Phase 6 Scenario Inputs
Progress, No-Action, WIPs and E3

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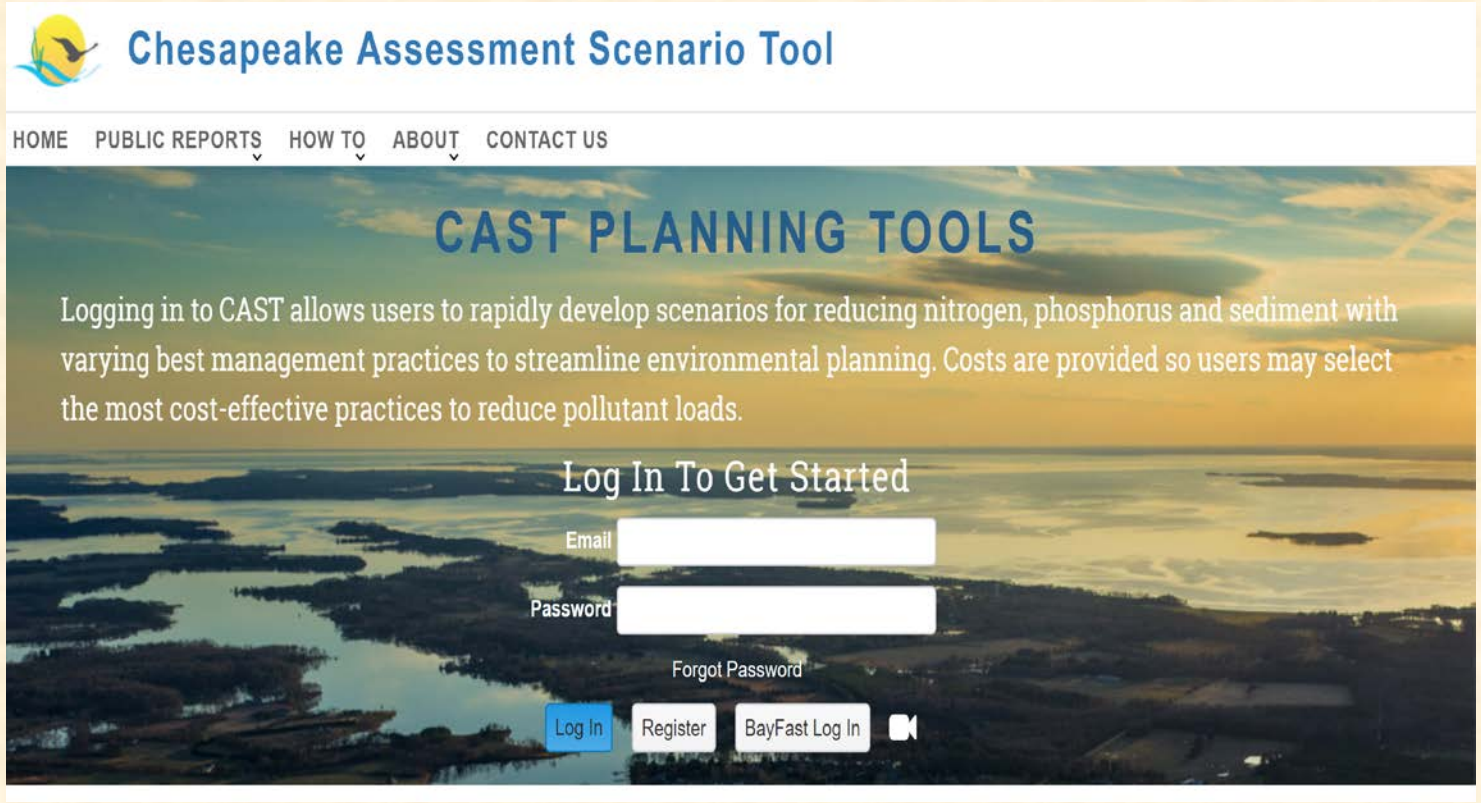
Modeling Workgroup Meeting
October 17, 2017

