Enhancing Approaches to Explain Management Effects on Water Quality Trends

Co-Sponsors

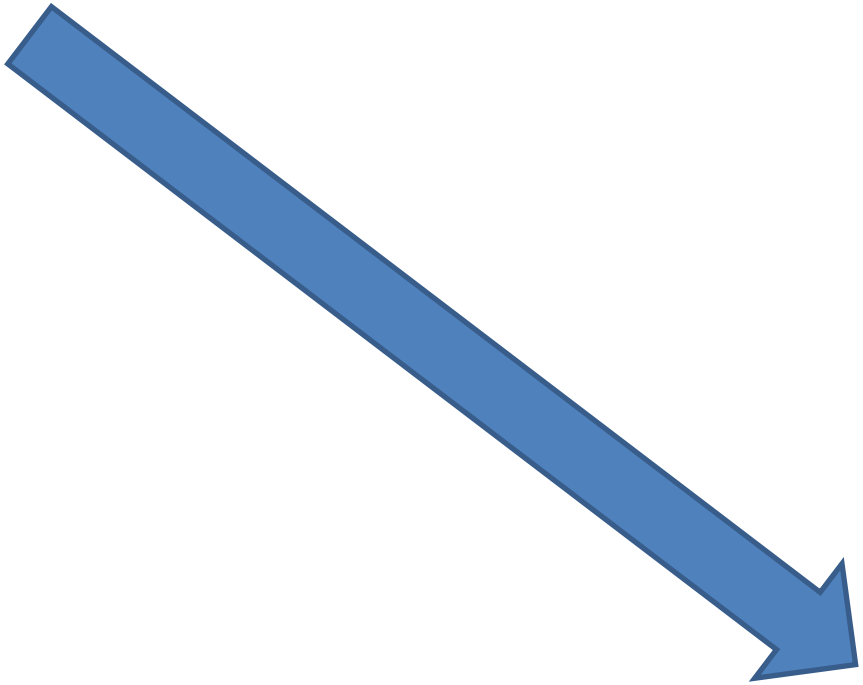
Chesapeake Bay Program Scientific and Technical Advisory Committee

And

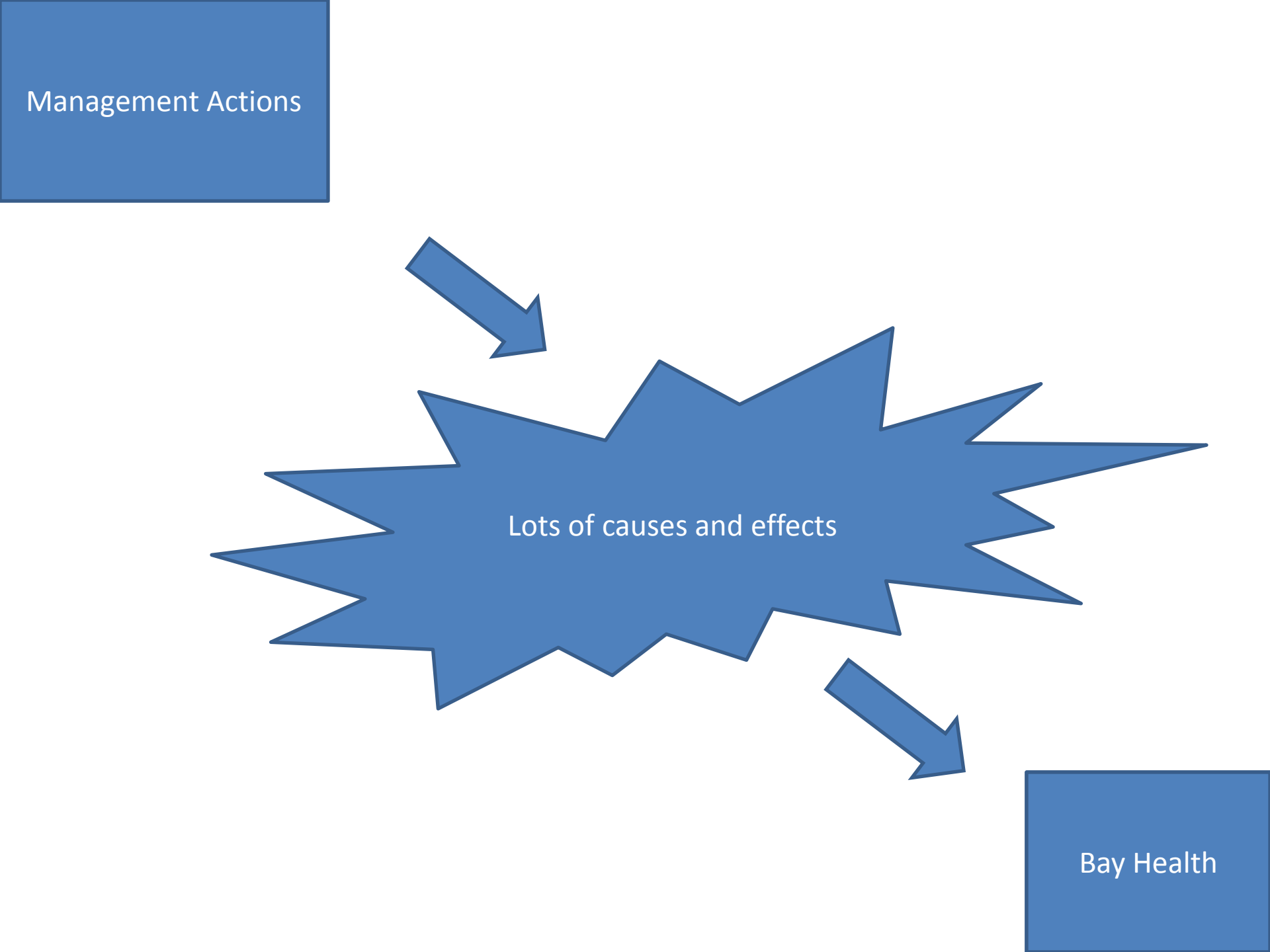
The Harry R. Hughes Center for Agro-Ecology

