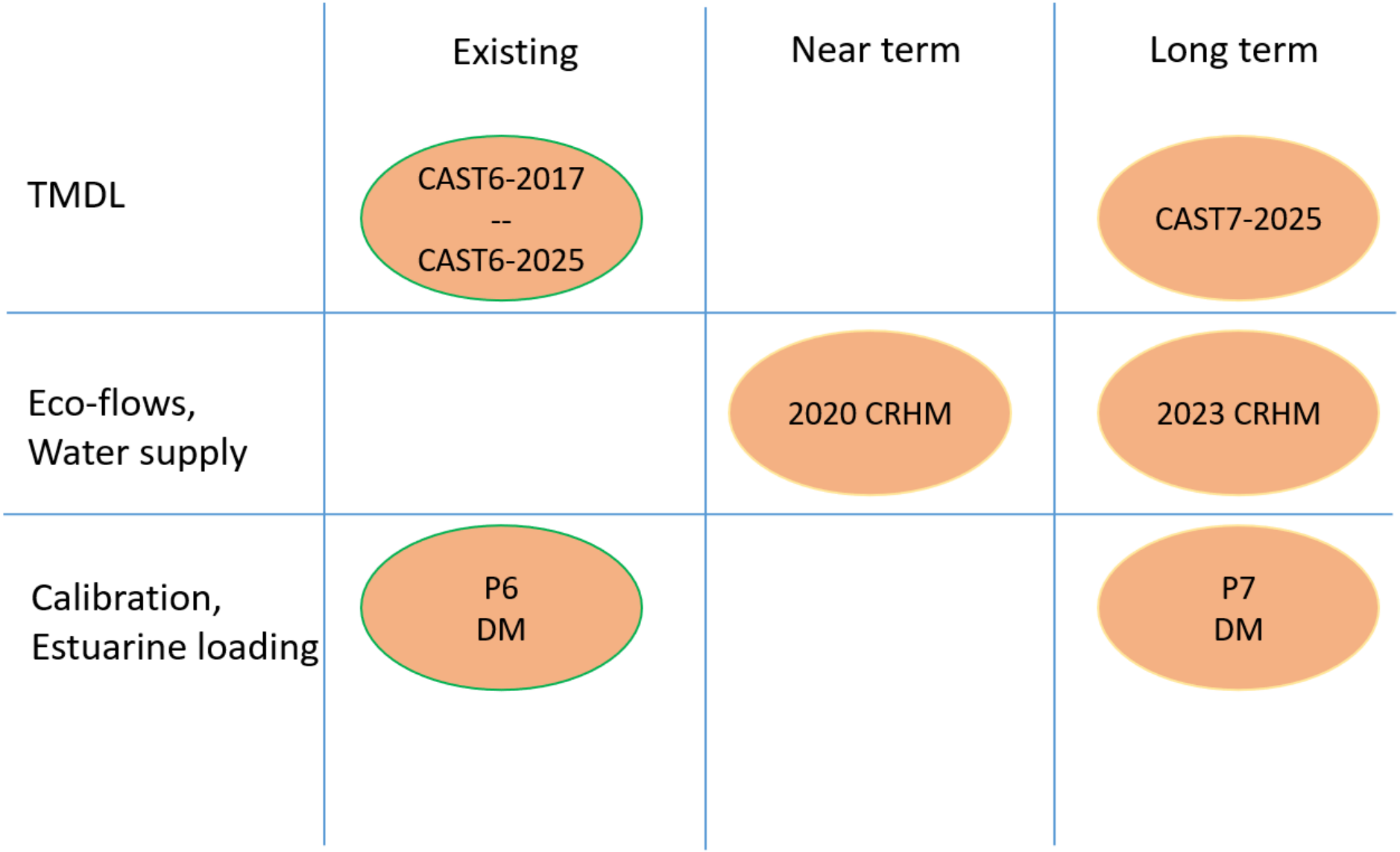
CBP Watershed Modeling Products



CBP Watershed Modeling Process

Model
Data Set
Endpoint
Project/Decision
Complete
In Process
Not Started

Phase 6

P6 DM

NHD-Scale Data sets

... Geomorphometry

~10m Static Model

... Nutrient and Sediment Simulation Method

... Factors Affecting Trends Analysis IB

... 2020 CRHM

... 2023 CRHM

P7 Land use, Hydrologic BMPS

P7 Nutrient Inputs ...