Phase 6 Scenario Inputs

CAST = Watershed Model

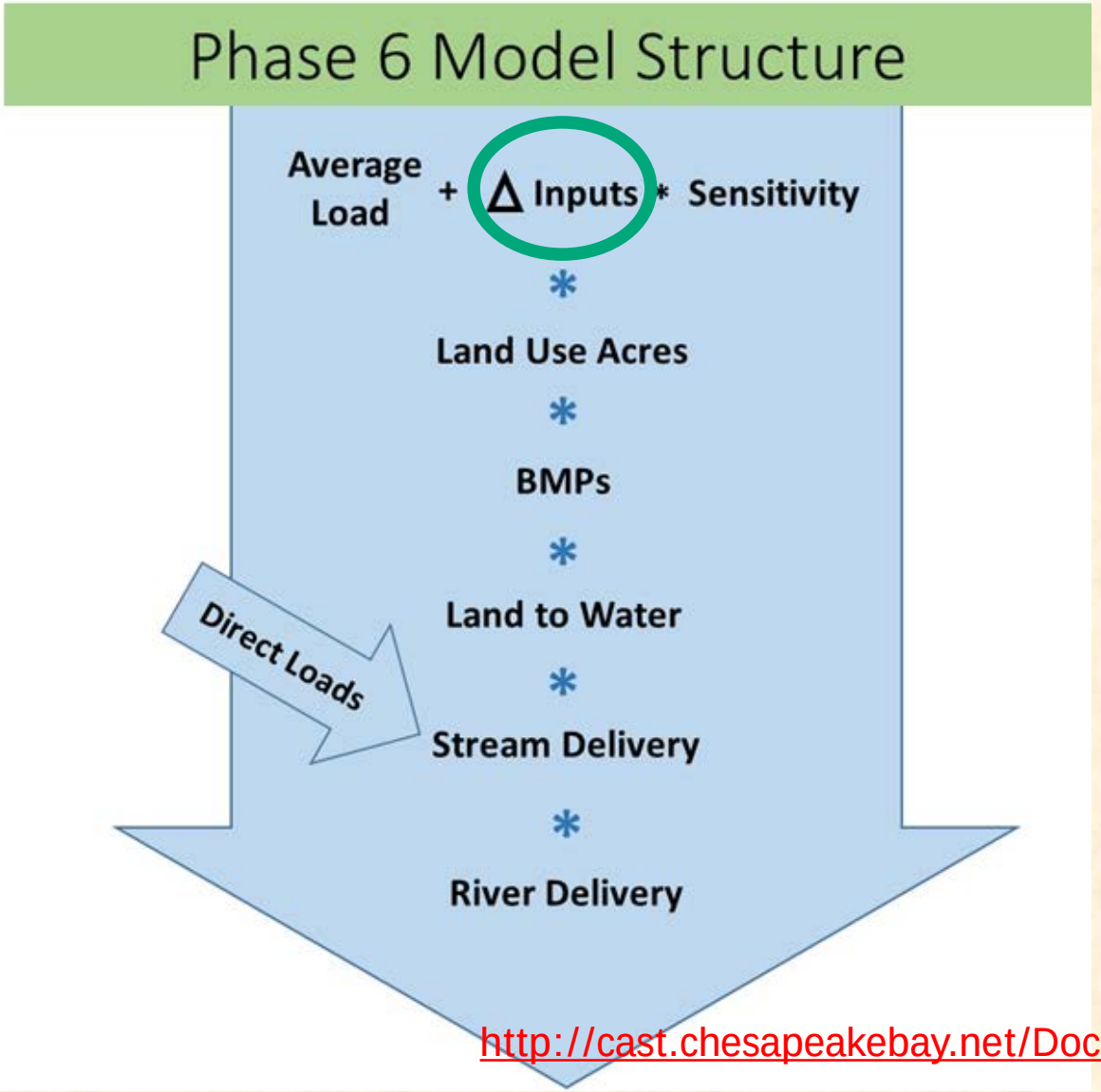


- The complex becomes simple with CAST.
- Users select a geographic area, add and remove implementation, and get estimated costs; N, P and SED reductions in minutes.

http://cast.chesapeakebay.net/

Phase 6 Scenario Inputs

CAST = Watershed Model



- Hundreds of decisions and parameters make a complex model for nutrient runoff from land.

http://cast.chesapeakebay.net/Documentation/ModelDocumentation

Phase 6 Scenario Inputs

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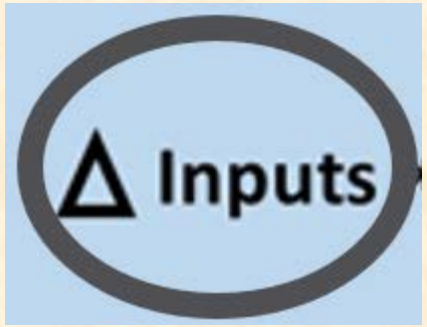
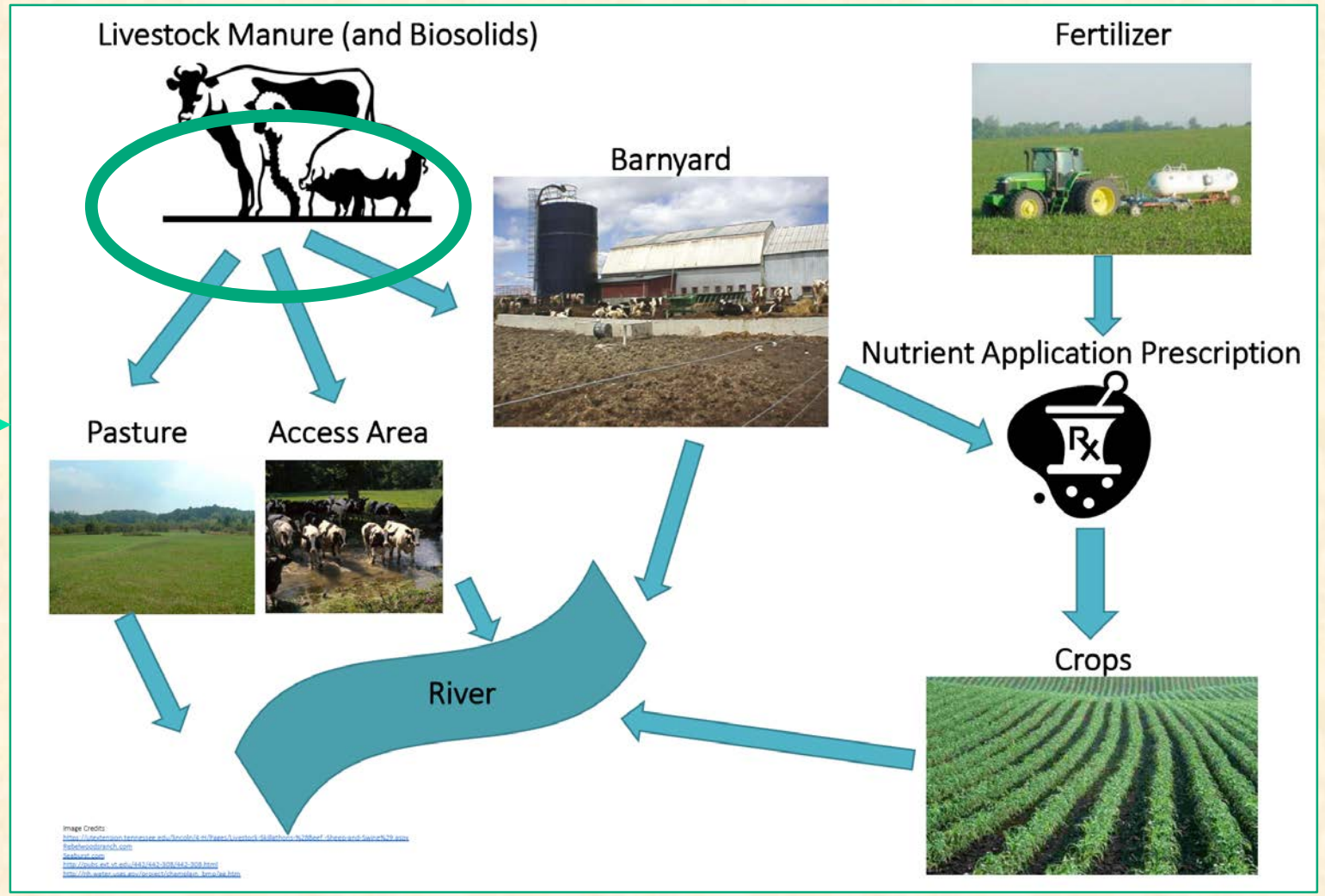




http://cast.chesapeakebay.net/Documentation/ModelDocumentation

Phase 6 Scenario Inputs

CAST = Watershed Model

- Data inputs for the calibration of the Phase 6 model are at http://cast.chesapeakebay.net/Documentation/CalibrationInputs
  - Graphical interface – graphs and maps + source data
    - Animals
    - Atmospheric deposition
    - Soils and plant uptake
    - Nutrient applications
    - Land use
    - Septic

Initial Set of Phase 6 Model Scenarios

Big Changes from Phase 5 to Phase 6

- Inputs matter!
- High resolution land use
- Nitrogen simulation simplified using multiple model approach
- Phosphorus simulation tied to soil P
- Sediment simulation enhanced using NRCS RUSLE2 model
- Calibration improved!

