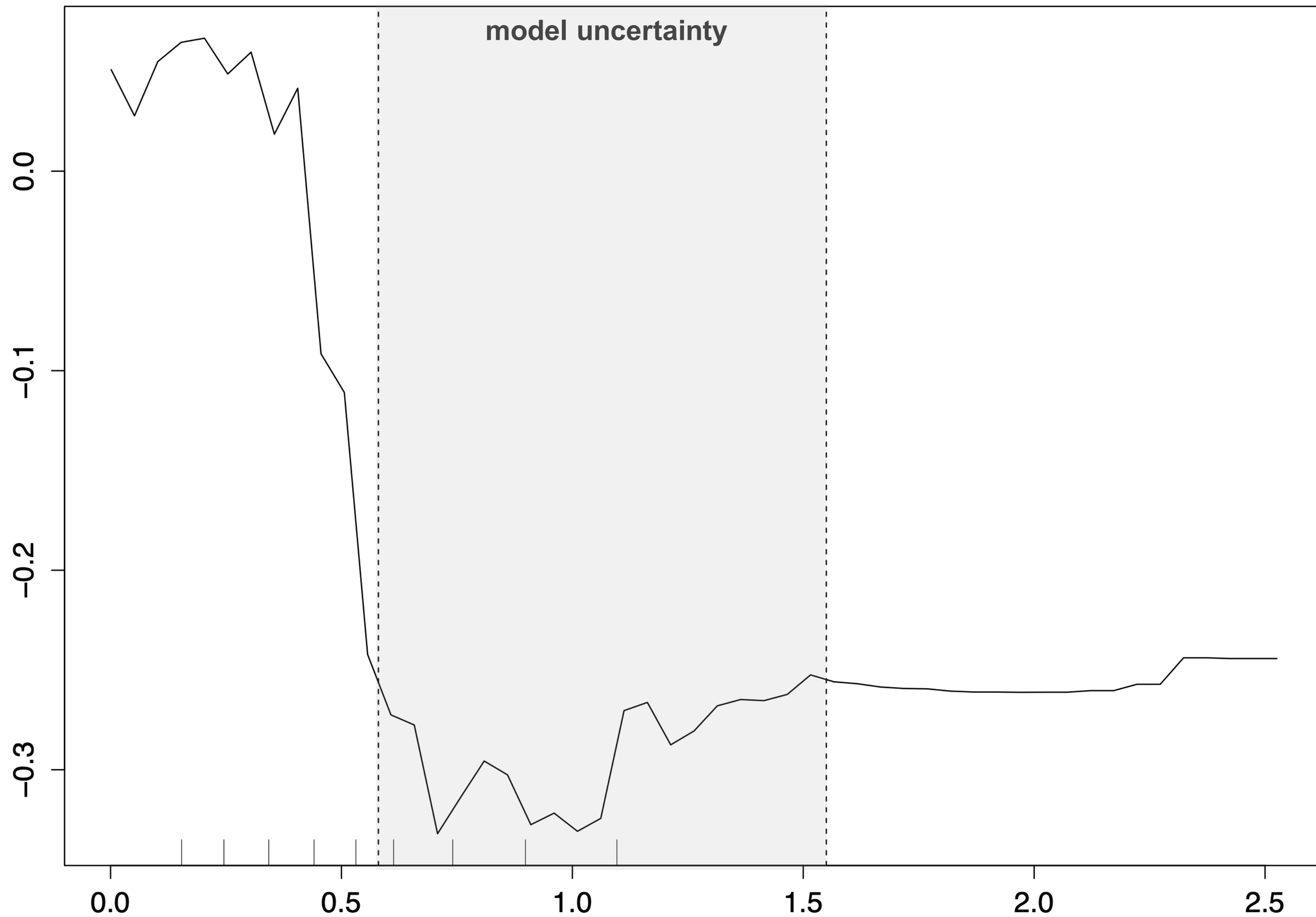
NRSA / NAWQA bioassessment data linked to USGS gages