CAST7-2025

Eco Flows Water Supply

TMDL applications

P7 DM

Lags

Steady State Phase 6 Model Structure

Edge of Field

*

Land Use Acres

*

BMPs

*

Land to Water

*

Stream Delivery

*

River Delivery

Direct Loads

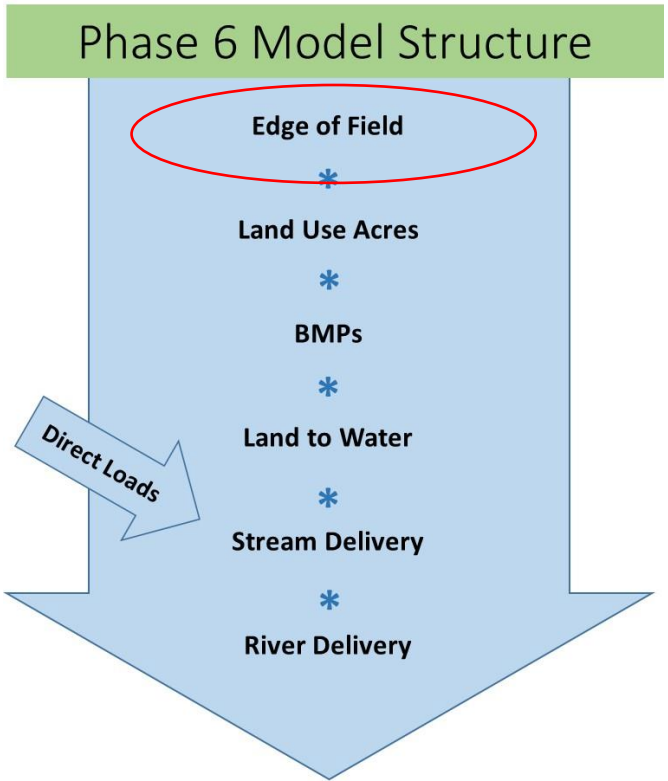
Phase 6 Sediment

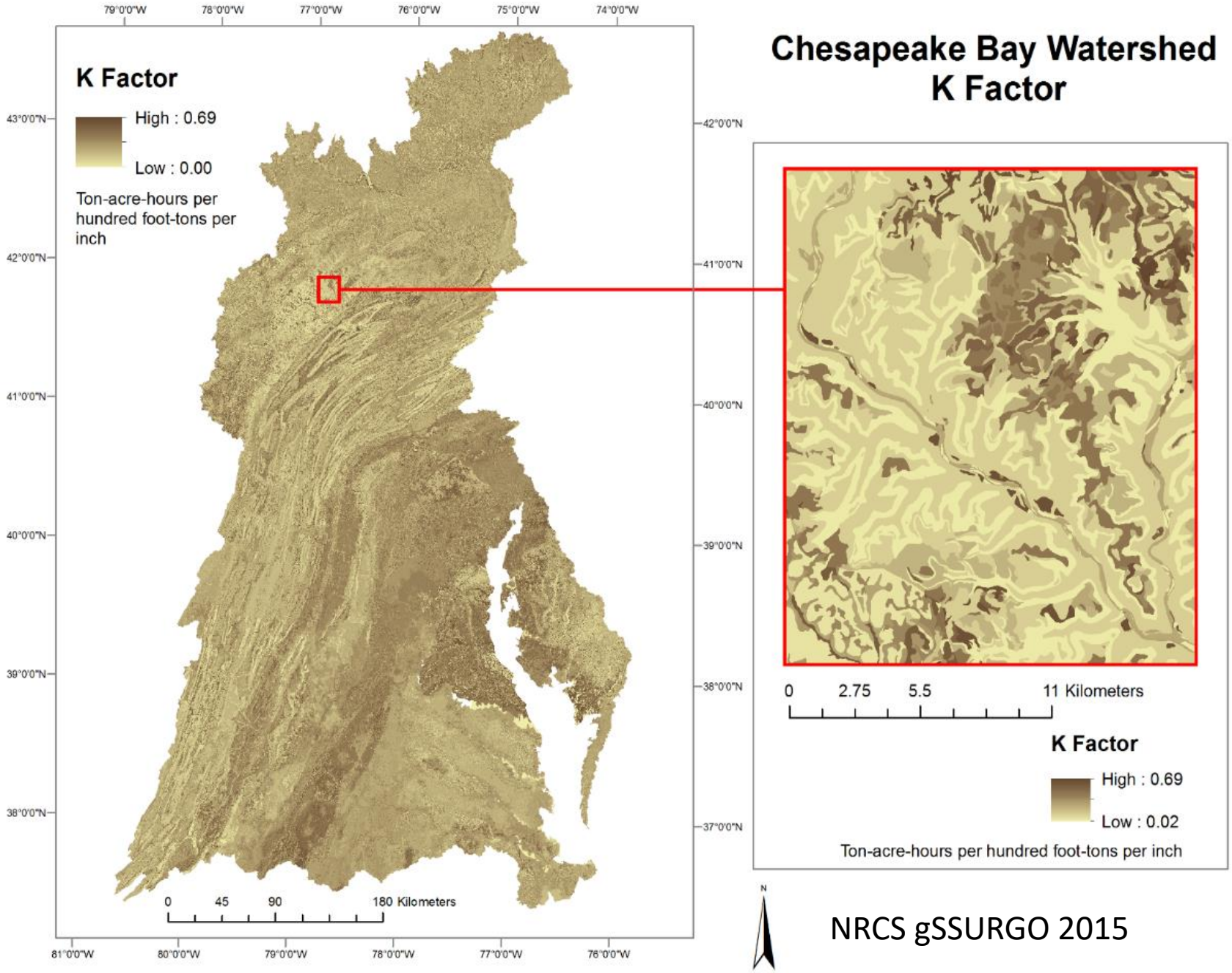