Phase 5

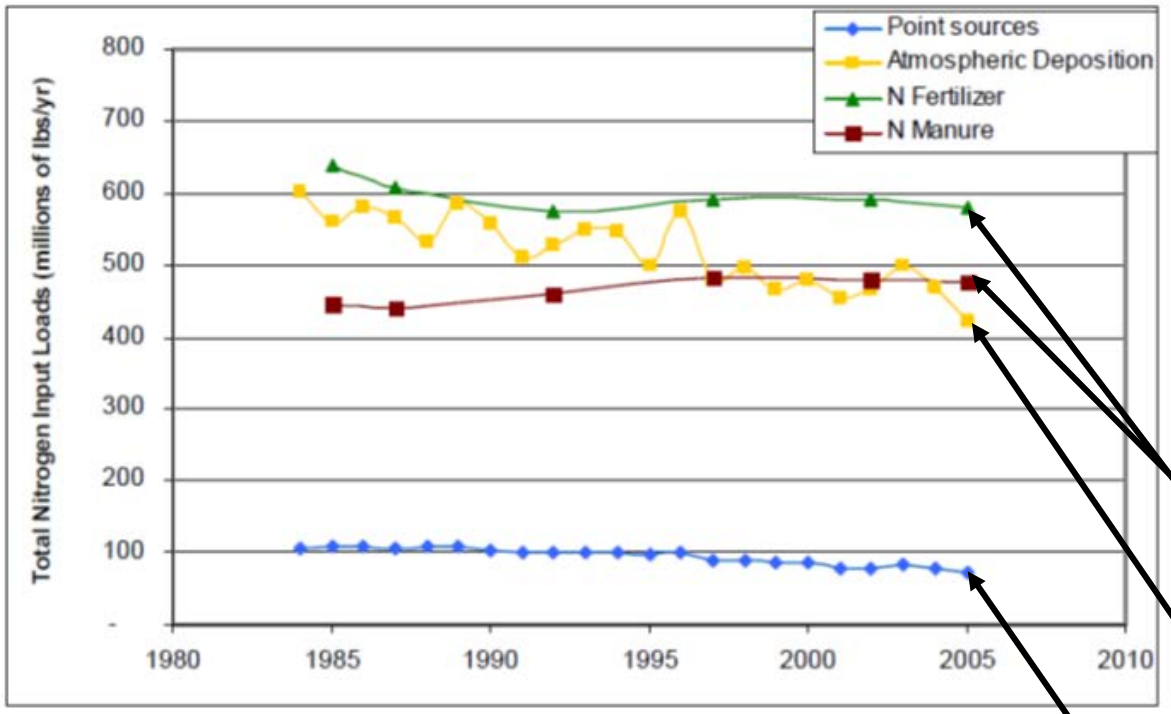
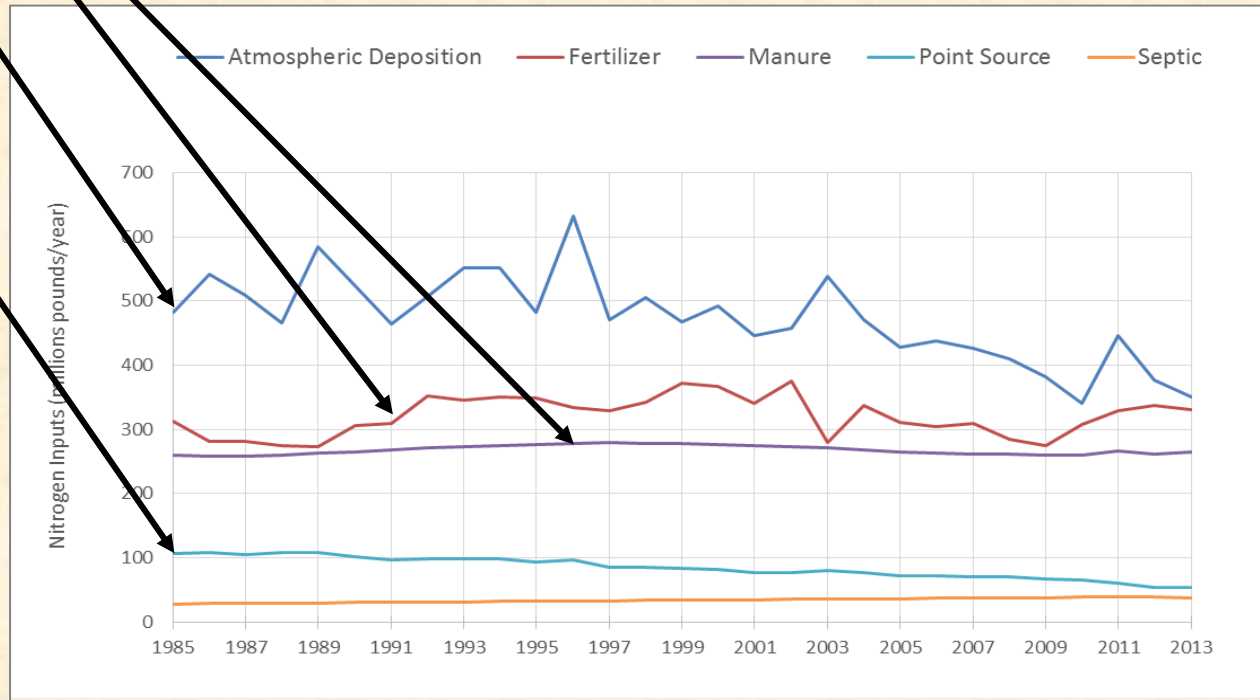


Figure 5-1. Time series of atmospheric, fertilizer, manure, and point source total nitrogen input loads to the Chesapeake Bay Watershed Model (Phase 5.3 calibration).

