DEVELOPMENT OF PHASE 6 LAND USE EXPORT RATE TARGETS

Forestry Workgroup

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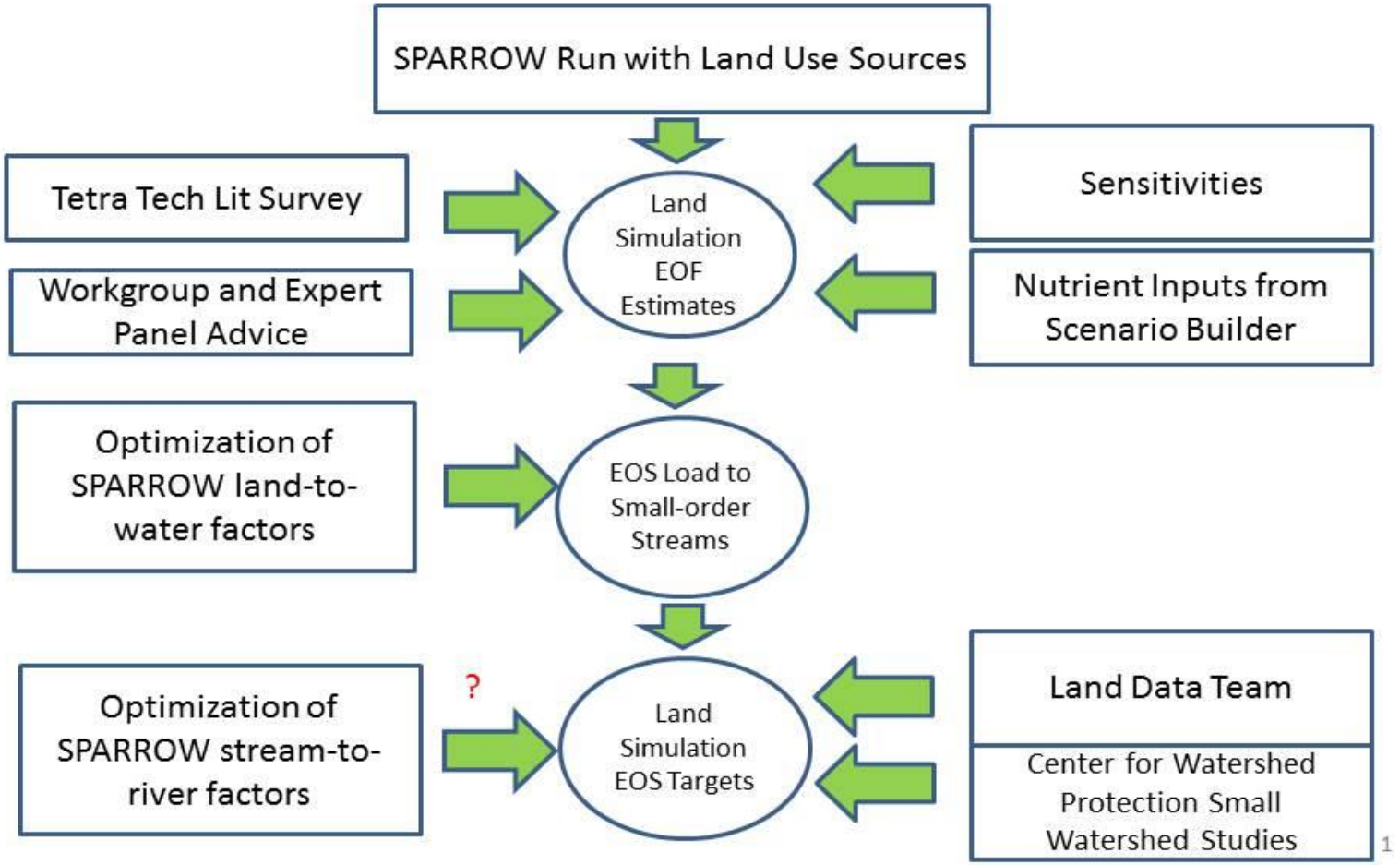
EXPORT RATES AND TARGETS

- Export rates from multiple models and literature are used to inform the targets

- Targets are specified export rates used to calibrate the Phase 6 Watershed Model
  - Do not include BMPs
  - Orders the influence of different land uses
  - Vary geographically based on nutrient and hydrology inputs
  - Subject to modification through calibration: actual rate adjusted while relative differences maintained

LAND SIMULATION DEVELOPMENT

Scale
Field
Hillslope Watershed
Small-order streams



PROPOSED LAND USES—PHASE 6 MODEL

- True Forest
- Harvested
- Disturbed (e.g.: insect, fire)
- Urban Tree Canopy
- Wetlands

Note: Riparian/floodplain effects will be accounted for in all land uses, but is not explicitly a land use.