Management Actions

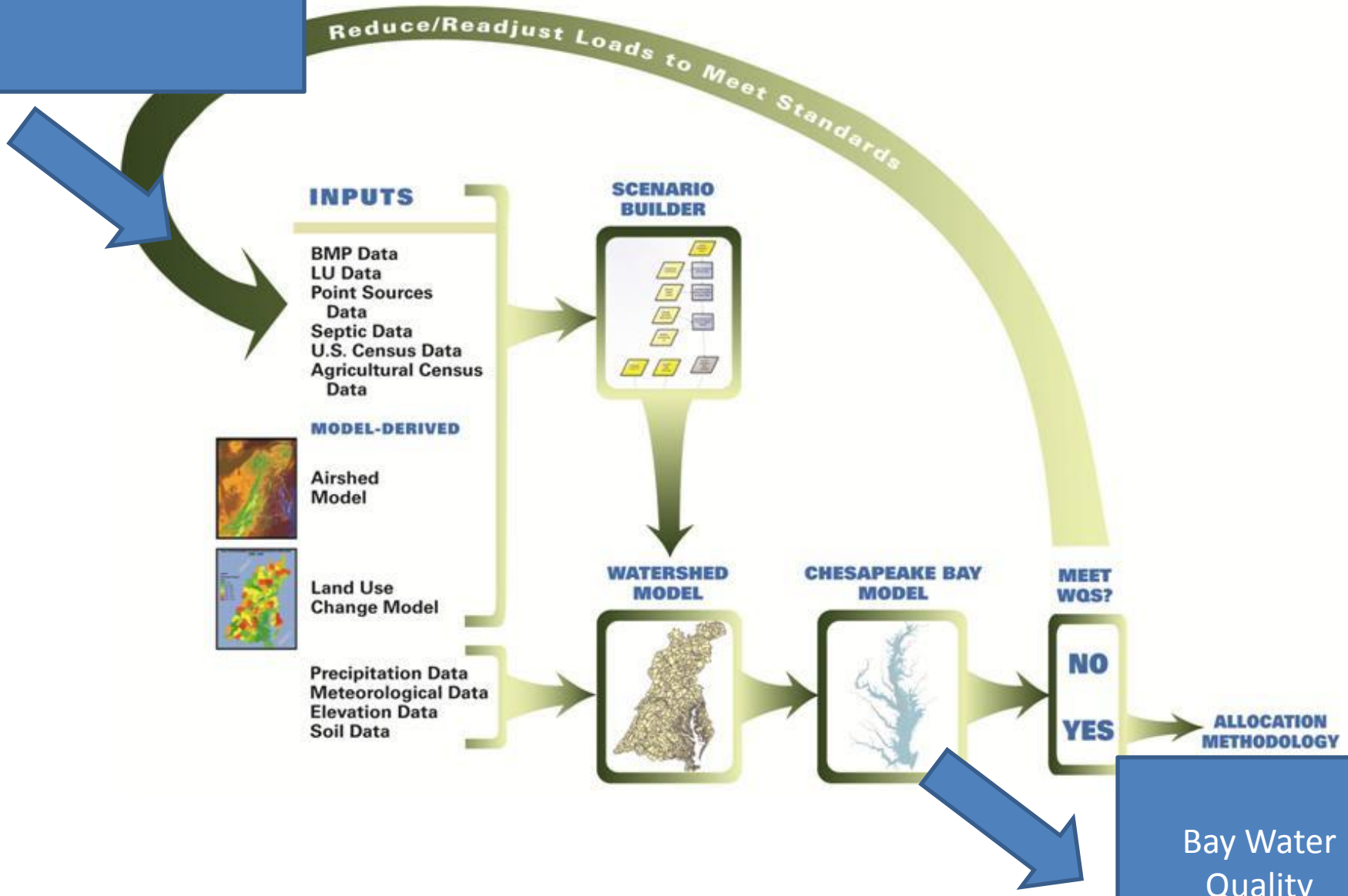
Chesapeake Restoration: the short version