Phase 6



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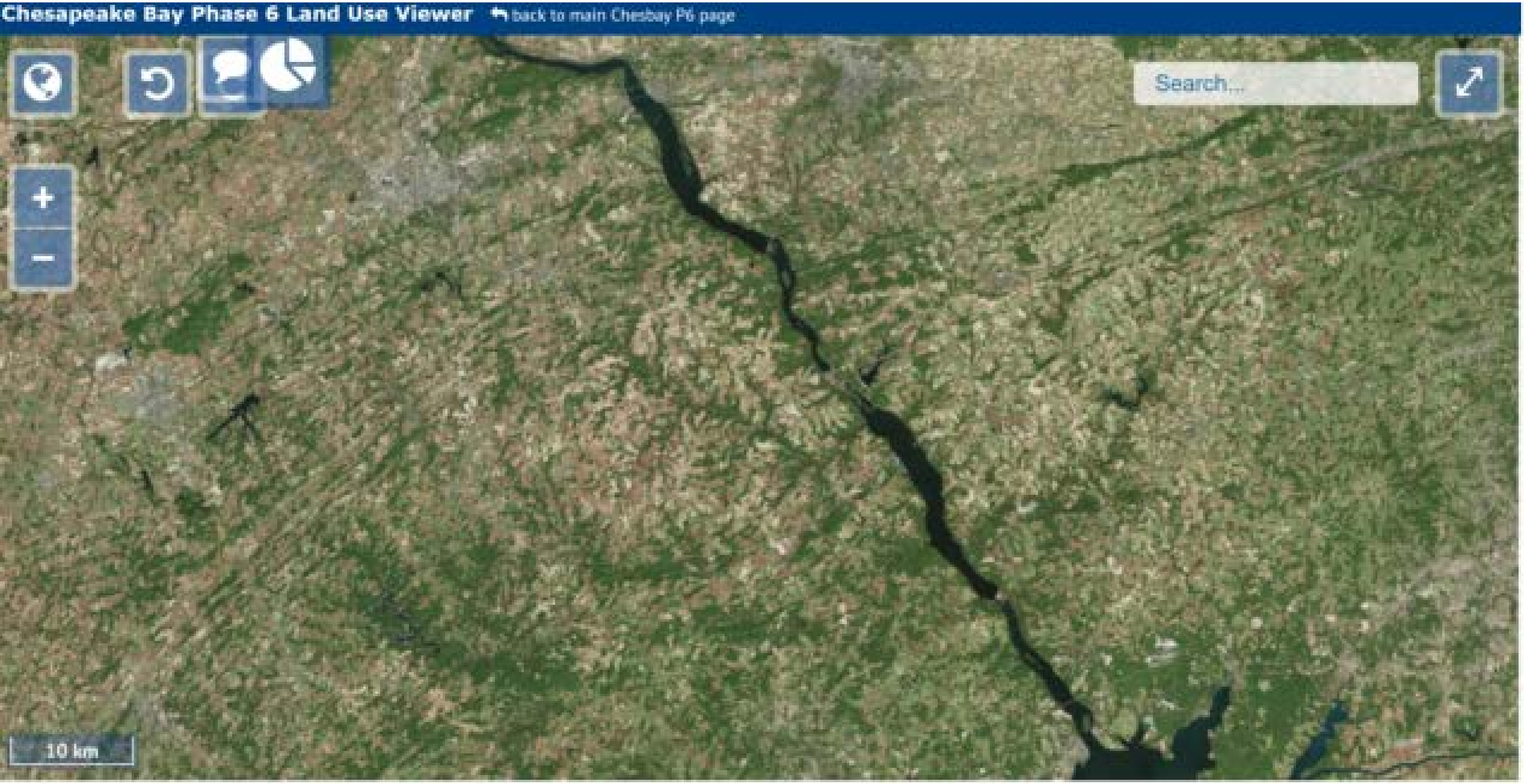
Chesapeake Bay Phase 6 Land Use Viewer
back to main Chesbay P6 page
Search...
10 km
Overlay Opacity: 0%


Chesapeake Bay Phase 6 Land Use Viewer
back to main Chesbay P6 page
Search...
20 km
Overlay Opacity: 100%

Initial Set of Phase 6 Model Scenarios

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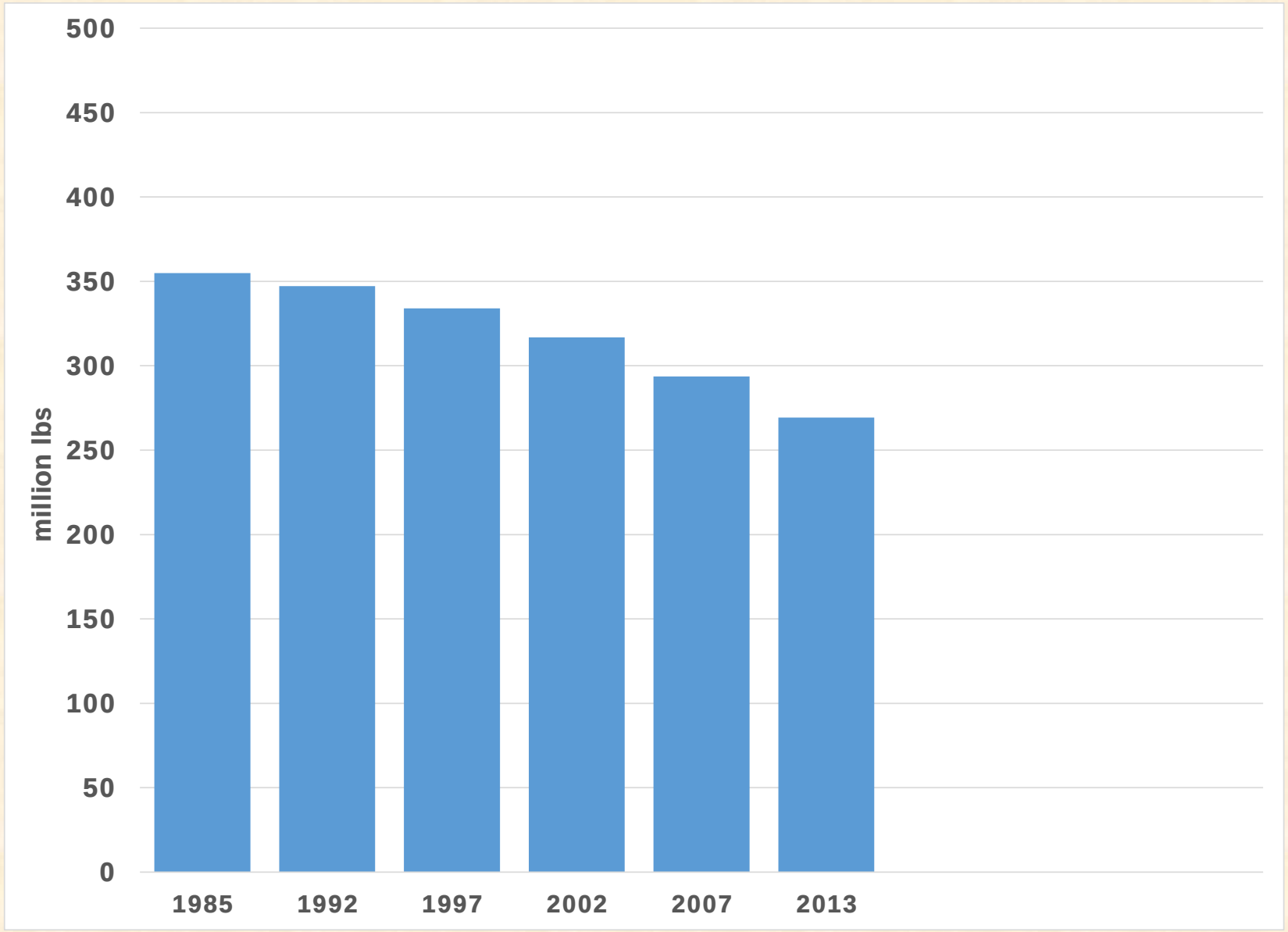
Initial Set of Phase 6 Model Scenarios

- 1985 – 2013 Progress, inclusive
  - Currently working on 2014 Progress – 2016 Progress
- Phase II WIPs
- No-Action
- E3 (Everything, Everywhere, by Everyone)
  - No-Action and E3 are one component of the Planning Target calculations
  - Equity rule = Major river basins that contribute the most to the Bay water quality problems must do the most to resolve those problems (on a pound-per-pound basis)