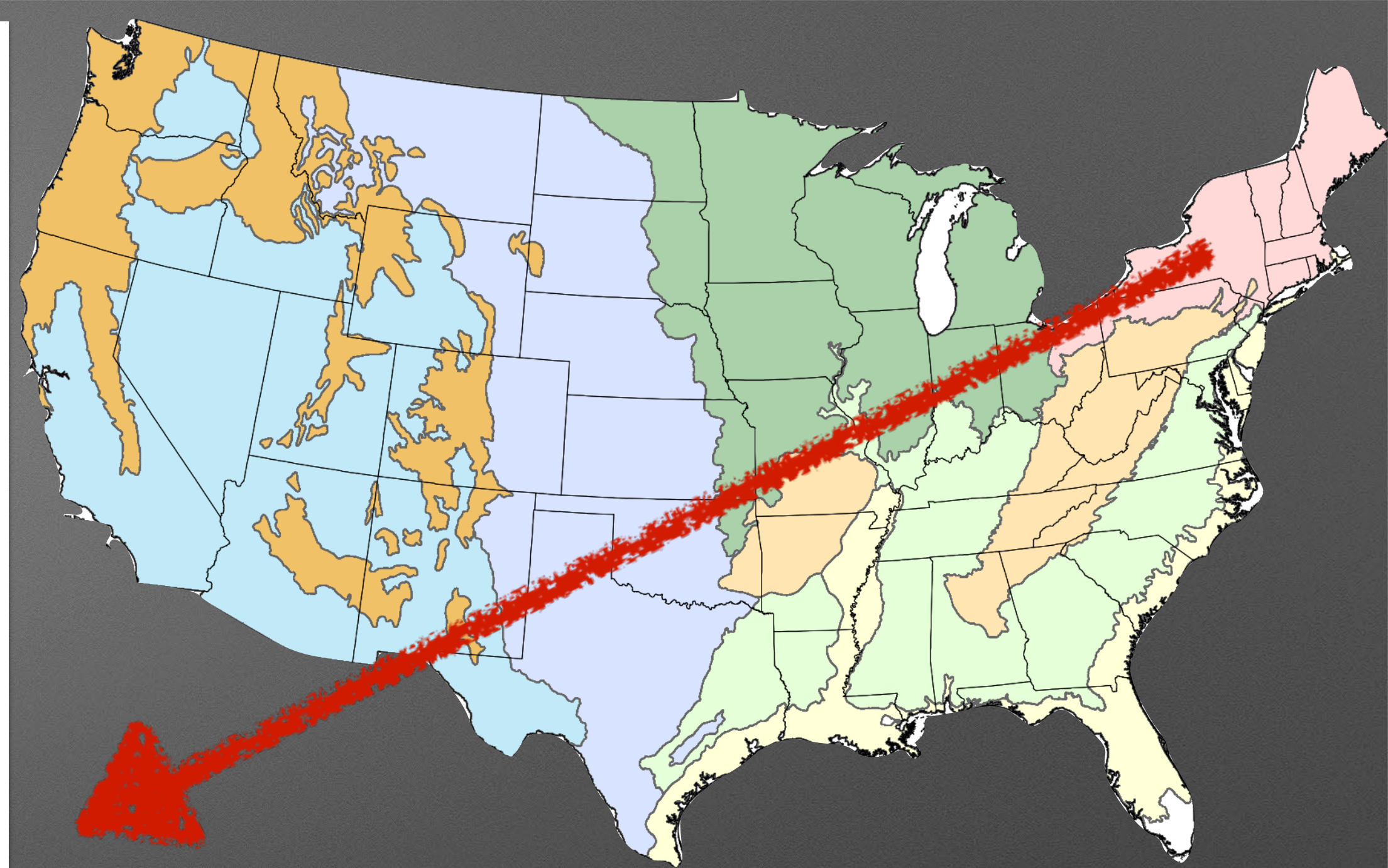
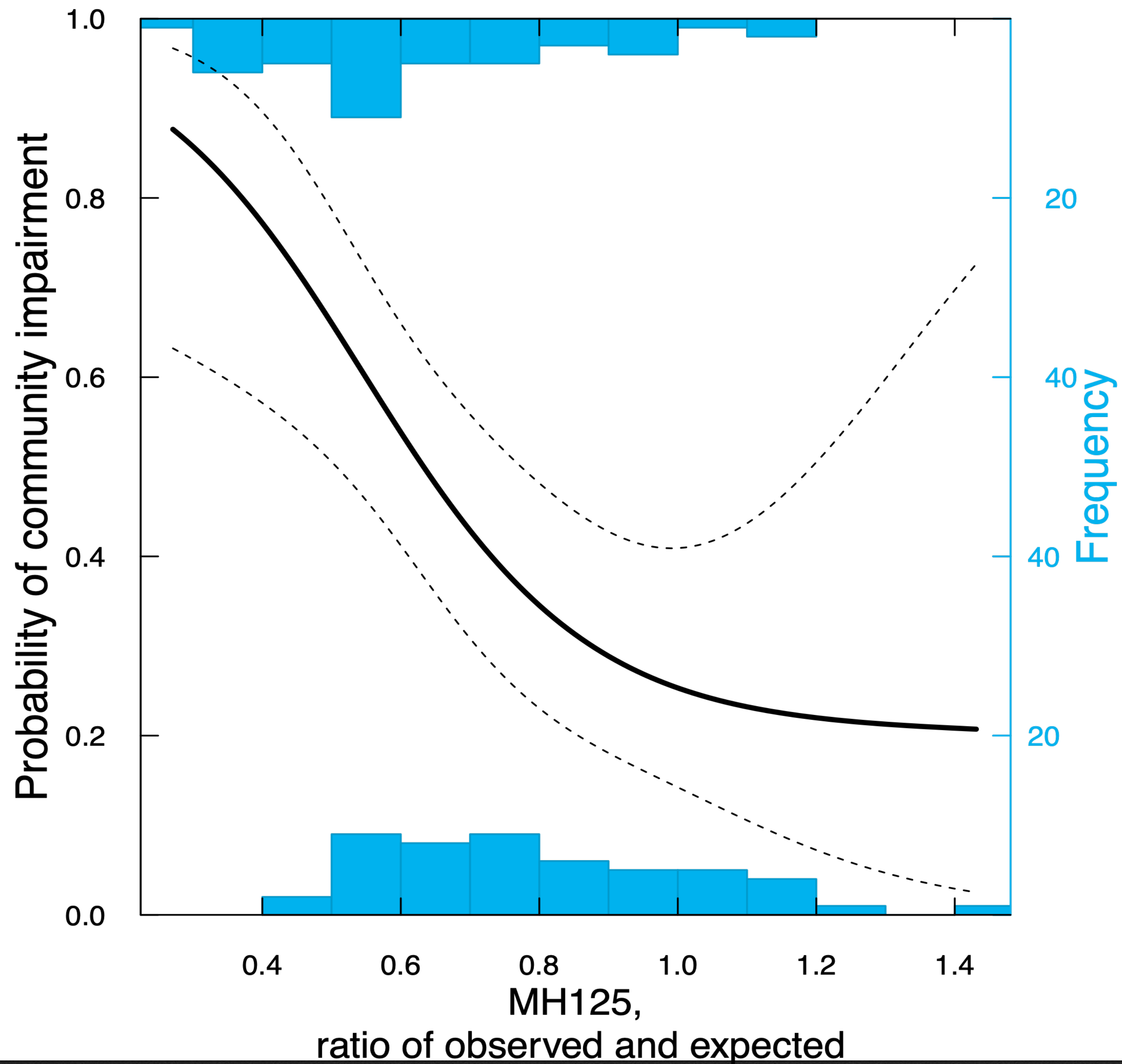