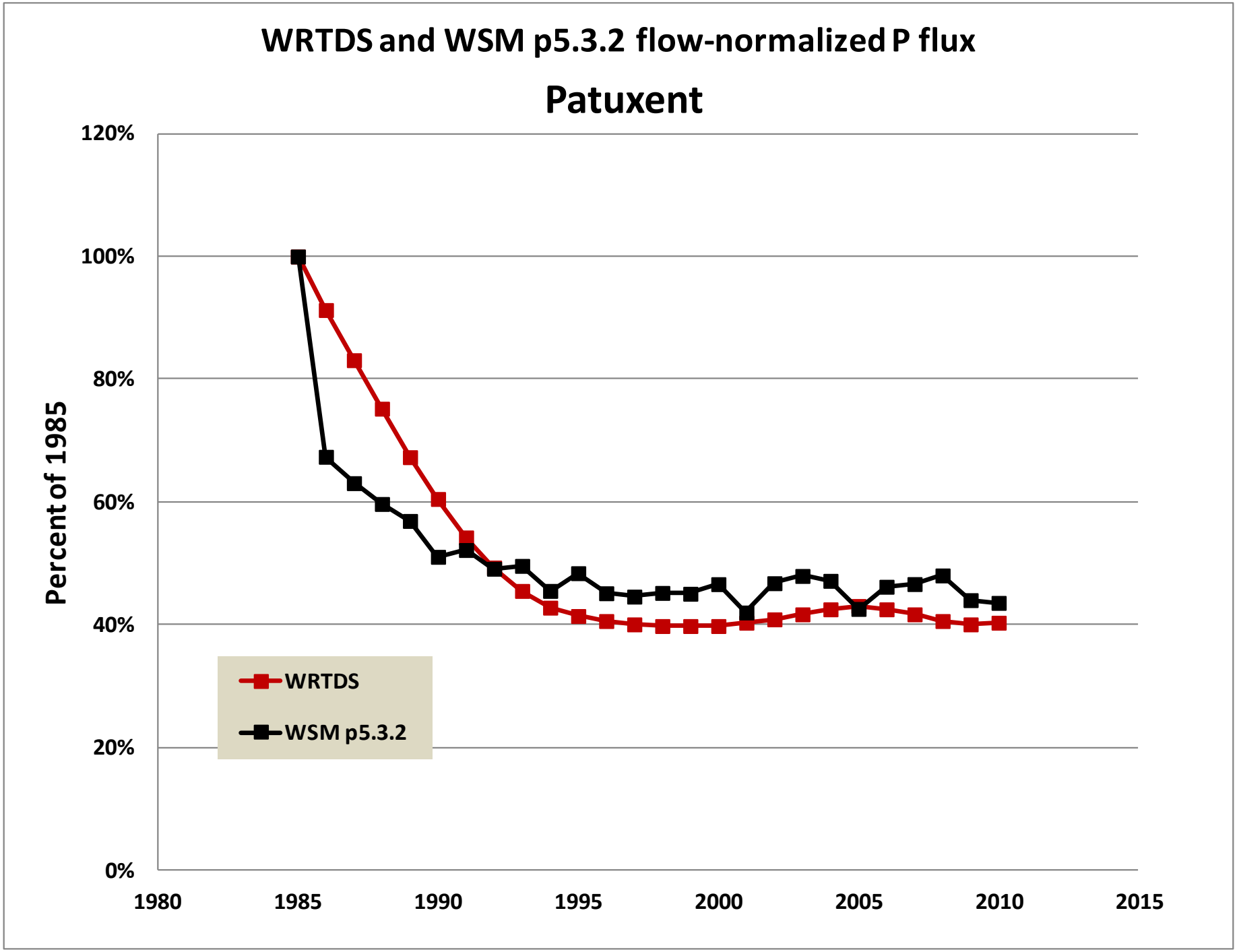
Bay Health

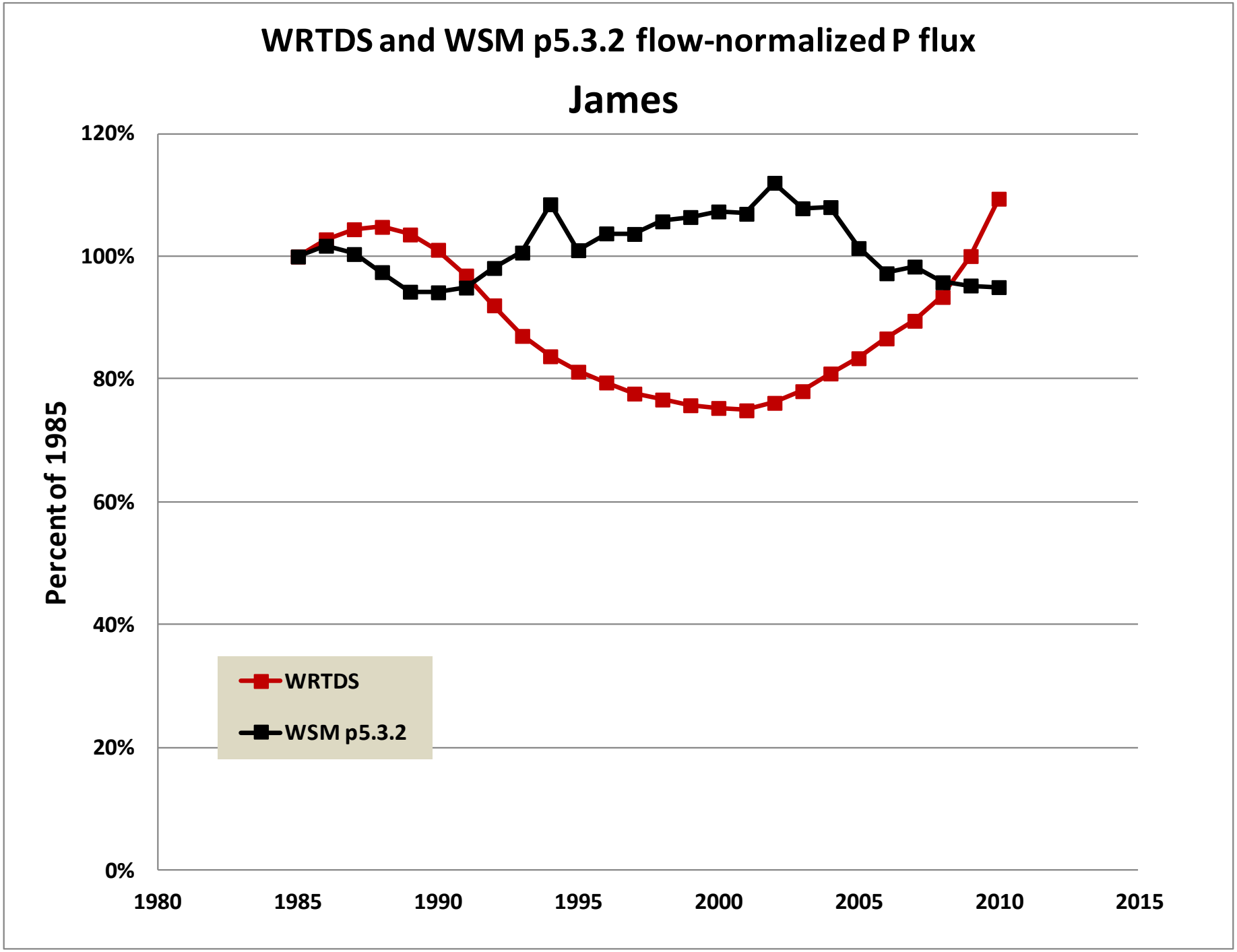

Management Actions
Lots of causes and effects
Bay Health

Management Actions



Bay Water Quality

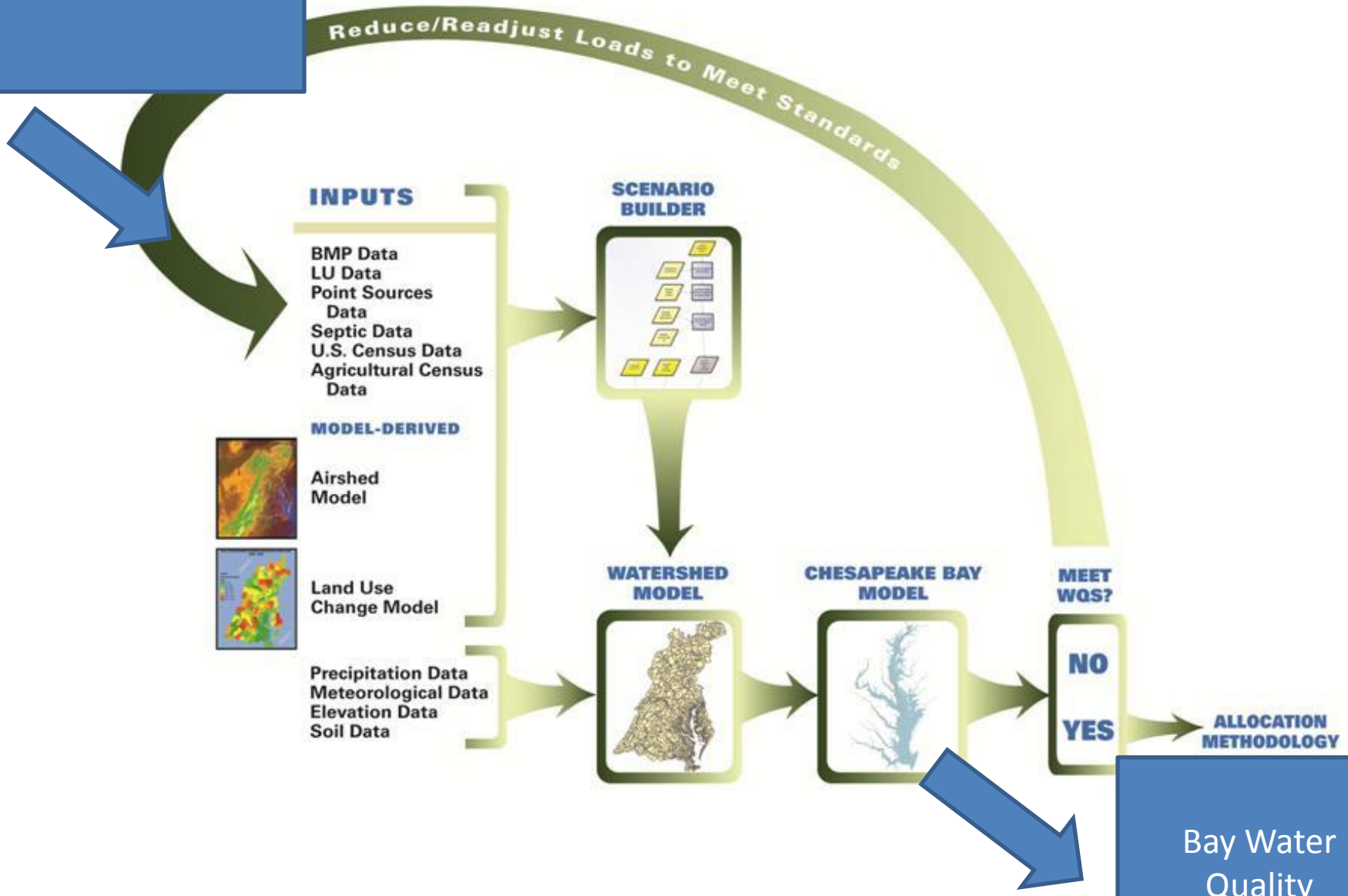

WRTDS and WSM p5.3.2 flow-normalized P flux
Patuxent
120%
100%
80%
60%
40%
20%
0%
Percent of 1985
1980
1985
1990
1995
2000
2005
2010
2015
WRTDS
WSM p5.3.2


WRTDS and WSM p5.3.2 flow-normalized P flux
James
120%
100%
80%
60%
40%
20%
0%
Percent of 1985
1980
1985
1990
1995
2000
2005
2010
2015
WRTDS
WSM p5.3.2

Why not more agreement?