RUSLE => R * K * LS * C * P

- R = Runoff
- K = Erodibility
- LS = slope length

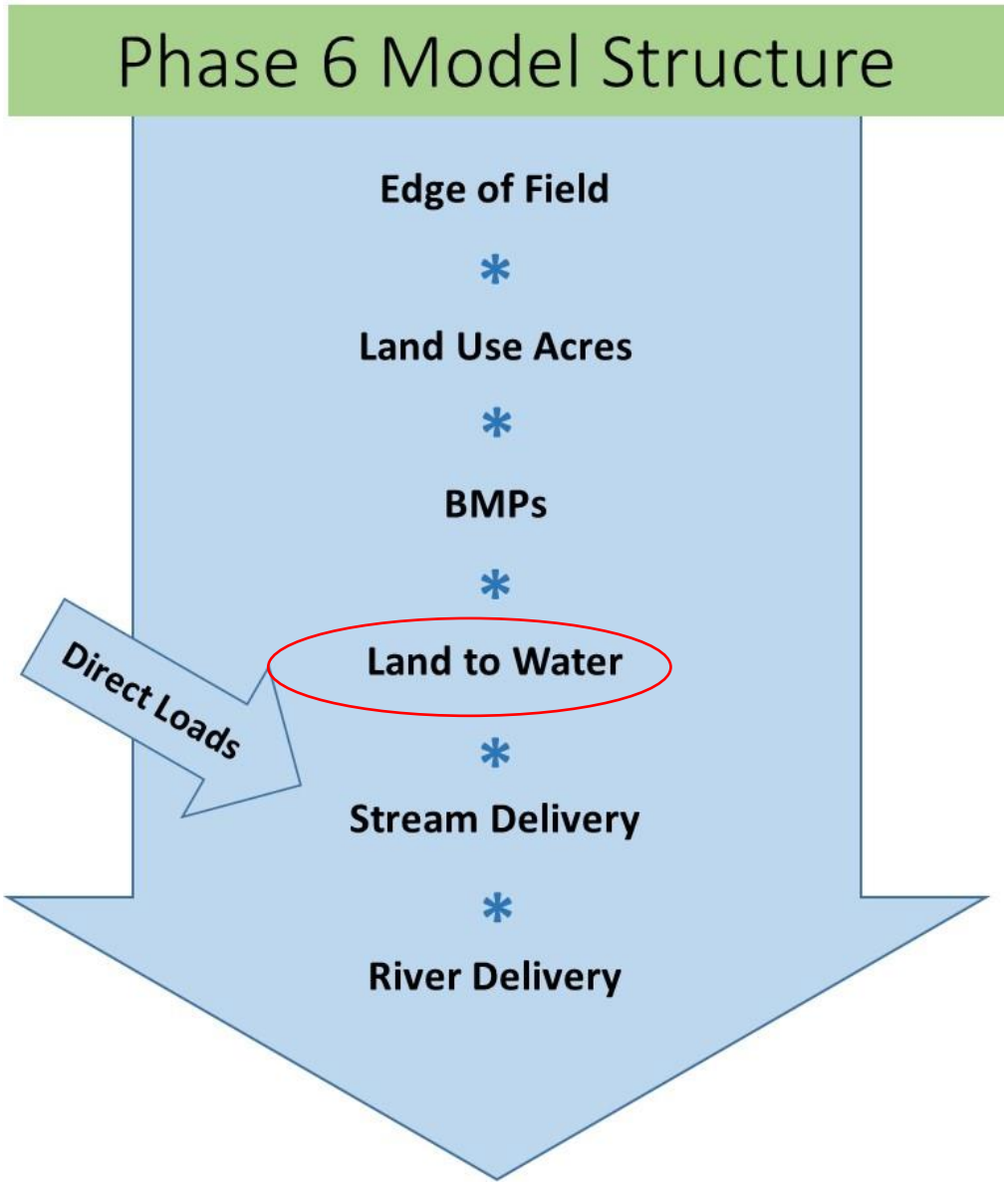
} Evaluated at 10 meter resolution

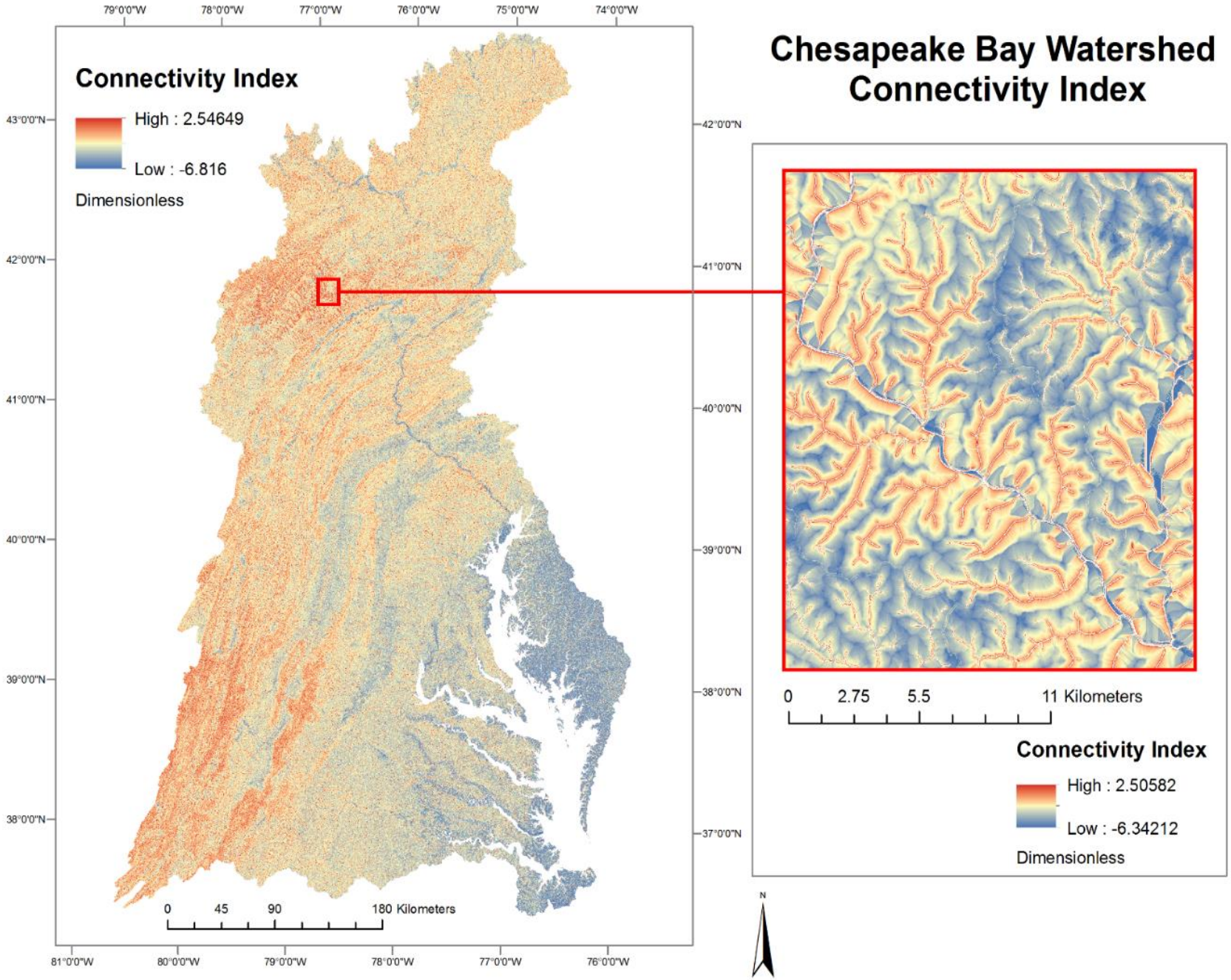
- C = Cover
  - By land use and Land-River segment
- P = Practice
  - = 1 since no action loads