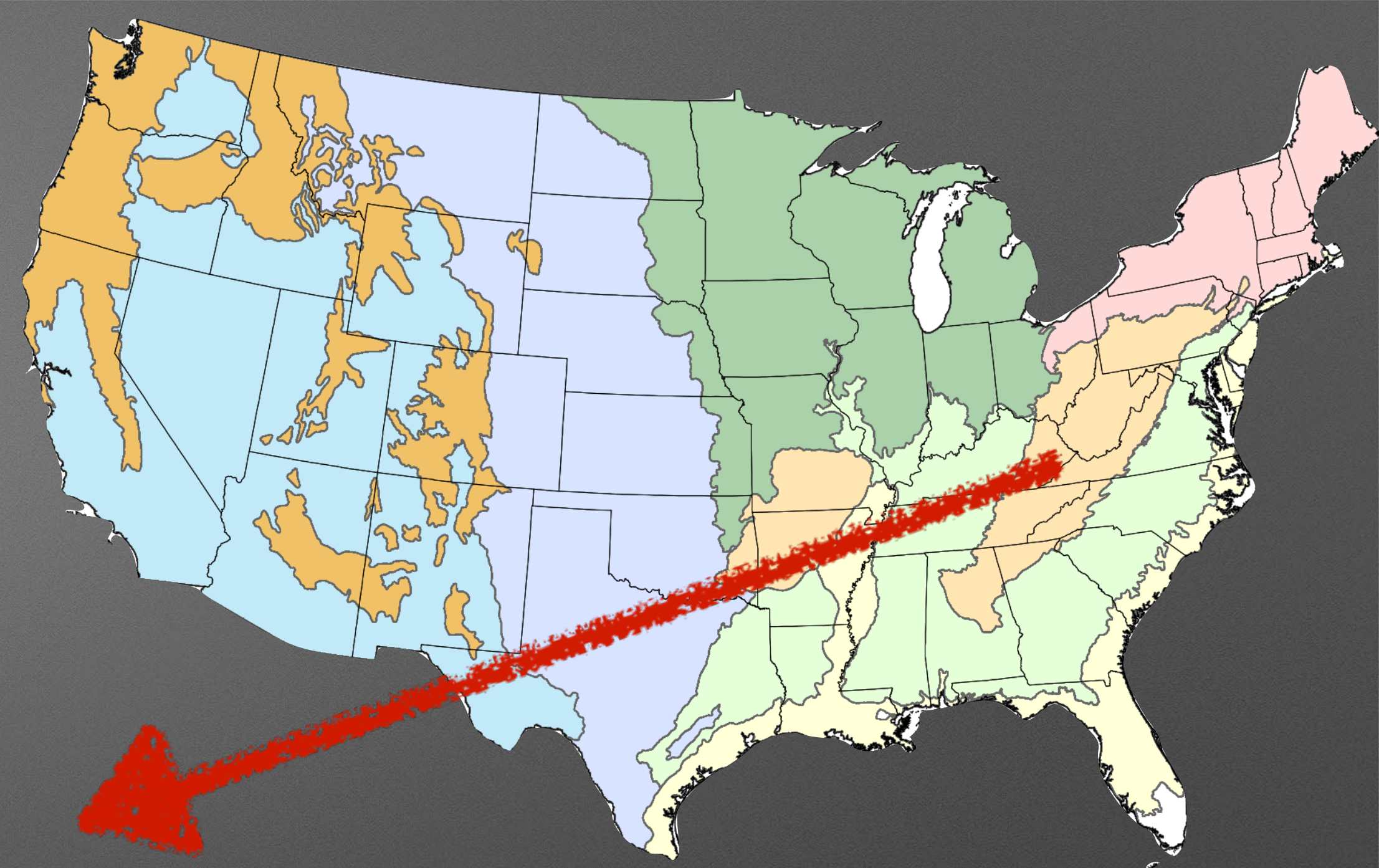
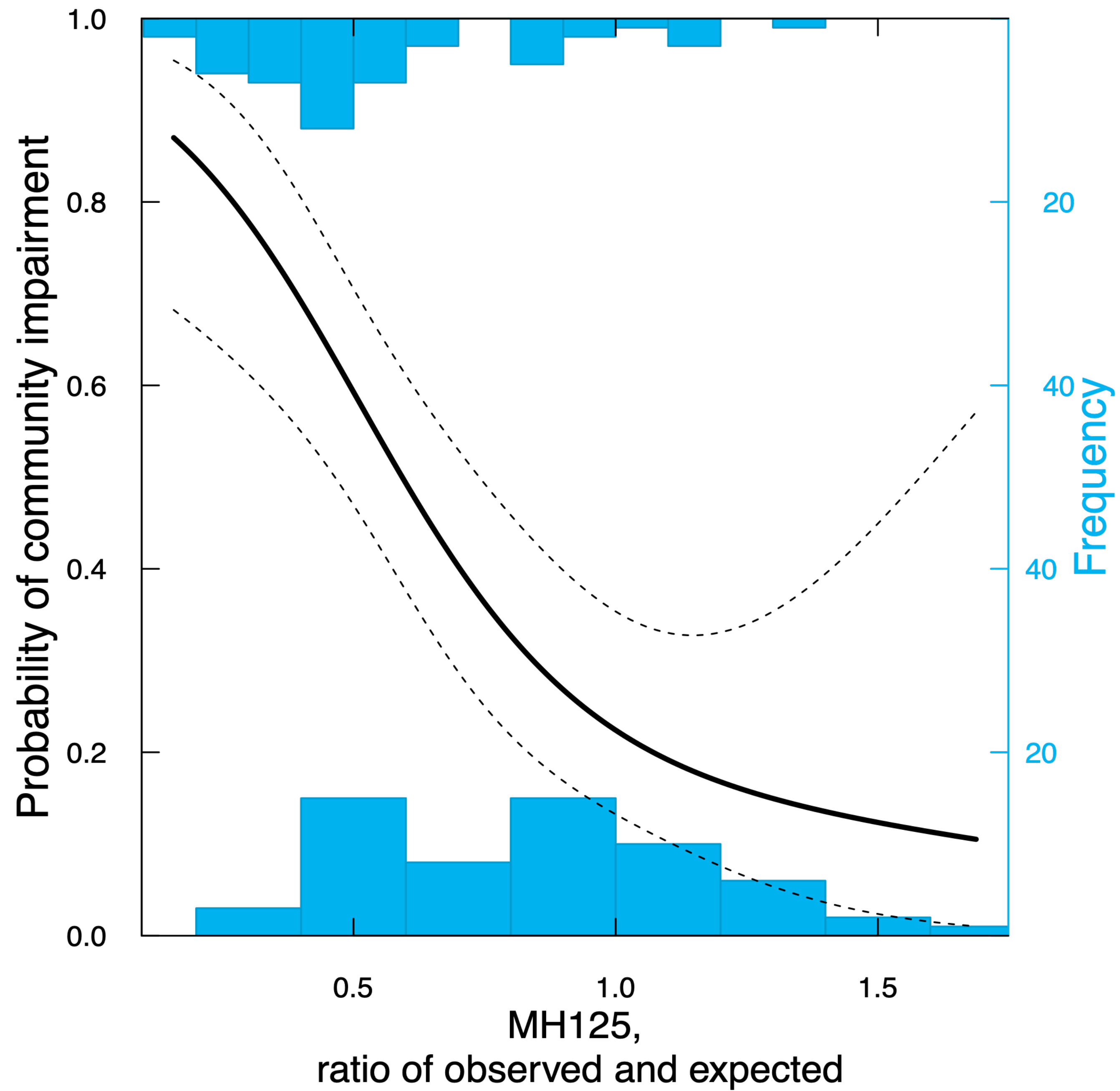
> 700 gaged
sites