- Unknown uncertainties of both methods
- Natural Factors More Significant
- Lag times
- BMP effectiveness information
- BMP implementation information
- Uncaptured anthropogenic effects
- Sunspots?
- …

Management Actions



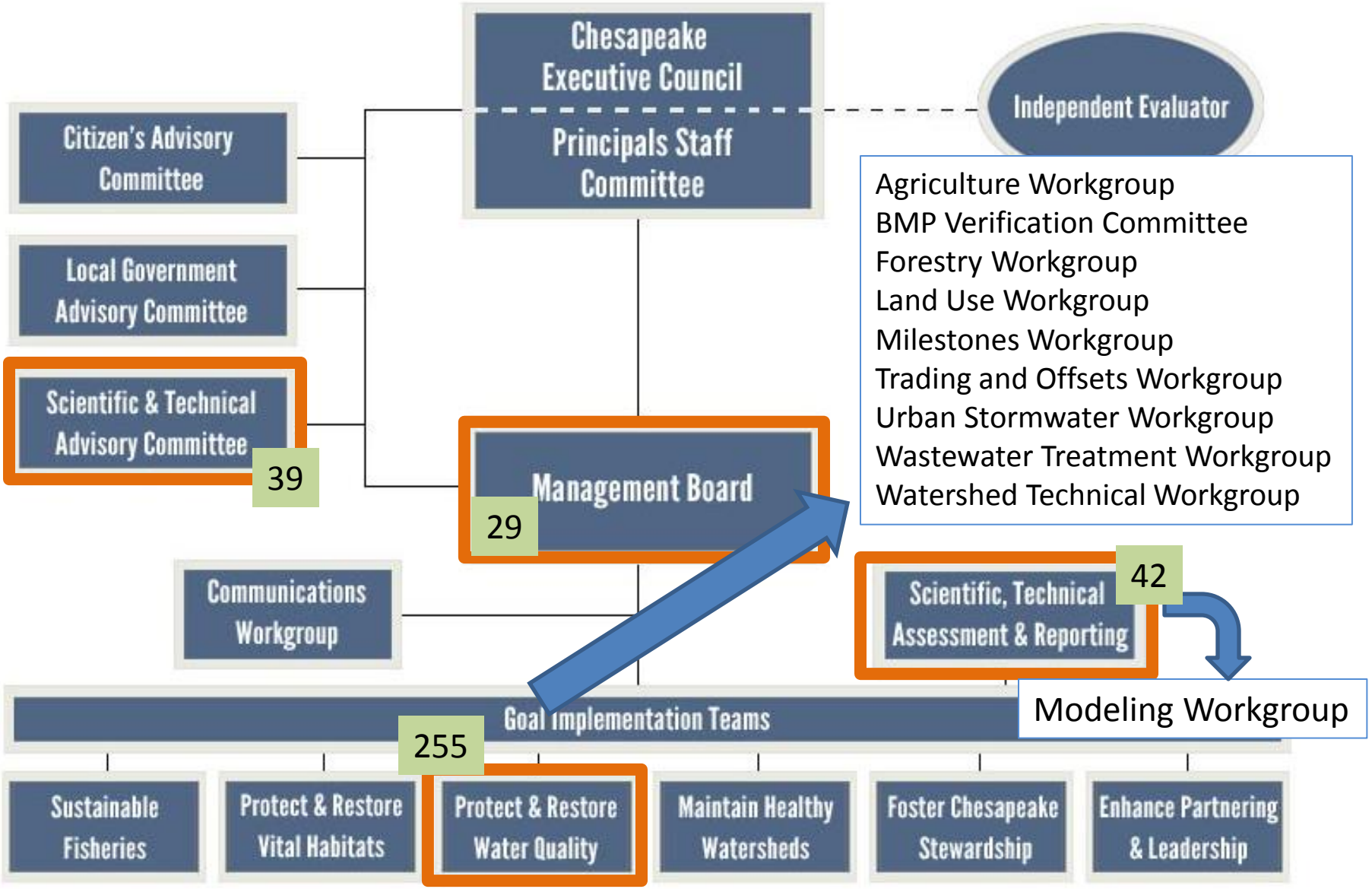