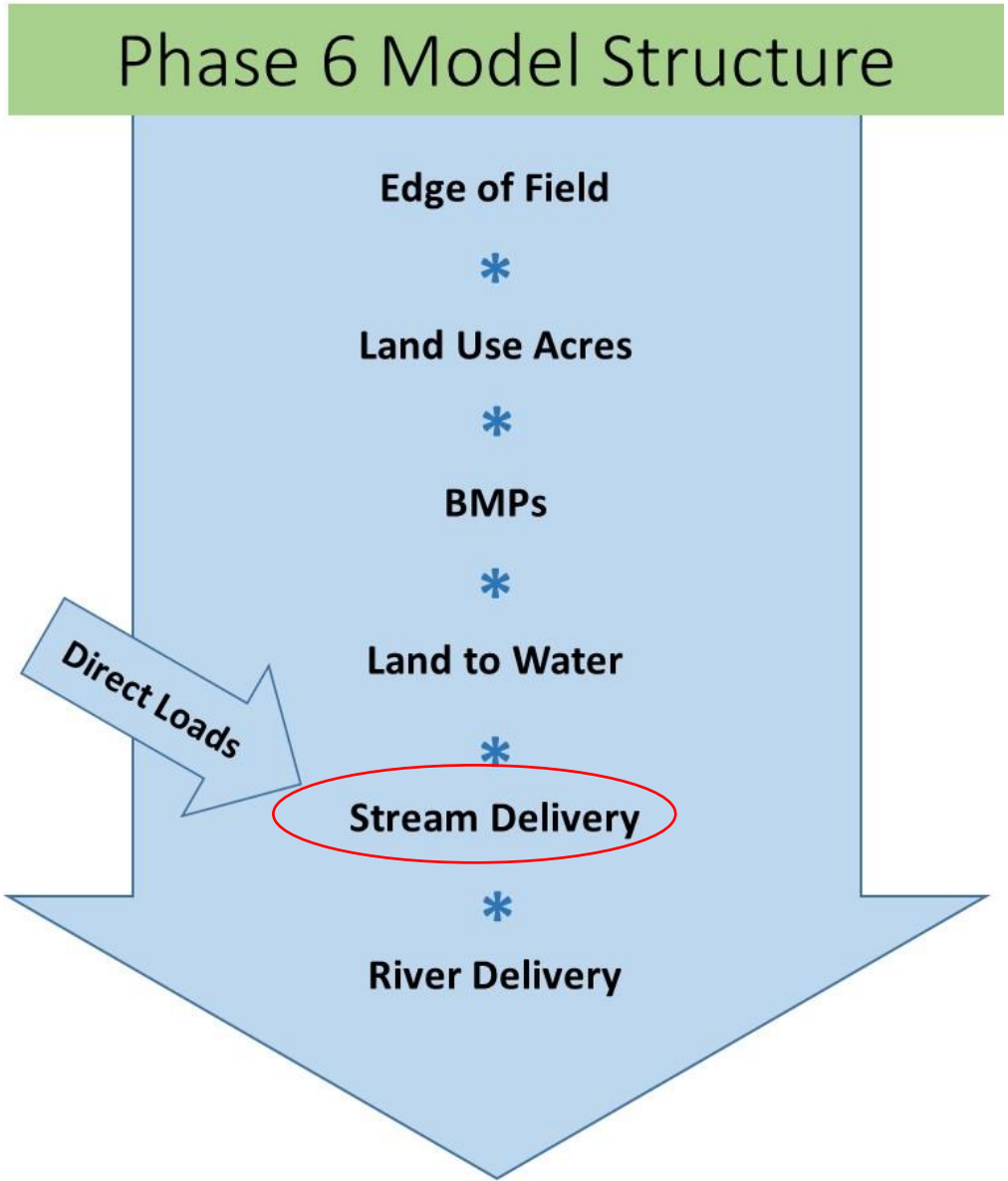

Chesapeake Bay Watershed
K Factor
K Factor
High : 0.69
Low : 0.00
Ton-acre-hours per hundred foot-tons per inch
79°0'0"W
78°0'0"W
77°0'0"W
76°0'0"W
75°0'0"W
74°0'0"W
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
38°0'0"N
37°0'0"N
81°0'0"W
80°0'0"W
79°0'0"W
78°0'0"W
77°0'0"W
76°0'0"W
0 45 90 180 Kilometers
0 2.75 5.5 11 Kilometers
K Factor
High : 0.69
Low : 0.02
Ton-acre-hours per hundred foot-tons per inch
N
NRCS gSSURGO 2015