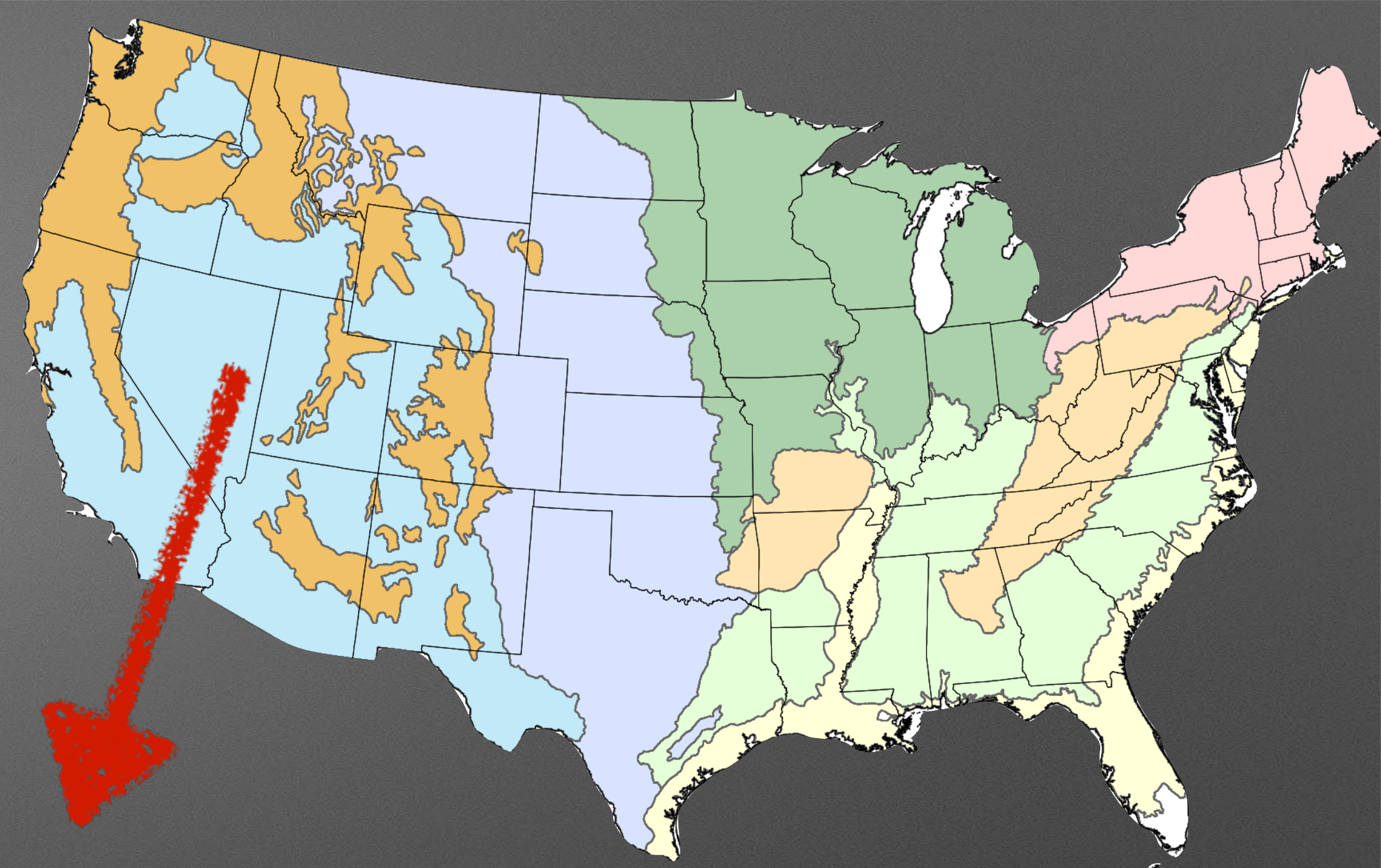
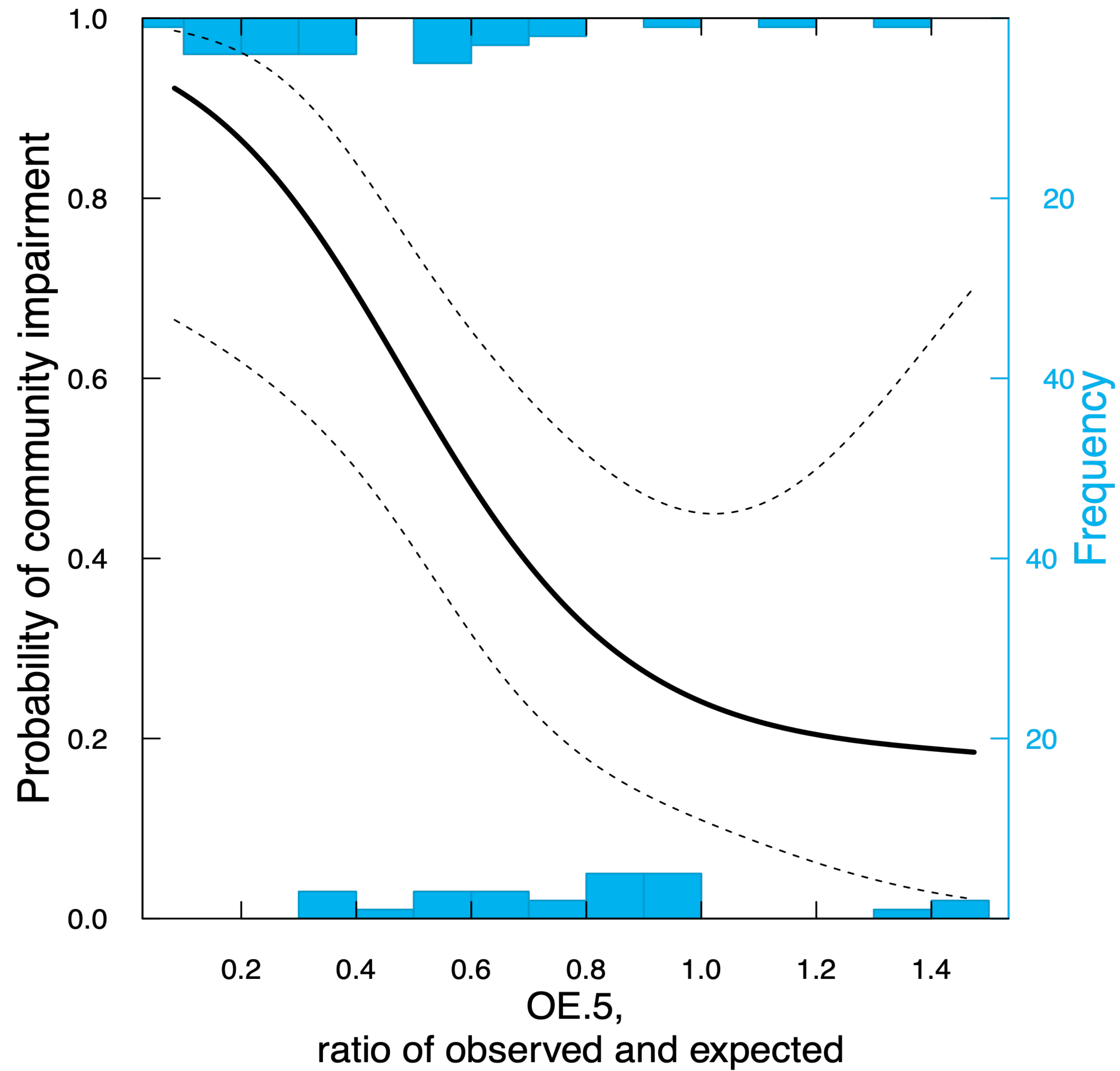
CONUS Scale