Bay Water Quality

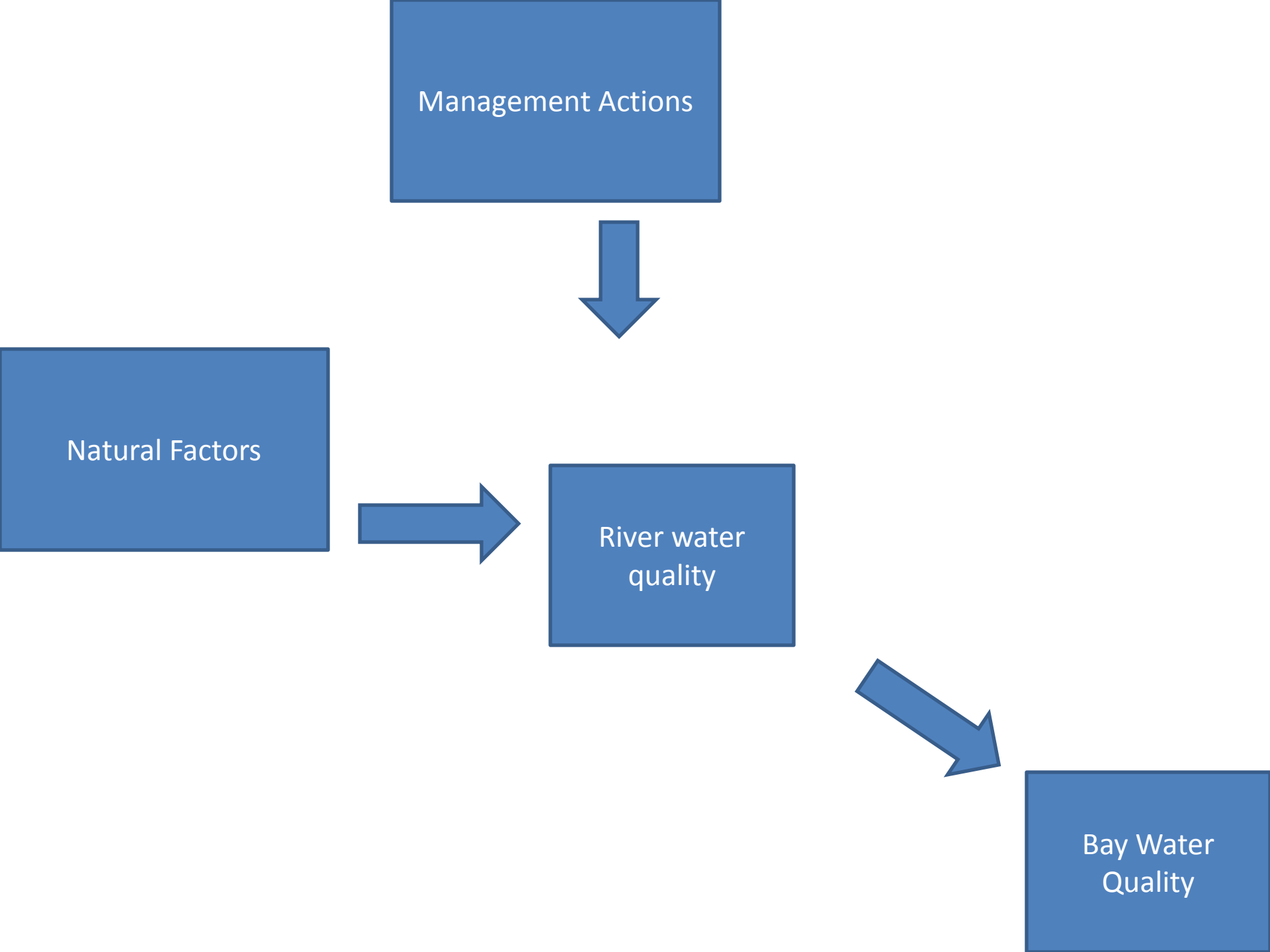
Management Actions

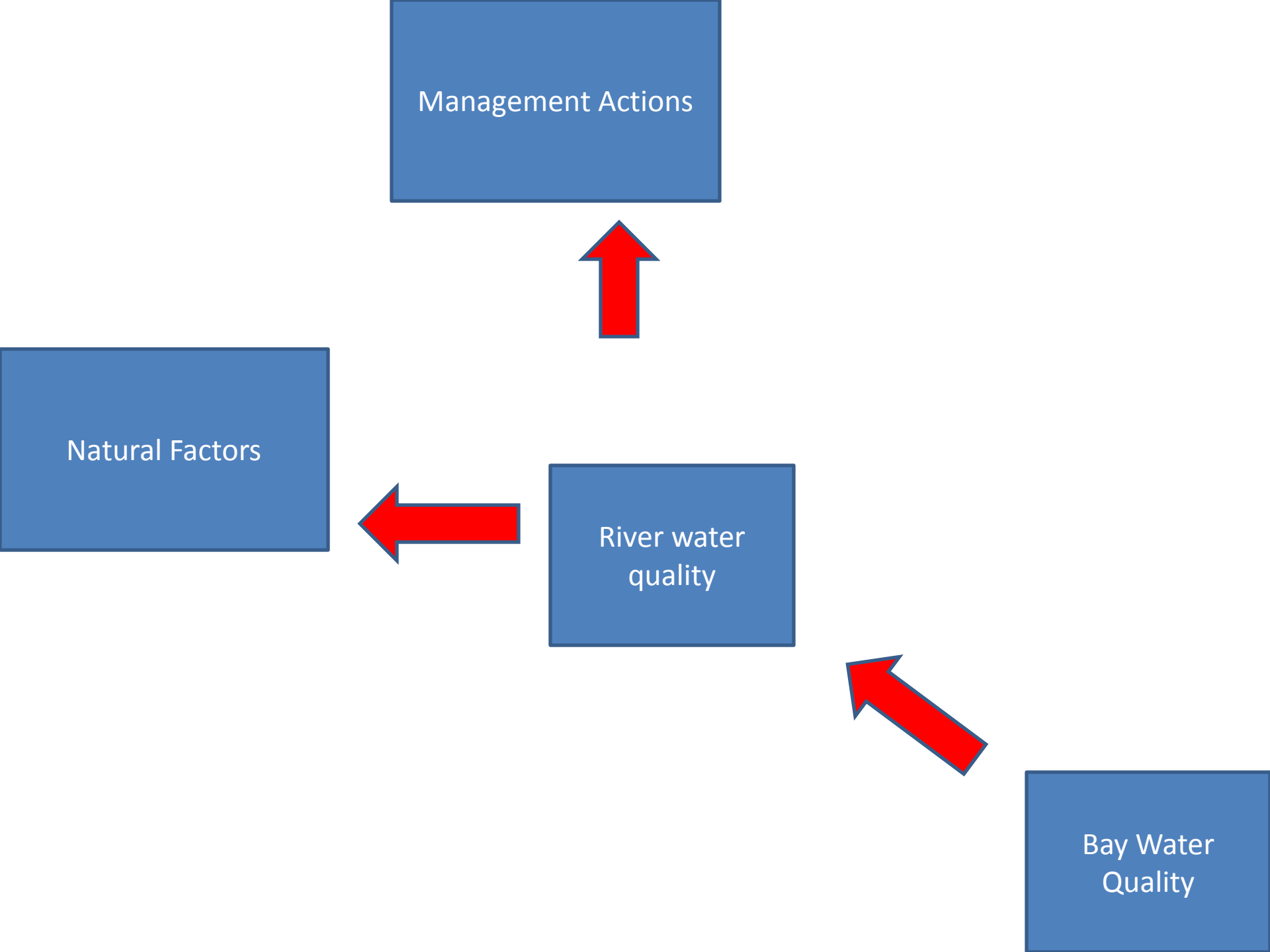
Bay Water Quality

Model related Membership as of 7/2013 – 365 individuals

Chesapeake Bay Program Partnership




Management Actions