Initial Set of Phase 6 Model Scenarios

Nitrogen Loads, CB Watershed-wide



Initial Set of Phase 6 Model Scenarios

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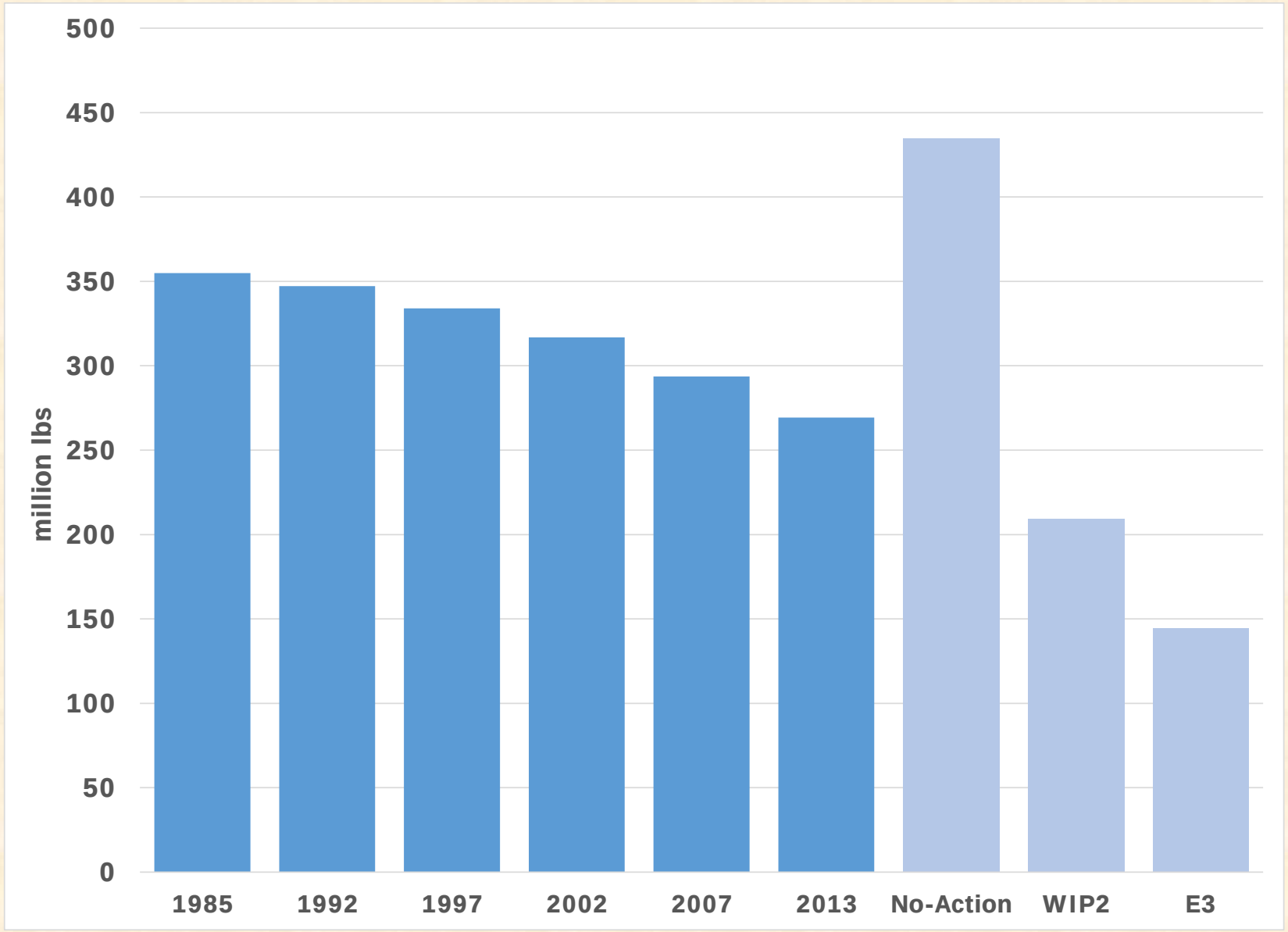

Phase 6 E3 Model Scenario

Chesapeake Bay TMDL

- The E3 scenario (Everything, Everywhere, by Everyone) is an estimate of the application of management actions . . . with theoretical maximum practicable levels of managed controls on all pollutant load sources.

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- There are no cost and few physical limitations to implementing BMPs in the E3 scenario.

Phase 6 E3 Model Scenario

Chesapeake Bay TMDL

- The E3 scenario (Everything, Everywhere, by Everyone) is an estimate of the application of management actions . . . with theoretical maximum practicable levels of managed controls on all pollutant load sources.
- There are no cost and few physical limitations to implementing BMPs in the E3 scenario.
- Generally, E3 implementation levels and their associated reductions in nutrients and sediment could not be achieved for many practices, programs and control technologies when considering physical limitations and participation levels.

Phase 6 E3 Scenario

Agriculture & Forestry BMPs

Agriculture & Forestry	
Phase 6 BMP	**E3 Implementation Level**
Nutrient Management Core N, Nutrient Management Core P	100% of all available agricultural landuses
NM Supplemental: N and P Placement, N and P Rate, N and P Timing	100% of all available agricultural landuses
Tillage Management-High Residue/Minimal Soil Disturbance	100% of row crops (excluding corn silage and soybeans), and low input specialty crops
Tillage Management-Conservation Tillage	100% of select row crops including corn silage and soybeans, and high input specialty crops; excludes mushrooms, greenhouse and container nursery
Tillage Management-Low Residue Tilage	100% of select high input specialty crops including potatoes, peanuts, tobacco; excludes mushrooms, greenhouse and container nursery
Cover Crop	81% of row crops; not associated with small-grain production and high input specialty (excludes mushroom, greenhouse and container nursery; early, drilled, rye
Commodity Cover Crop	19% of row crops; associated with small-grain production; early, drilled, wheat
Cover Crop Composite	100% of row crops and high input specialty crops; excludes mushroom, greenhouse, and container nursery
Off Stream Watering Without Fencing	100% of all available livestock pasture
Prescribed Grazing	100%; includes PIRG acres
Forest Buffer-Streamside with Exclusion Fencing	Pasture land within 30m of all streams and rivers that's unbuffered - from high-resolution land cover (originally 5% of pasture for Phase6, 10% for Phase5)
Pasture Management Composite	100%
Forest Buffers	Crop land within 30m of all streams and rivers that's unbuffered - from high-resolution land cover (originally 6% of cropland for Phase6, 15% for Phase5)
Wetland Restoration	1% of available crops and pasture
Land Retirement to Ag Open Space and to Pasture	7% of available crops and pasture
Tree Planting	1% of available crops and pasture
	Total land use change not to exceed 15%