Sediment Delivery Ratio

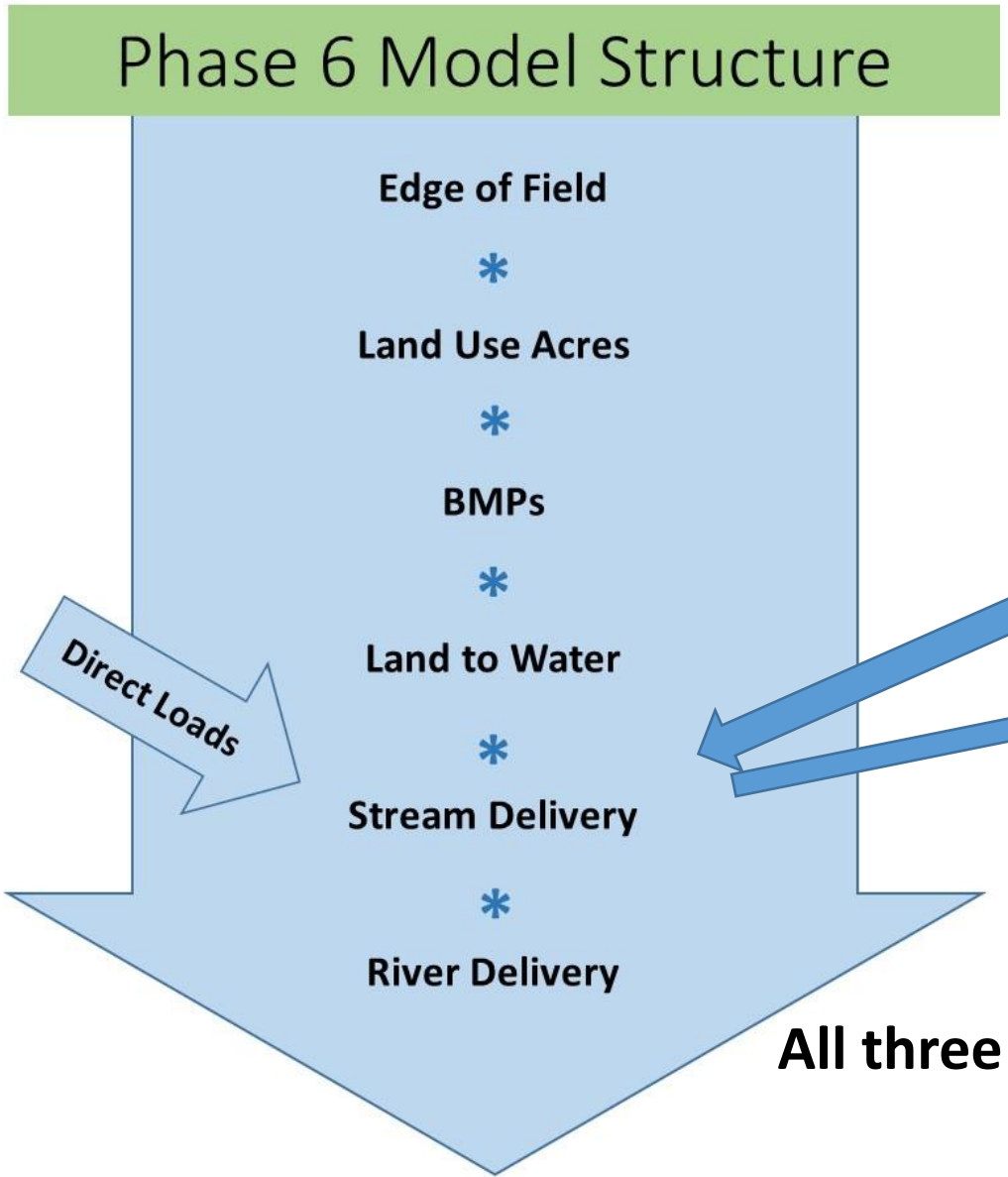



Chesapeake Bay Watershed
Connectivity Index
Connectivity Index
High : 2.54649
Low : -6.816
Dimensionless
79°0'0"W
78°0'0"W
77°0'0"W
76°0'0"W
75°0'0"W
74°0'0"W
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
38°0'0"N
37°0'0"N
81°0'0"W
80°0'0"W
0 45 90 180 Kilometers
0 2.75 5.5 11 Kilometers
Connectivity Index
High : 2.50582
Low : -6.34212
Dimensionless
N

Stream Sediment Effects



Stream Sediment Effects – 2 methods



Absolute Load change
Streambank (+) STR
Floodplain (-) STF

Simple pass-through Factor

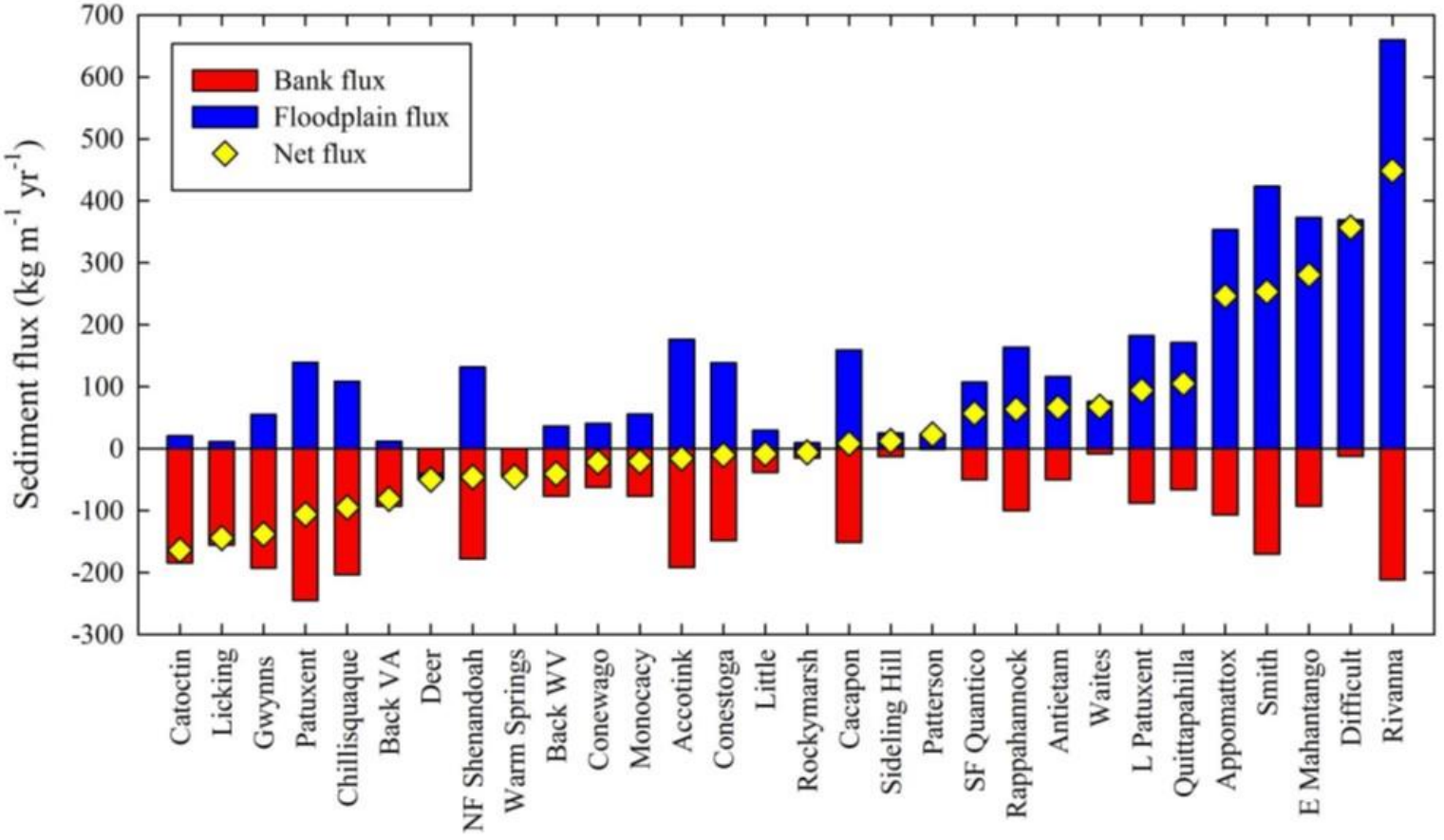
All three can exist in the same segment

Methods for Stream Estimation

- Chesapeake Floodplain Network
- USGS Sparrow Regression Model
- National Stormwater Quality Database