Natural Factors
River water quality
Bay Water Quality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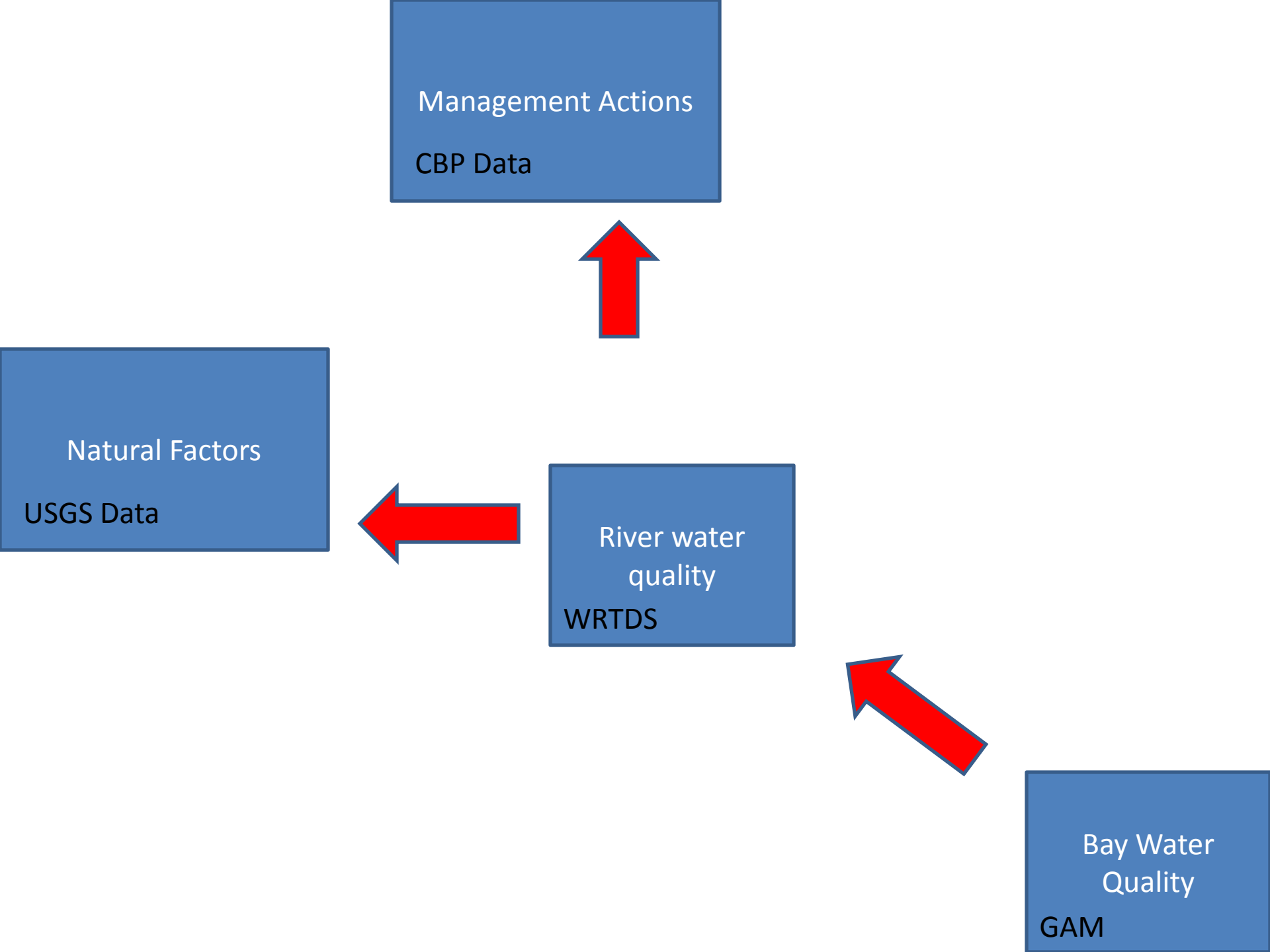
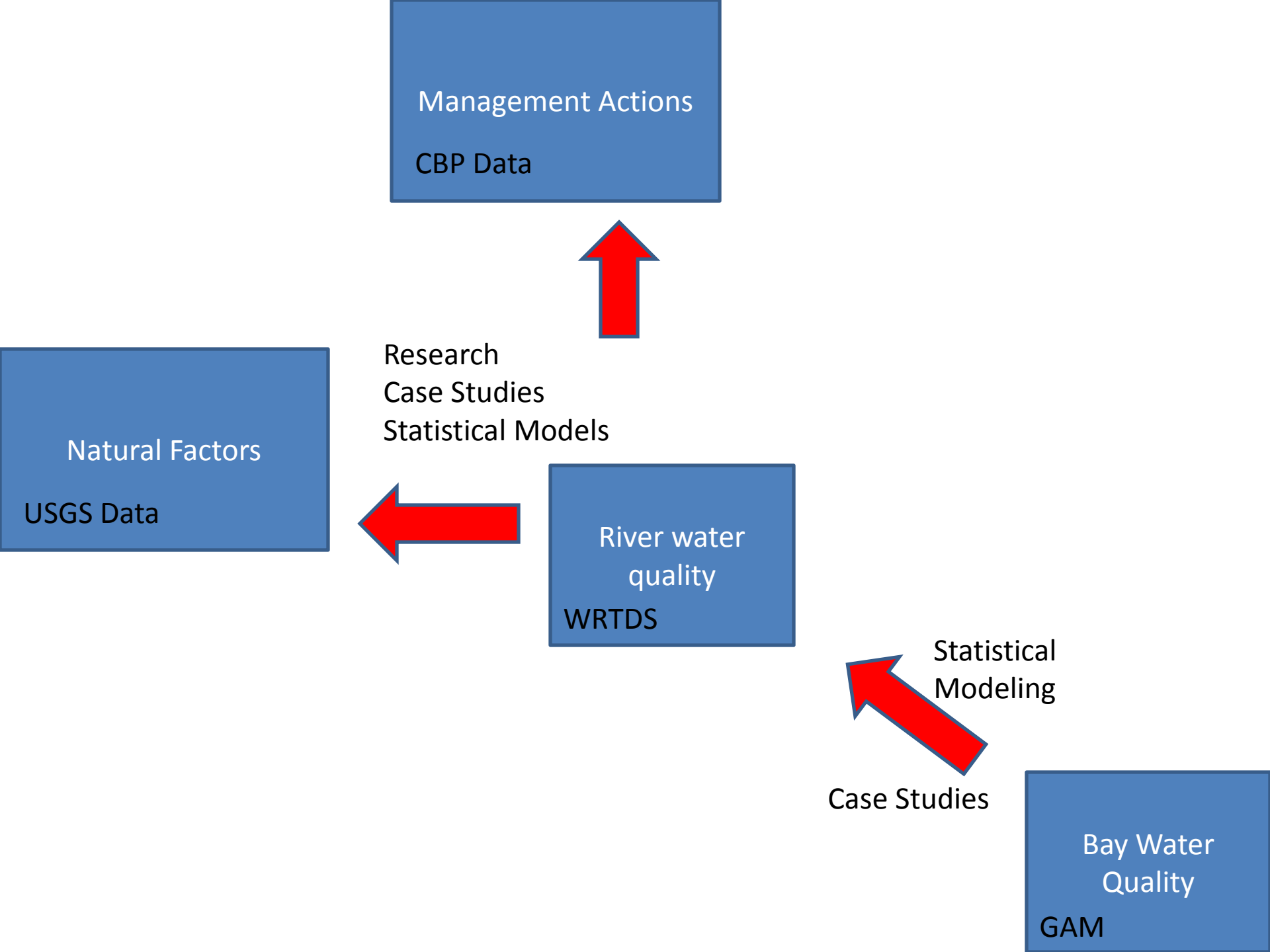
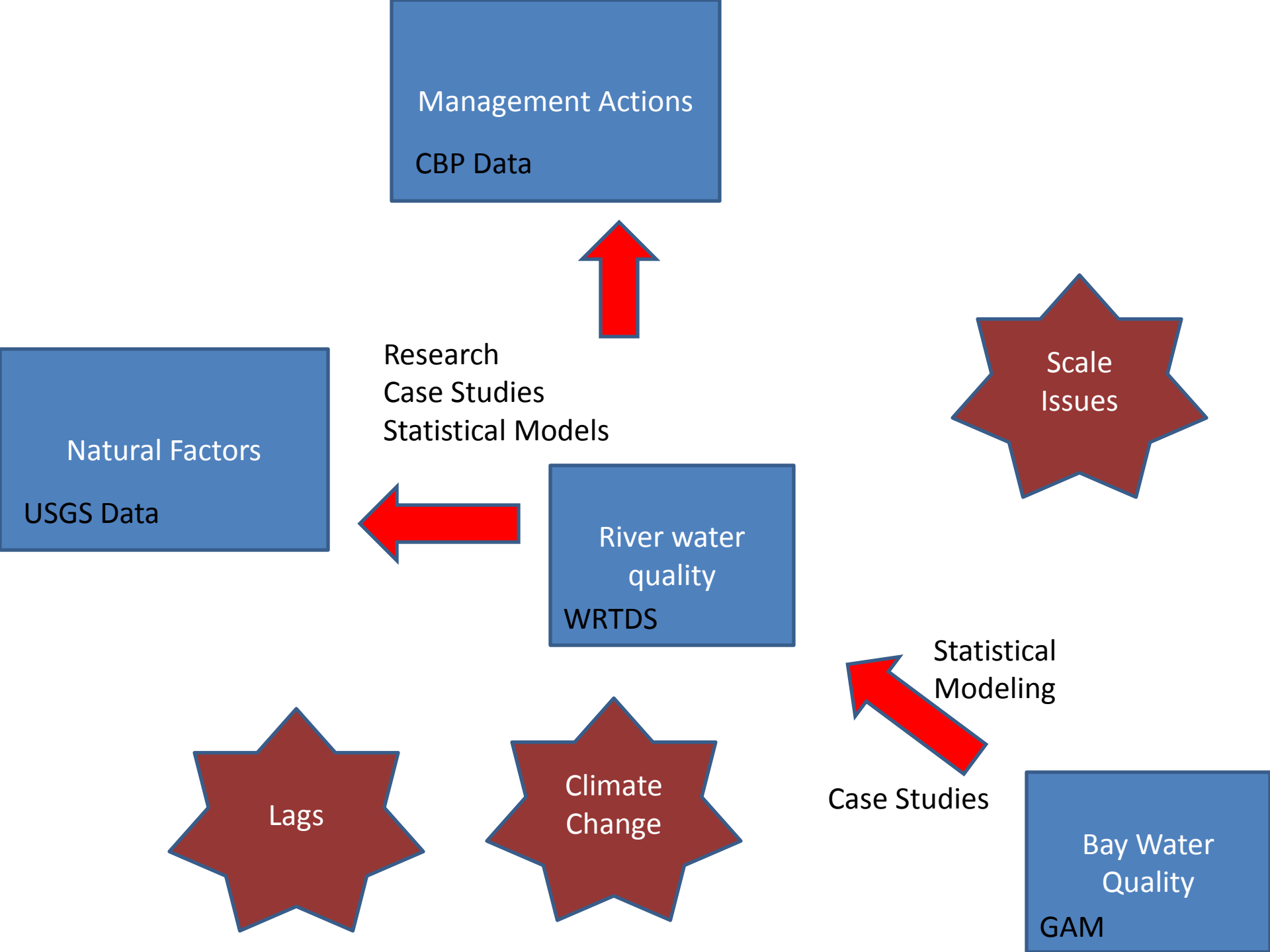
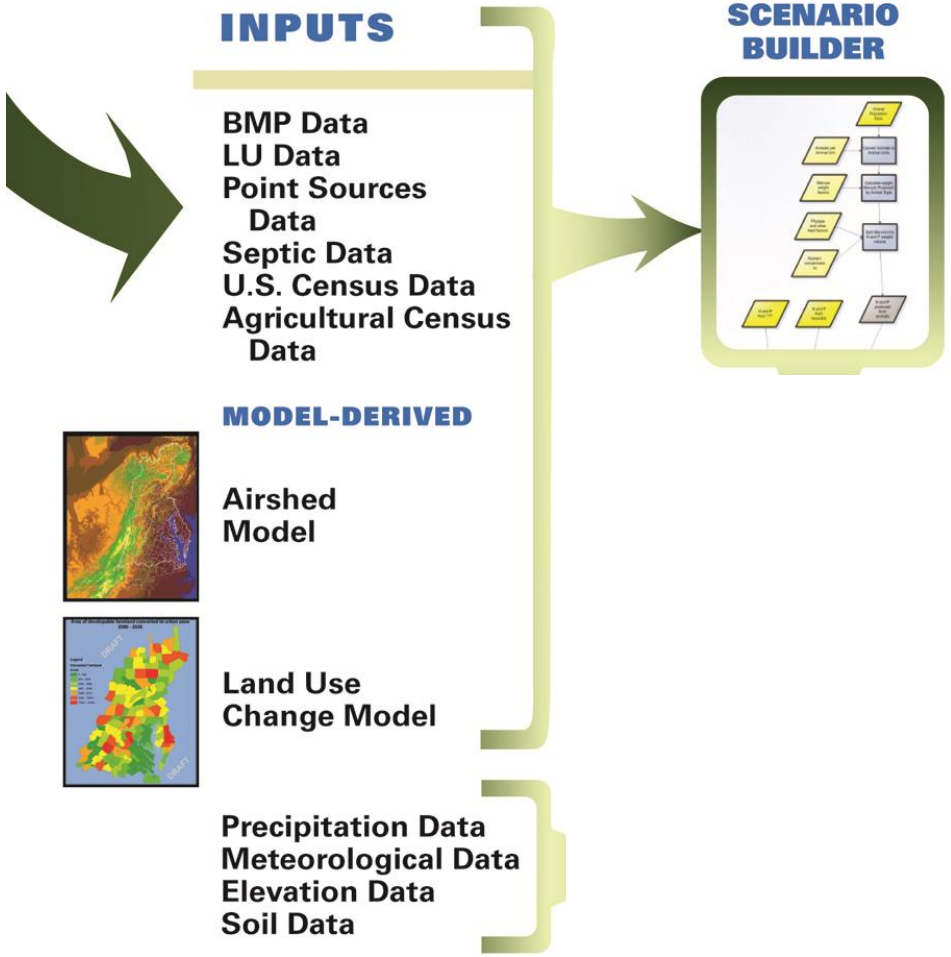