Phase 6 E3 Scenario

Agriculture & Forestry BMPs

Phase 6 BMP	E3 Implementation Level
Alternative Crops	1% of row crop
Soil Conservation and Water Quality Plans	100% over all available agricultural land uses
Manure Injection	Will be added based on applicable land use and manure type availability (0% Row with Manure)
Manure Incorporation; Low Disturbance	Will be added based on applicable land use and manure type availability (100% Row with Manure)
Manure Transport	Will be added based on excess of crop goal; Includes benefits of Manure Treatment Technologies
Crop Irrigation Management	Will be added if approved
Livestock Waste Management Systems	100% of all livestock production areas
Poultry Waste Management Systems	100% of all poultry production areas
Animal Waste Management Systems	100%
Livestock Mortality Composting	100% of all livestock mortality
Poultry Mortality Composting	100% of all poultry mortality
Mortality Composting	100%
Barnyard Runoff Control	100% of all large animal livestock facilities
Loafing Lot Management	100% of all large animal livestock facilities
Animal Feed Operations	100%
Dairy Precision Feeding and/or Forage Management N	100% of Dairy @ TN = 24% reduction
Dairy Precision Feeding and/or Forage Management P	100% of Dairy @ TP = 28% reduction
Biofilters and Lagoon Covers	100% of Dairy and Swine, excludes manure storage for dry manure/stackable manure
Non-Urban Stream Restoration	15% of agriculture stream miles are restored @ twice the default Stream Restoration value.
	Stream miles from Chesapeake Conservancy synthetic data layer at lower order than National Hydrography Dataset (NHD).
Shoreline Erosion Control	Any practice along agriculturally-dominated tidal shorelines that prevents and/or reduces tidal sediments to the Bay.
	Shoreline practices can include living shorelines, revetments and/or breakwater systems and bulkheads and seawalls.
	Using new buffer data set of buffered:unbuffered shoreline to define domain.

Phase 6 E3 Scenario

Urban, Forestry & Septic

Urban, Forestry & Septic	
Phase 6 BMP	**E3 Implementation Level**
Stormwater Management - New Development	100% of new development has Runoff Reduction BMPs sized for 2.0 inch Impervious area
Stormwater Management - Retrofits	Runoff Reduction Retrofits sized to treat 1.5 inch Impervious area for 75% of each urban land use type (accommodates physical limitations)
Stormwater Management Composite	100% of area that can be managed
Erosion & Sediment Control	100% of construction sites are treated to ESC Level 3 and have high-risk Urban Nutrient Management plans
Urban Nutrient Management	100% eligible Pervious Cover has Urban Nutrient Management Plan implementation which is split 20% High Risk and 80% Low Risk
Forest Buffers	All turfgrass (no canopy) within 30m of all streams and rivers that's unbuffered - from high-resolution land cover
Urban Tree Canopy	10% gain (2,400 additional acres) of canopy from now (2013) by 2025
Street Cleaning	100% of Transport Impervious Cover swept using SCP-1
Advanced Grey Infrastructure Nutrient Discovery Program & Storm Drain Clean Outs	5% of Urban N and P load removed due to both credits
Urban Stream Restoration	15% of urban stream miles are restored @ twice the default Stream Restoration value. Stream miles from Chesapeake Conservancy synthetic data layer at lower order than National Hydrography Dataset (NHD).
Shoreline Erosion Control	Any practice along urban-dominated tidal shorelines that prevents and/or reduces tidal sediments to the Bay. Shoreline practices can include living shorelines, revetments and/or breakwater systems and bulkheads and seawalls. Using new buffer data set of buffered:unbuffered shoreline to define domain.
Septic Connections	10% of septic systems connected to wastewater treatment facilities
Septic Denitrification Enhanced	100% of systems remaining after connections
Resource BMPs	***Bold italics indicates changes since Oct, 2016 version***
Forest Harvesting BMP	100% of Harvested Forest area
Forest Conservation	No net loss of true forest
DiploidOysters3	MD = 112 M oysters; VA = 280 M oysters

Phase 6 E3 Model Scenario

Tillage Practices Versus Incorporation

- Tillage Management
  1. High-Residue/Minimal Soil Disturbance
     - 100% of row crops (excluding corn silage and soybeans), and low input specialty crops
  2. Conservation-Tillage
     - 100% of select row crops including corn silage and soybeans, and high input specialty crops
  3. Low-Residue Tillage
     - 100% of select high input specialty crops including potatoes, peanuts, tobacco

Phase 6 E3 Model Scenario

Sector Equity

- For the urban sector, the drainage area of ALL households, businesses, roads, etc. is:
  - retrofitted to meet a 1.5” performance standard, or
  - the sewer system of hardened cities is separated so there are no overflows
- $ = 100’s million, trillions?
- E3 does not consider feasibility = implementation at 100% unless physically/technically impossible

Phase 6 E3 Model Scenario

Chesapeake Bay TMDL

- E3 is used with the No-Action scenario to define “controllable” loads, the difference between No-Action and E3 loads.