Prob. biological impairment (logit / 2)

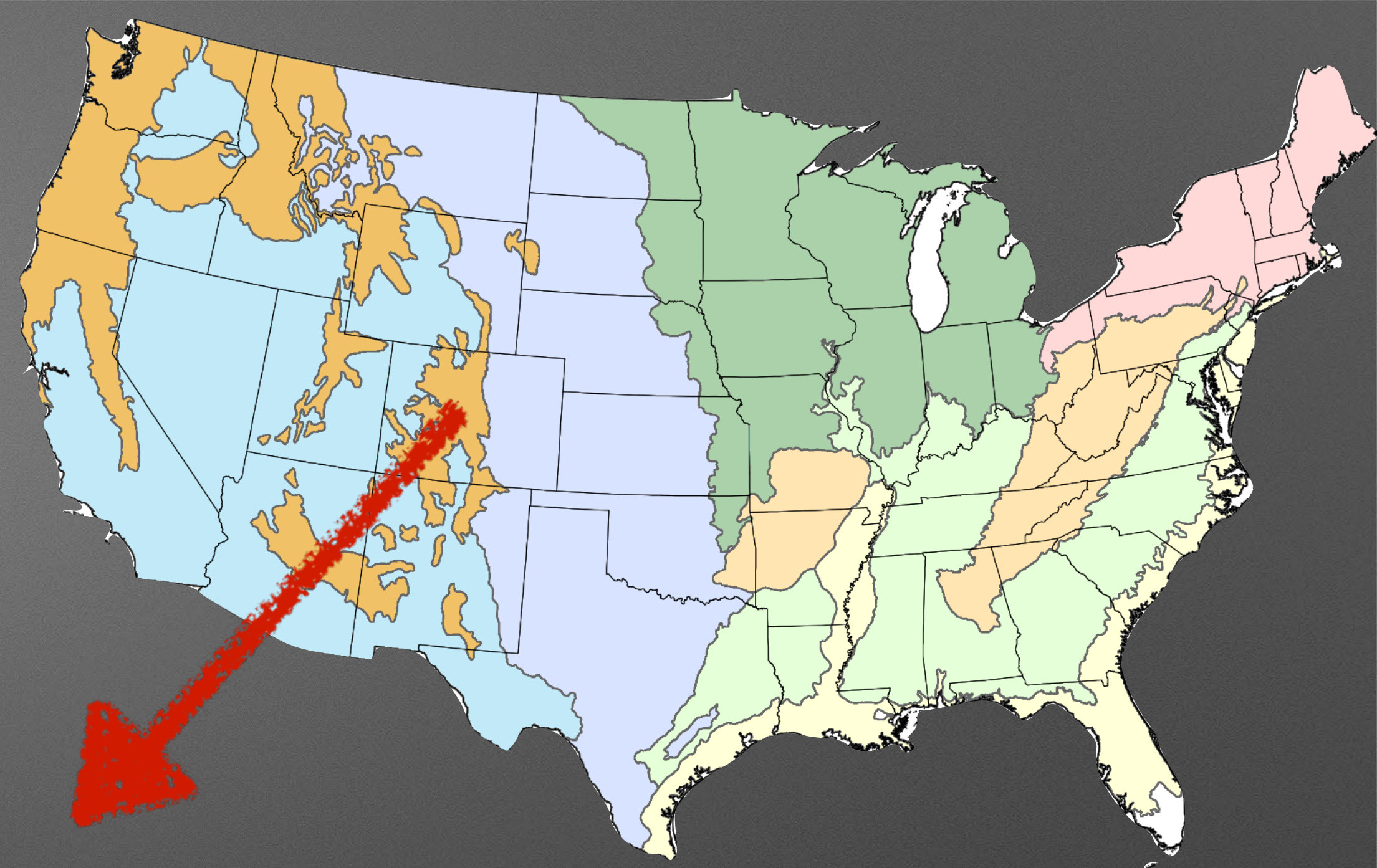