Management Actions
CBP Data
Natural Factors
USGS Data
River water quality
WRTDS
Bay Water Quality
GAM


Management Actions
CBP Data
Research
Case Studies
Statistical Models
Natural Factors
USGS Data
River water quality
WRTDS
Statistical Modeling
Case Studies
Bay Water Quality
GAM


Management Actions
CBP Data
Research
Case Studies
Statistical Models
Natural Factors
USGS Data
River water quality
WRTDS
Scale Issues
Statistical Modeling
Case Studies
Bay Water Quality
GAM
Lags
Climate Change

CBP Scenario Builder, land use modeling and other data systems –

Tool for estimating changes to the watershed



Land Use
Point Sources
Septic Loads
Human Population
Animal Population
Atmospheric Deposition
Fertilizer application
Manure application
Legume fixation
Crop uptake
Vegetative cover
Plowing disturbance
BMP implementation
Physical setting information

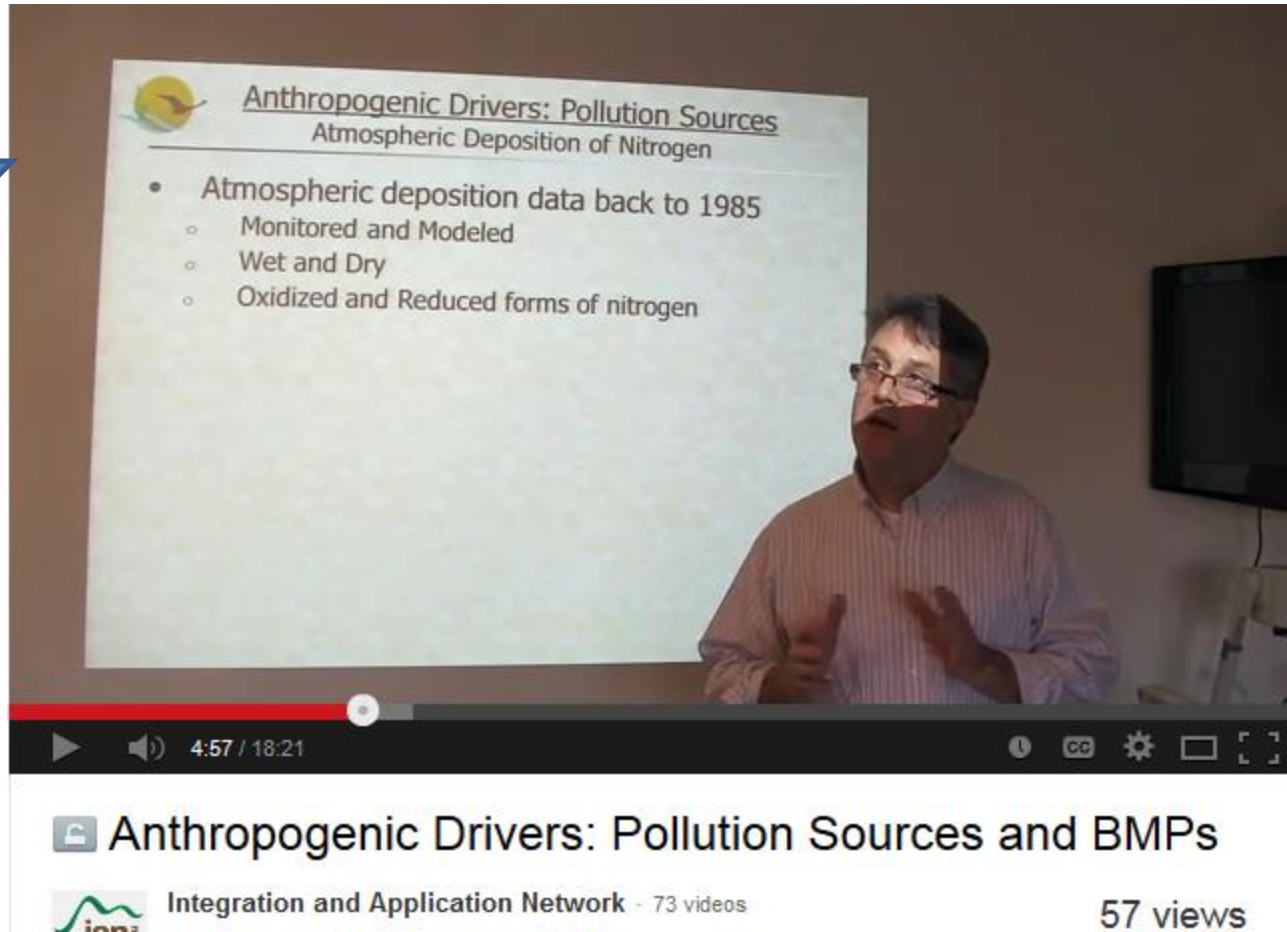
New Insights
Christina Lyerly

- Case Studies where WQ changes have been observed
- Wastewater is rapid improvement
- Air Quality broad improvement
- Targeted Ag practices
- Multiple Urban Practices