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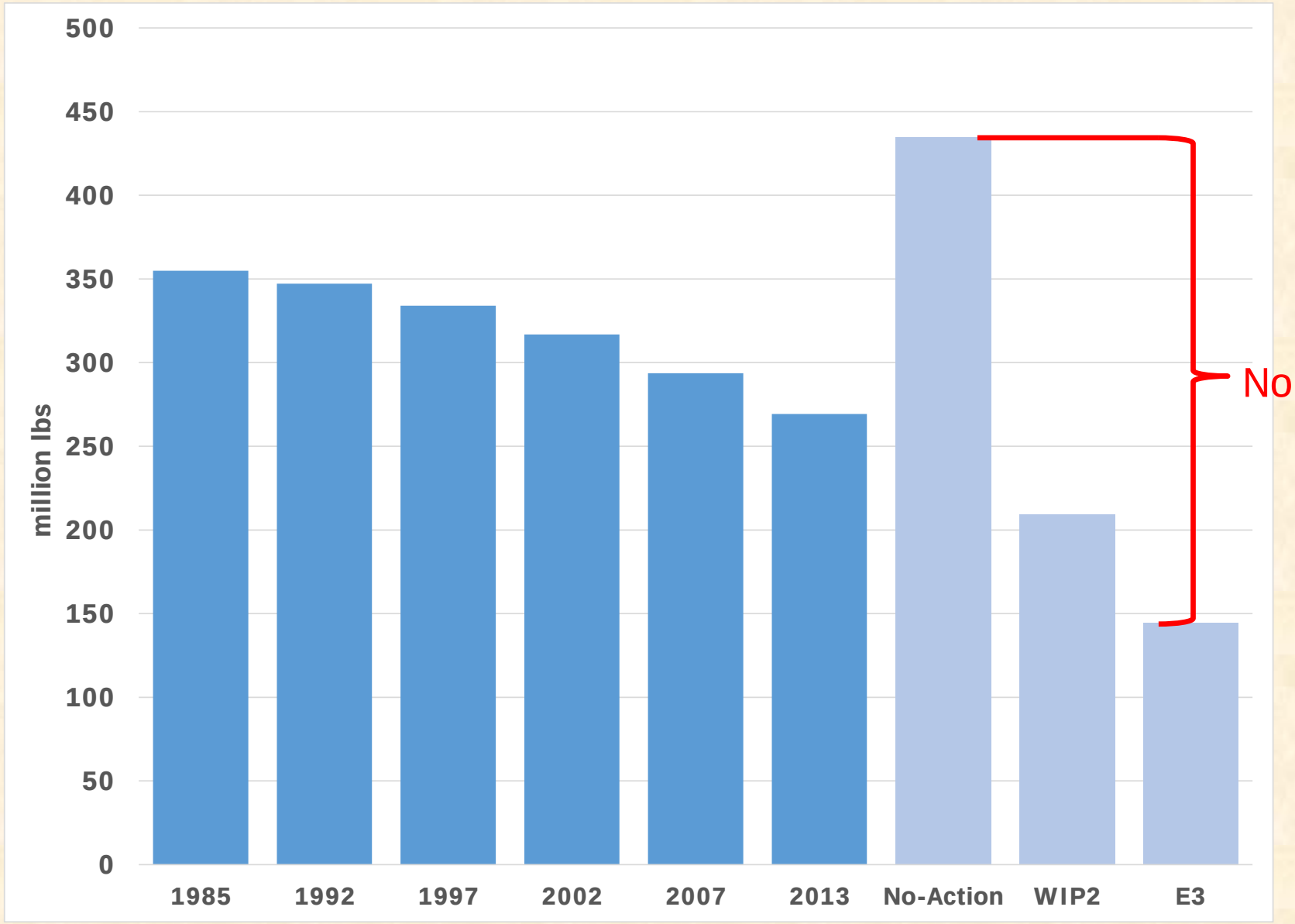
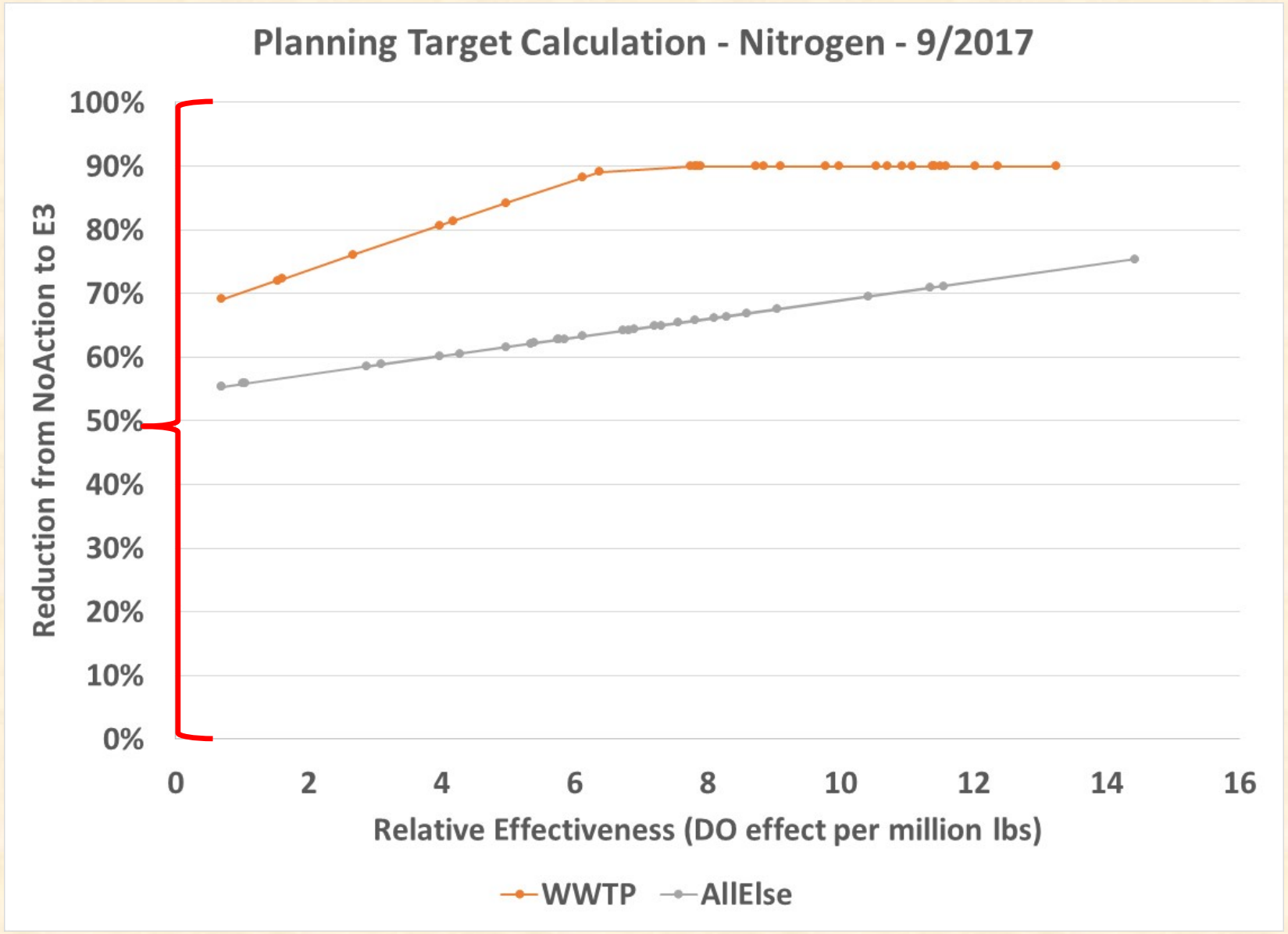
Nitrogen Loads, CB Watershed-wide