REASONS TO DIFFERENTIATE LAND USES

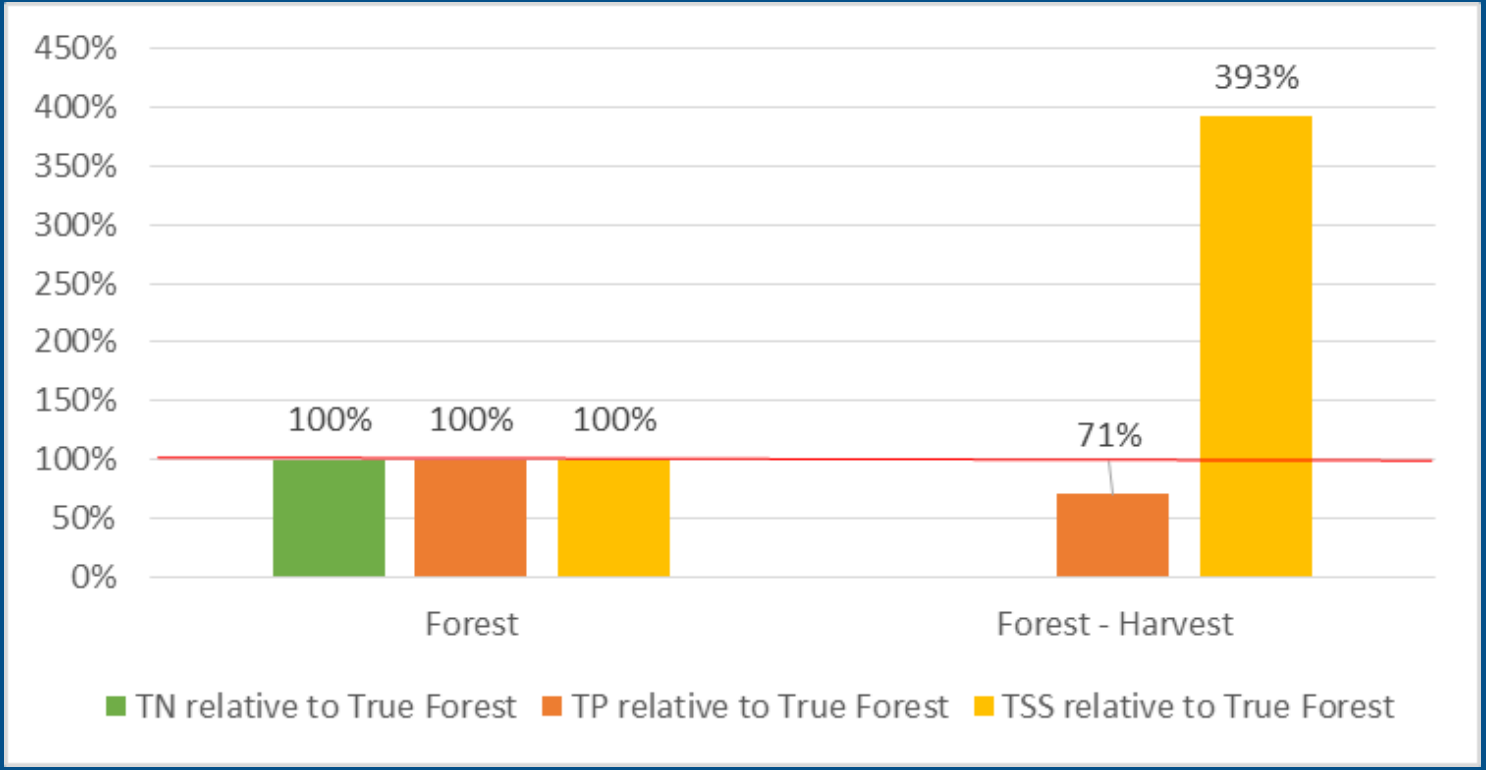
- Literature, models, other data sources offer distinct land use loading rates
- BMPs are exclusive to one type of land use (e.g.: stream corridor buffers or fencing)
- Helps jurisdictions for planning and reporting purposes (e.g.: regulated and nonregulated urban, AFO and CFO)

DATA SOURCES

Land use	Scale	TN-N size	TP-N size	TSS-N size*
True Forest	EOS	19	16	1
Forest-Harvest	EOS	NULL	2	1

* Madej, et al. 2011. Assessing Effects of Changing Land Use Practices on Sediment Loads in Panther Creek, North Coastal California. Redwoods Science Symposium.