- But…
  - Lags exist
  - Swimming upstream

Anthropogenic Drivers
Jeff Sweeney

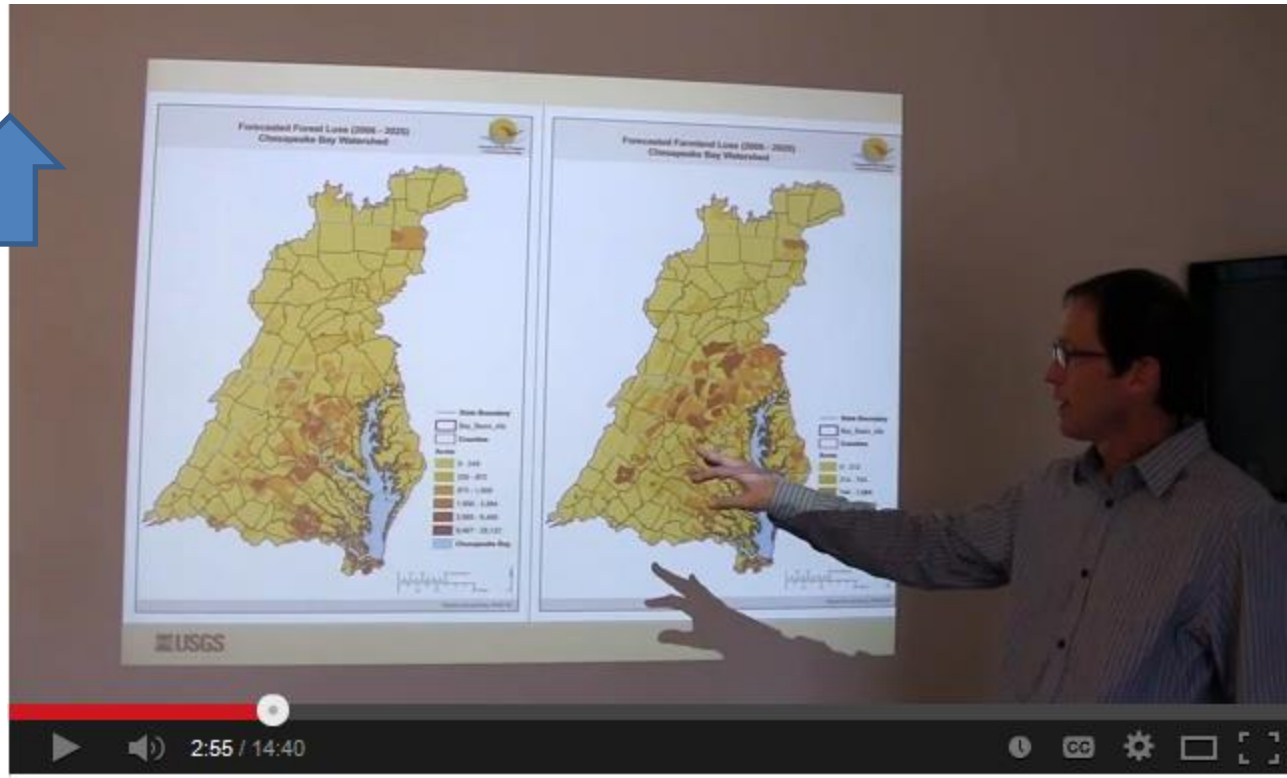
- Resources available from CBPO
- Atmospheric Deposition
- Manure
- Fertilizer
- BMPs



Land Use

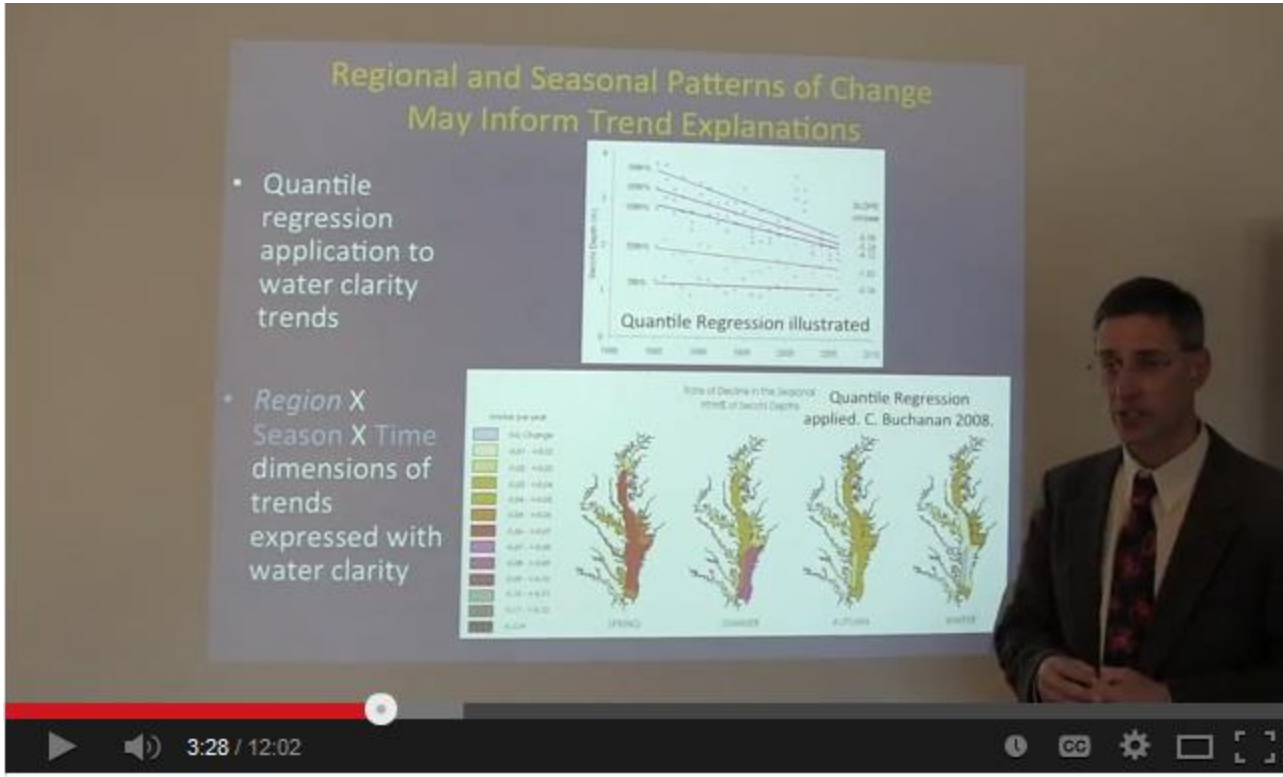
Peter Claggett

- Resources available from CBPO
- Population
- Development
- Density
- Ag
- Forest



Bay Health
Peter Tango

- Baywide trends are rare, but small areas have large changes
- DO up, then down
- Secchi down
- SAV up, then variable



Bay Health

Joel Blomquist

- Natural factors include
- Climate
- Geomorphology
- Lag times

- Building data at 123 sites