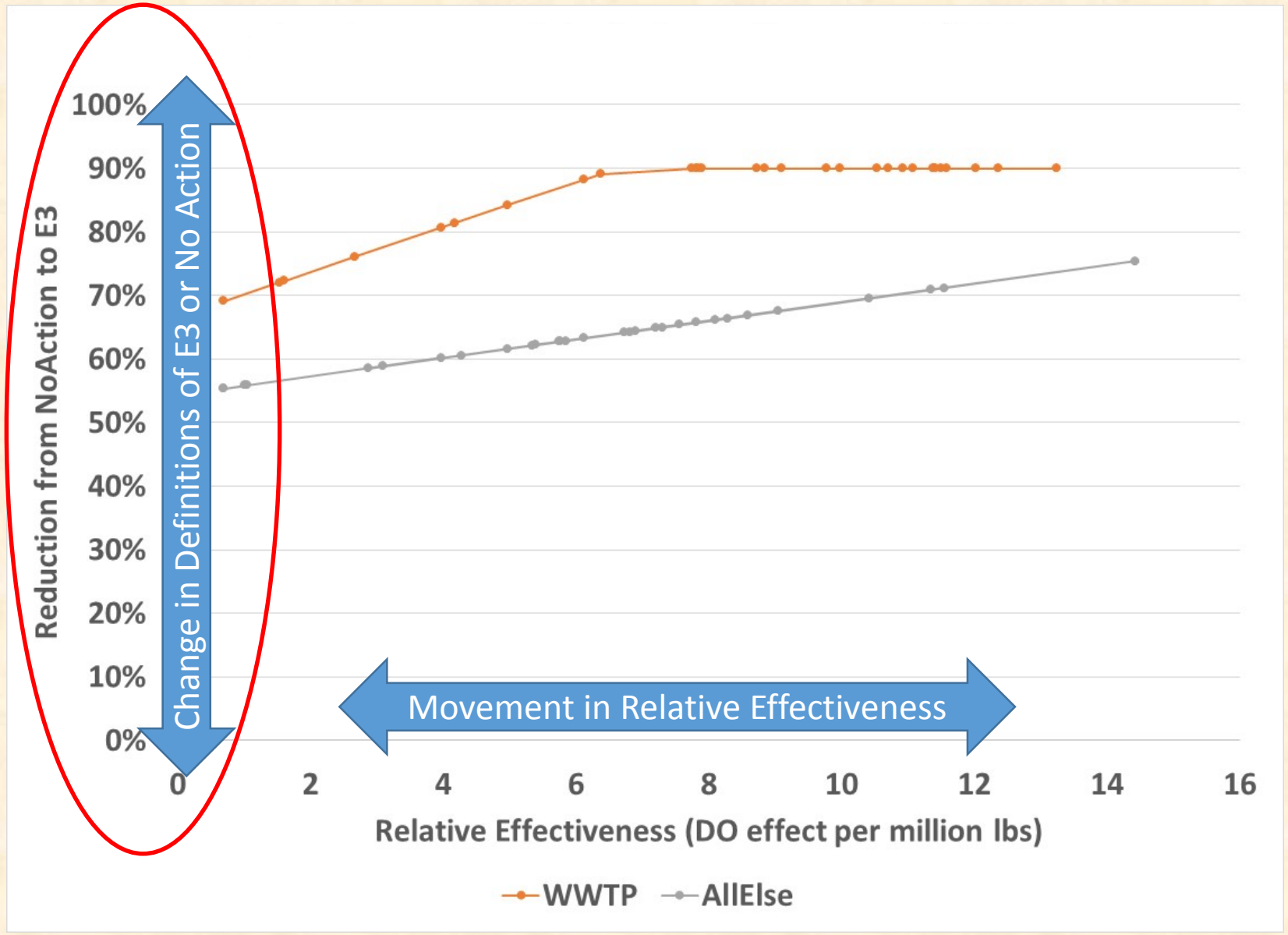
Planning Target Methodology

"Hockey Stick"



Planning Target Methodology

How can Level of Effort Change?



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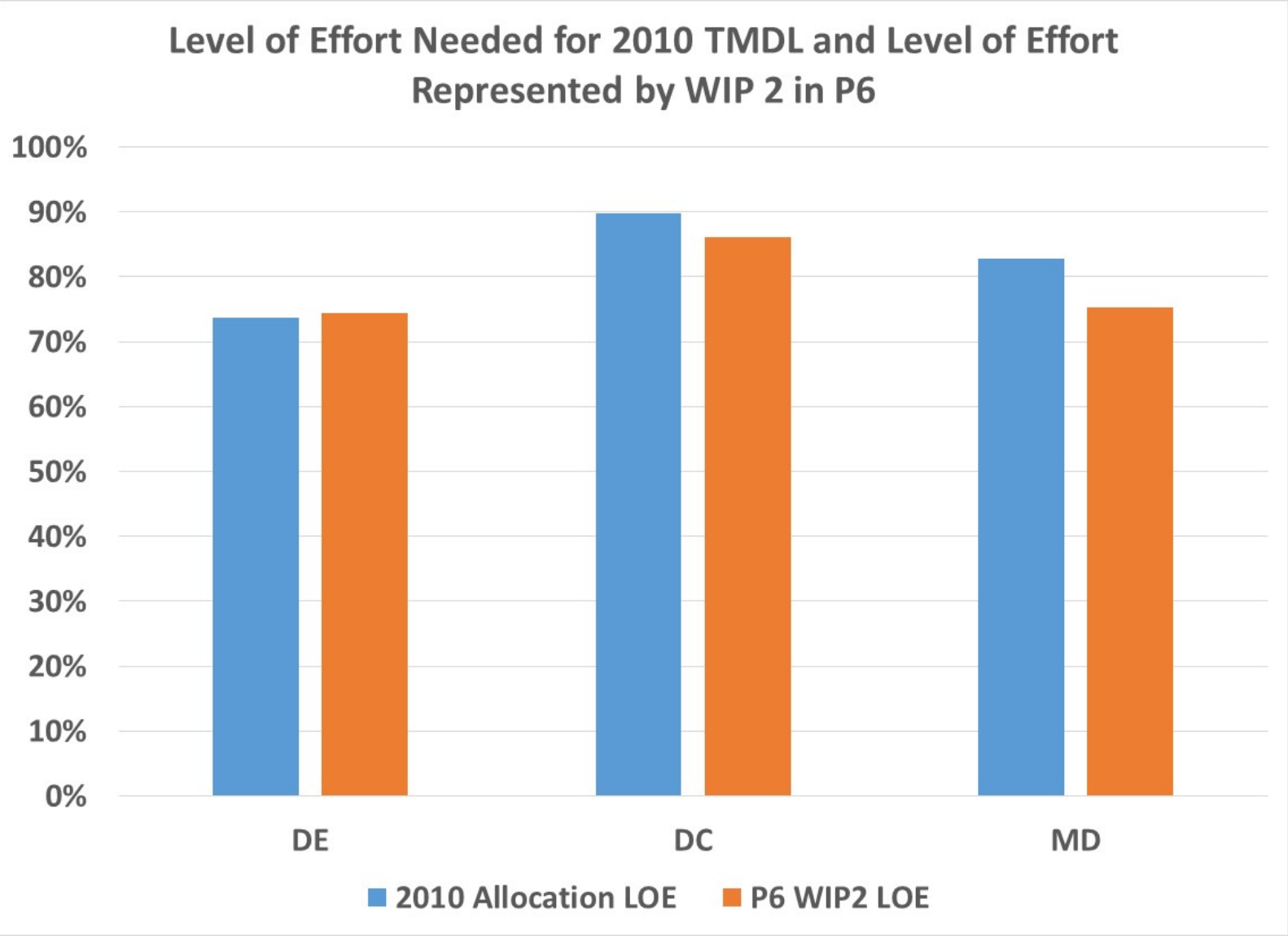

WIP Load can change relative to No Action, E3, and progress scenarios

- BMPs are translated
- BMPs applied to new land uses
- Relative loading rate of land uses change
- Definitions of No Action and E3 changed