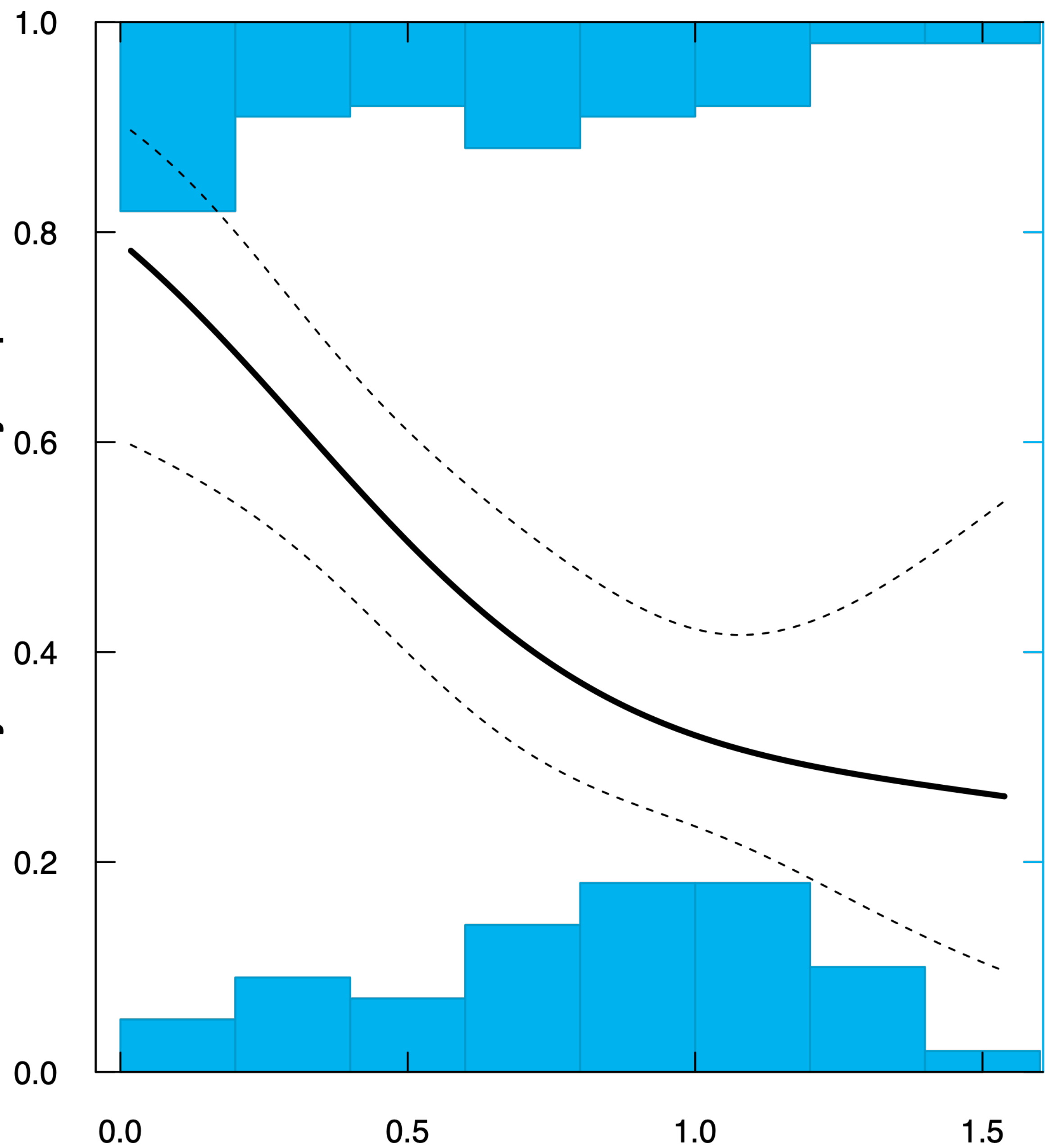