Chesapeake Floodplain Network – Ag and Natural

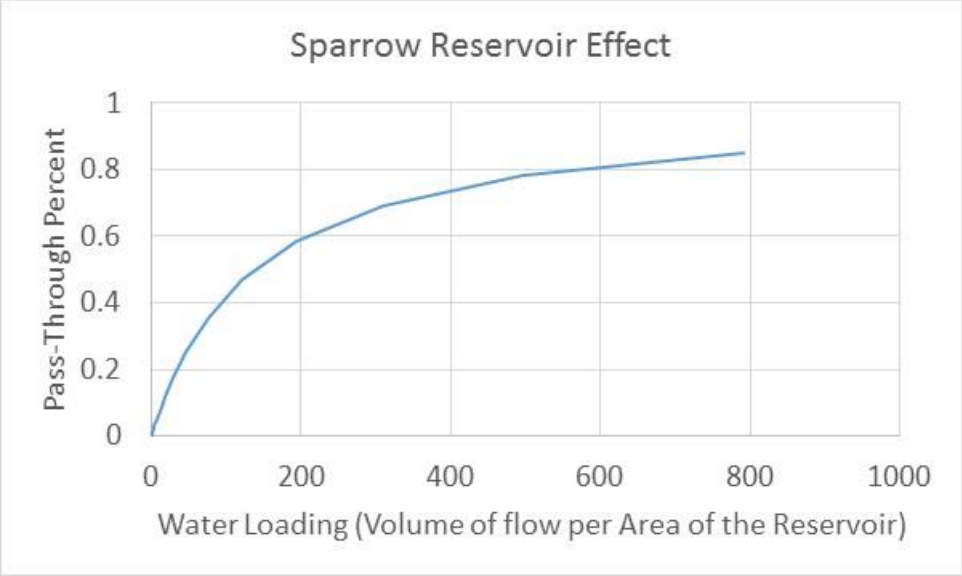
Greg Noe and others



- No net change
- Spatial variability not able to be generalized

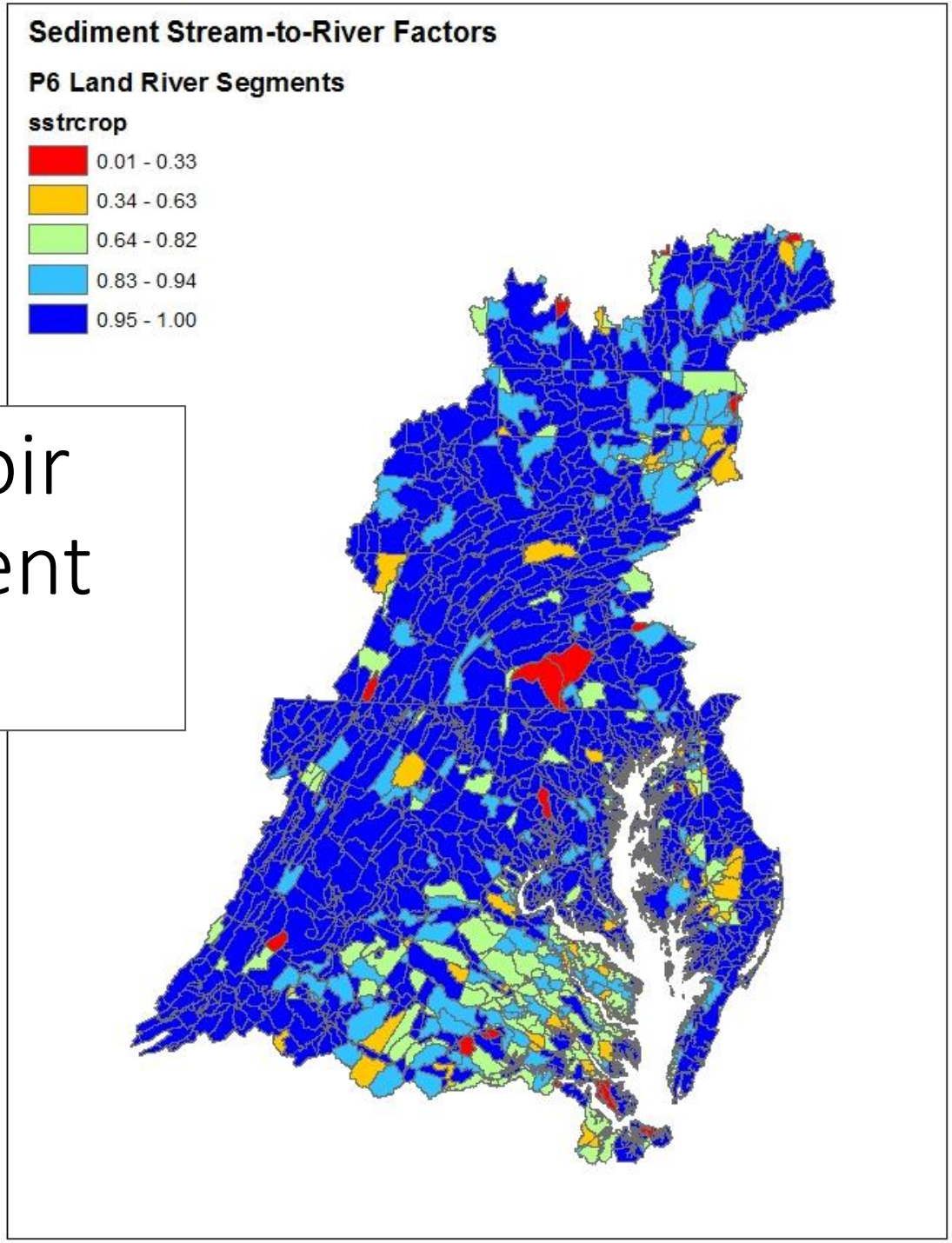
Sediment Sparrow

- Rivers are not a significant sediment sink except
  - Coastal Plain rivers larger than 120 cfs
  - Reservoirs