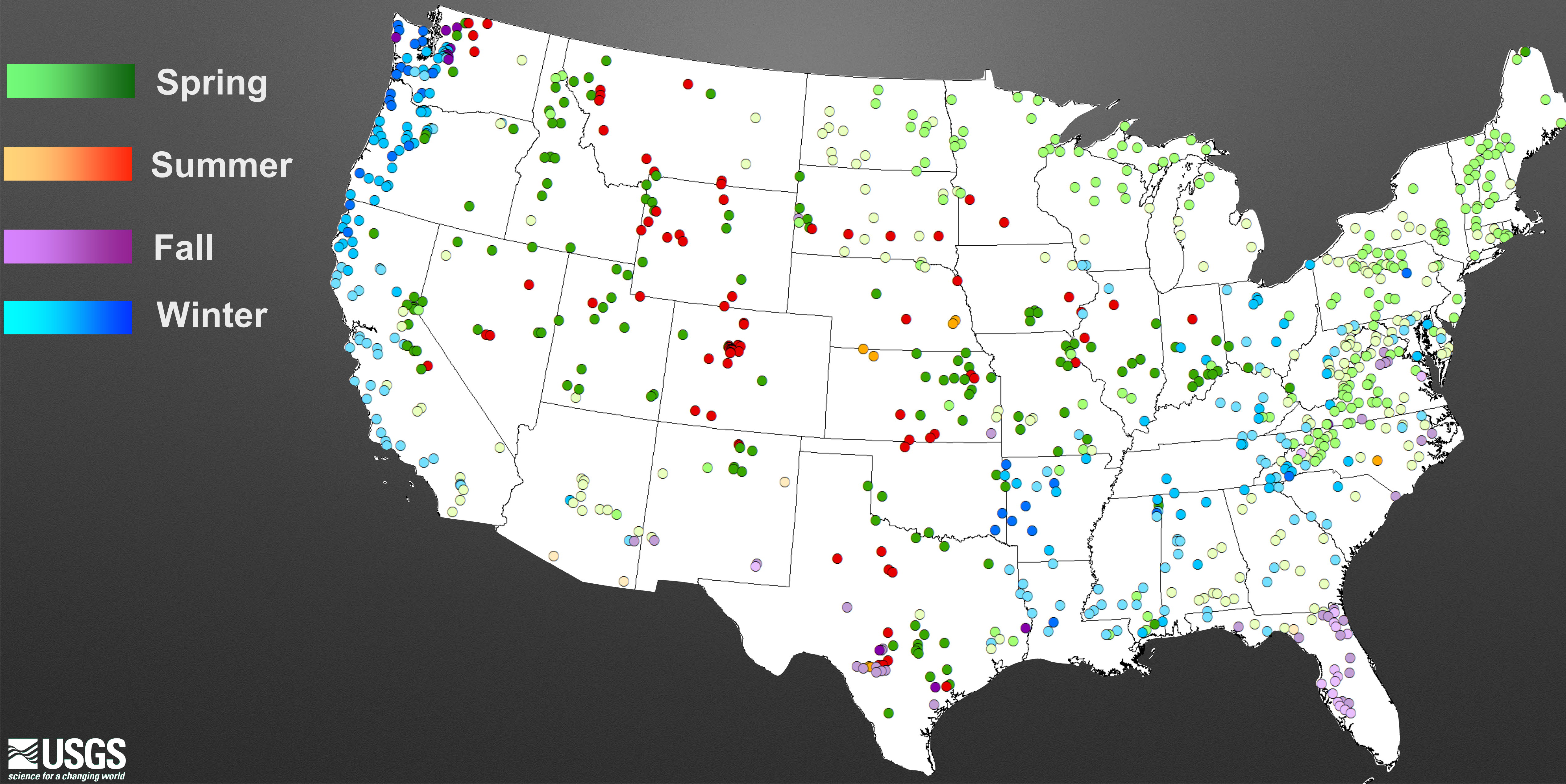


Probability of community impairment





Natural Occurrence of Annual Maximum Flows



winter

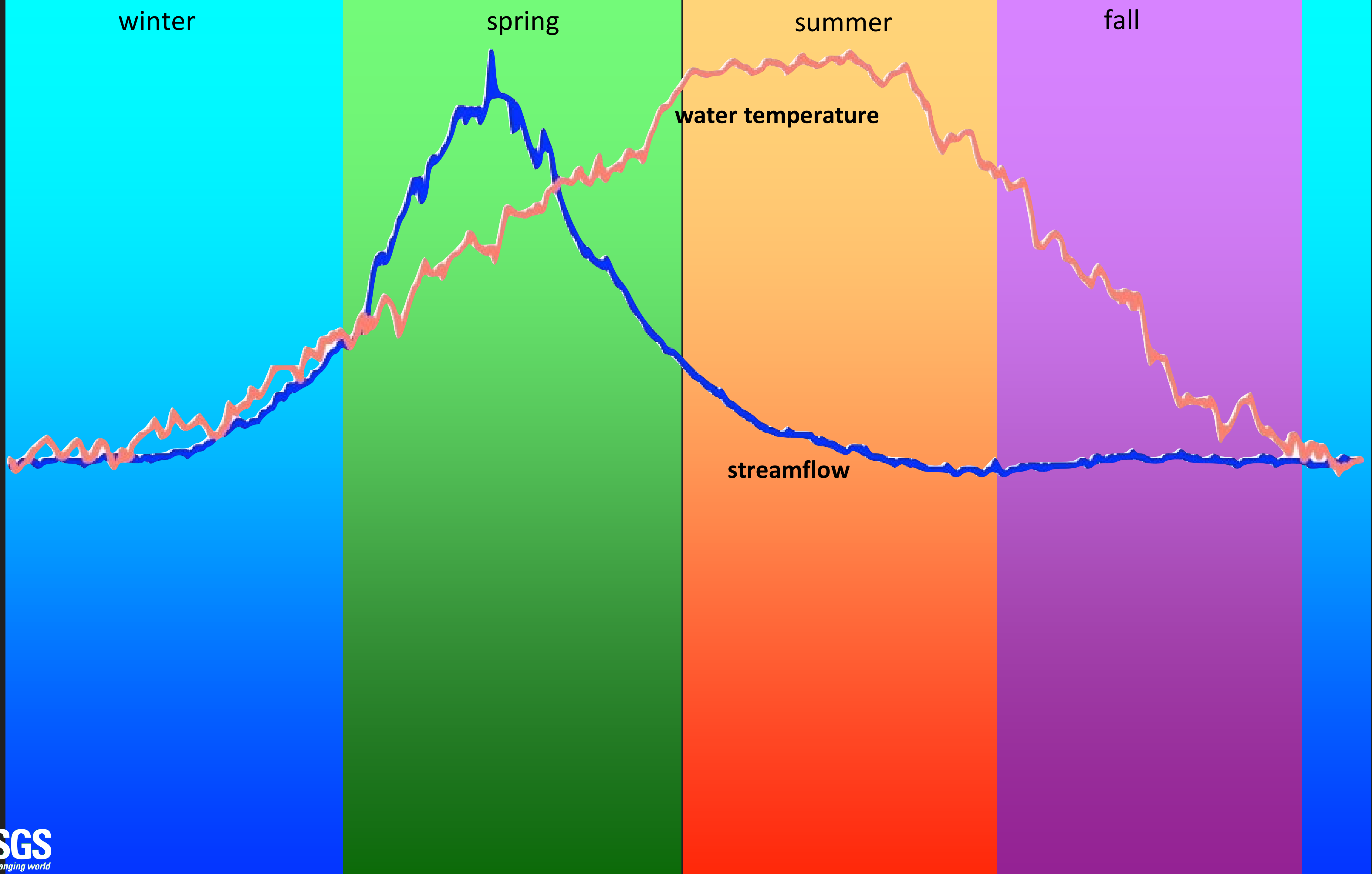
spring

summer

fall

water temperature

streamflow



North American Aquatic Insect Emergence

No. of taxa

400

300

200

100

0

Spring

Summer

Fall

Winter