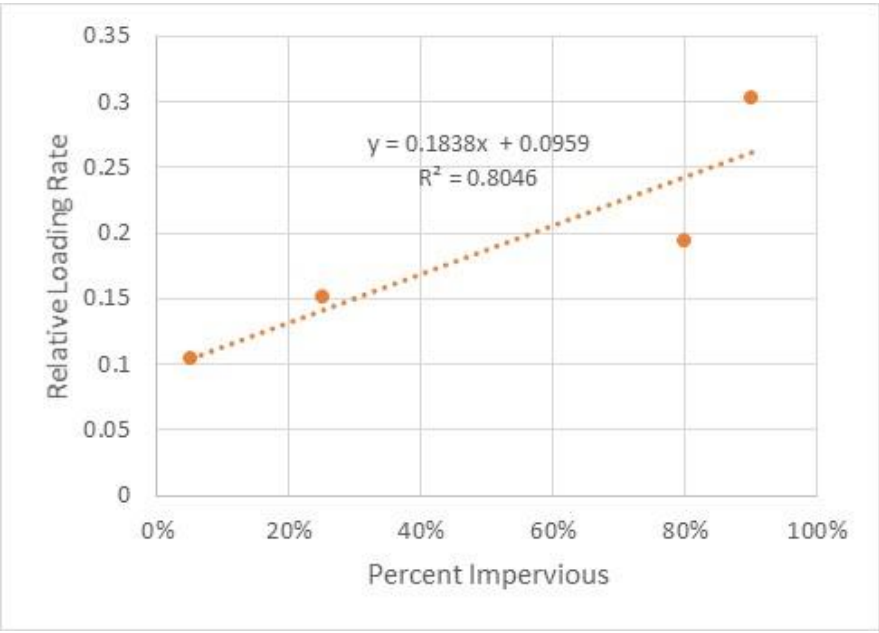


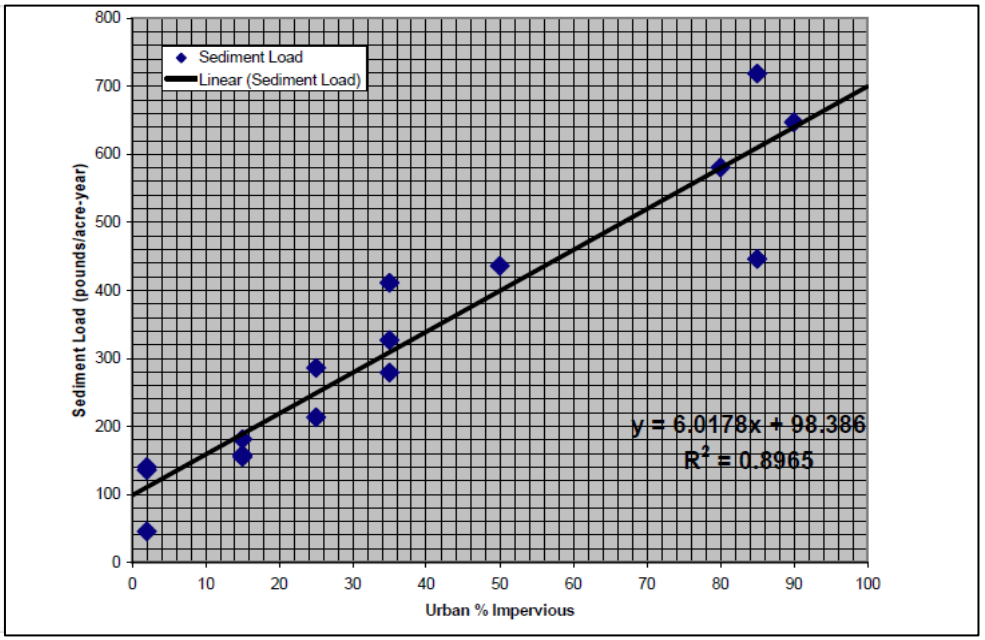
Brakebill, Ator, and Schwarz, 2010

Sparrow Reservoir Effect on Sediment from crop



Impervious-related stream Load



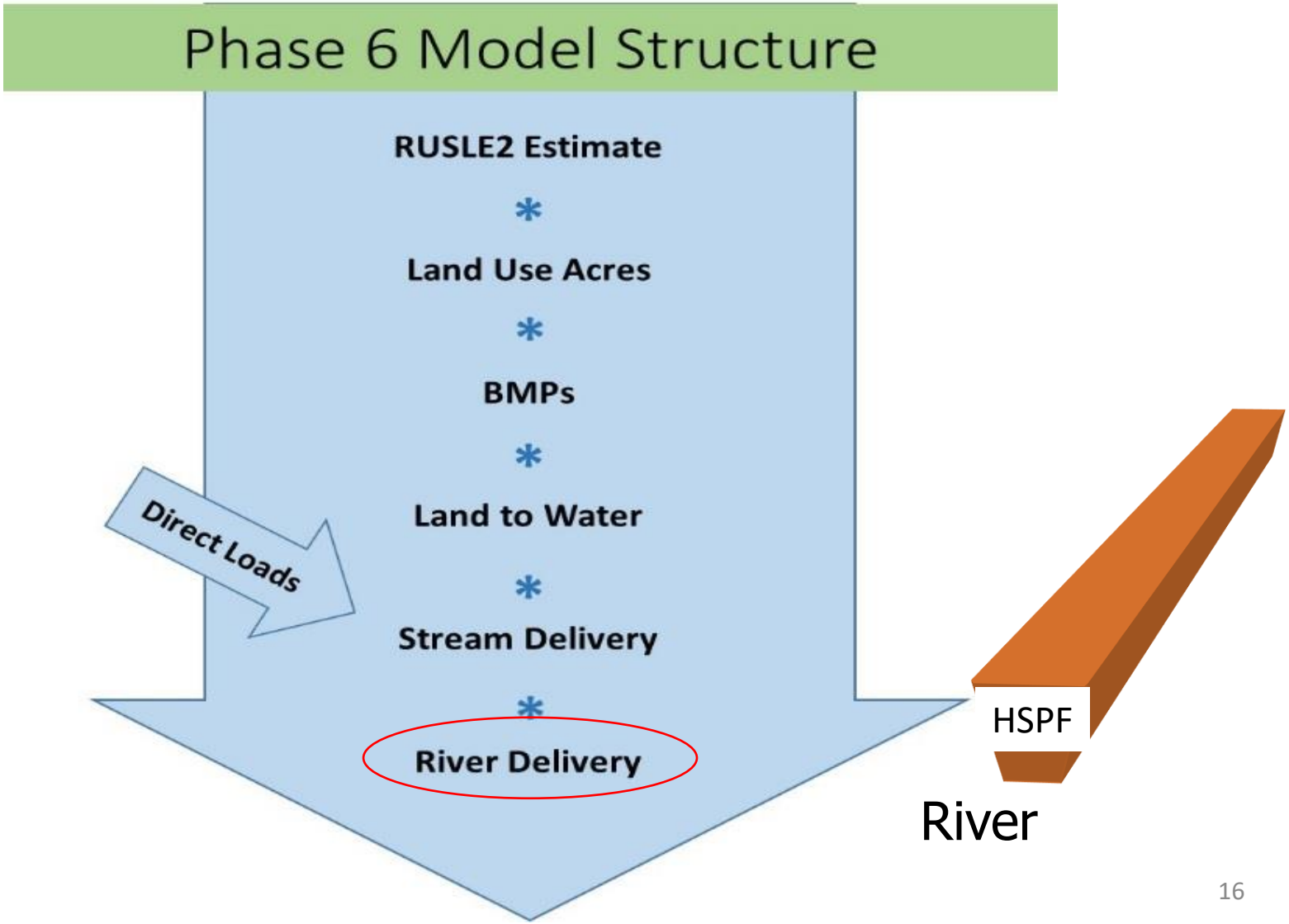


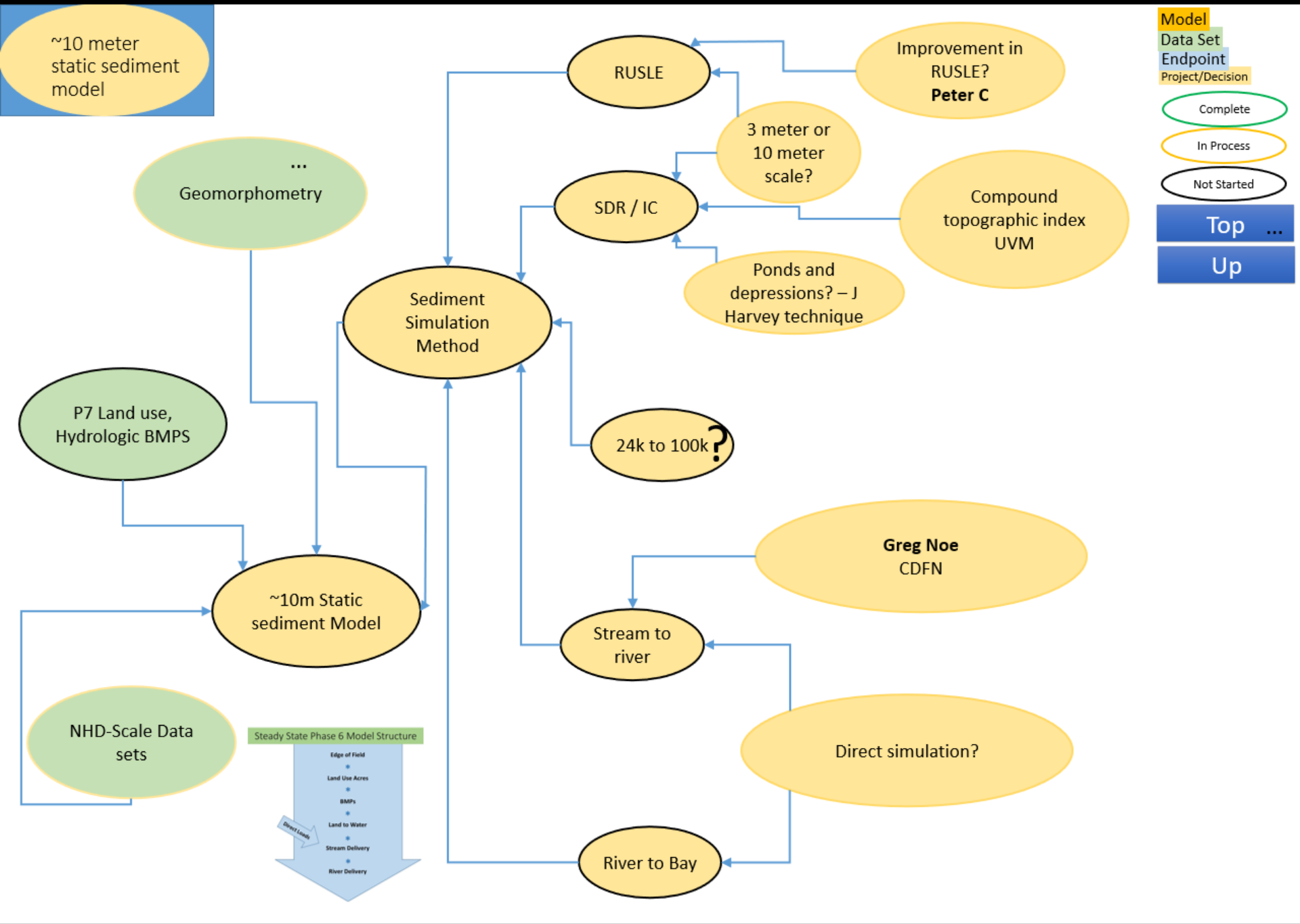
- Impervious is 3x the pervious sediment load according to ***outfall*** **data** in the NSQD
- Impervious is 7x the pervious sediment load according to ***instream*** **data** in the NSQD
- Additional stream sediment from impervious is 4/3 of the impervious loading rate

Stream simulation

- Add average CFN as a source
- Set SDR such that CFN load has no net effect
- Add impervious load as a source
- Apply sparrow reservoir and coastal plain SDR

Sediment Delivery Ratio




~10 meter static sediment model
RUSLE
Improvement in RUSLE? **Peter C**
3 meter or 10 meter scale?
...
Geomorphometry
SDR / IC
Compound topographic index UVM
Ponds and depressions? – J Harvey technique
Sediment Simulation Method
P7 Land use, Hydrologic BMPS
24k to 100k?
Greg Noe CDFN
~10m Static sediment Model
Stream to river
NHD-Scale Data sets
Steady State Phase 6 Model Structure
Edge of Field
Land Use Acres
BMPs
Land to Water
Direct Loads
Stream Delivery
River Delivery
Direct simulation?
River to Bay
Model
Data Set
Endpoint
Project/Decision
Complete
In Process
Not Started
Top ...
Up