RELATIVE EXPORT RATES-EDGE OF SMALL STREAM



Land use	Scale	TN Lb / A	TP Lb / A	TSS Lb / A
Forest	EOSS	2.926	0.229	0.00000050
Forest - Harvest	EOSS	No data	0.162	0.00000197

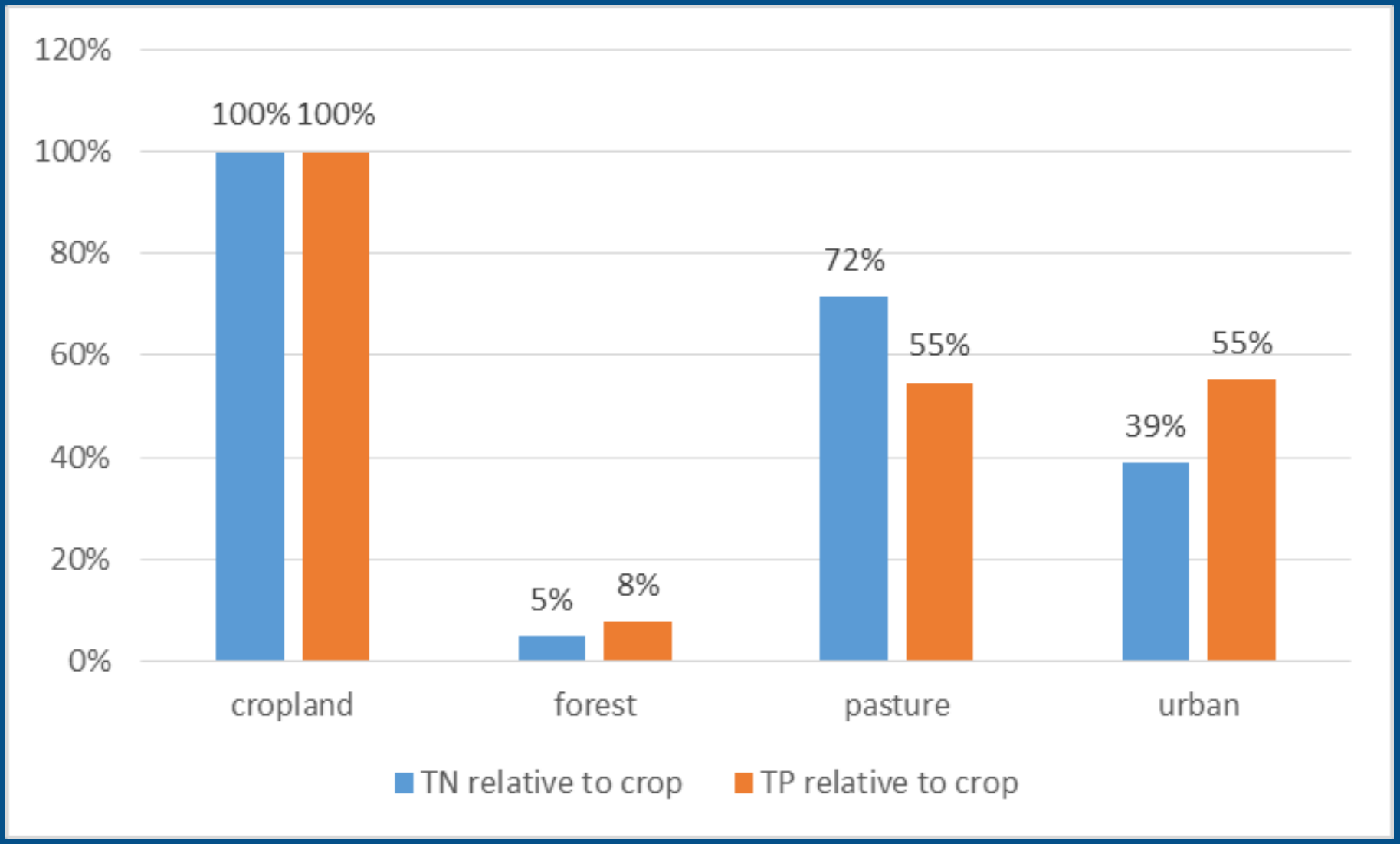
- Order the influence of different land uses
- Rates are subject to modification through calibration: actual rate adjusted while relative differences maintained

DATA NEEDED

- True Forest
- Harvested forest
  - TN
- Disturbed (e.g.: insect, fire)
  - TN, TP, and TSS export rate
  - Acres from 1985 with projections through 2025
  - Consider if episodic, or average amount annually
- Tree canopy over developed
  - TN, TP, TSS
  - i-Tree Hydro is one likely source of data

- Definitions of all forest land uses

DRAFT GLOBAL RATES USING SPARROW

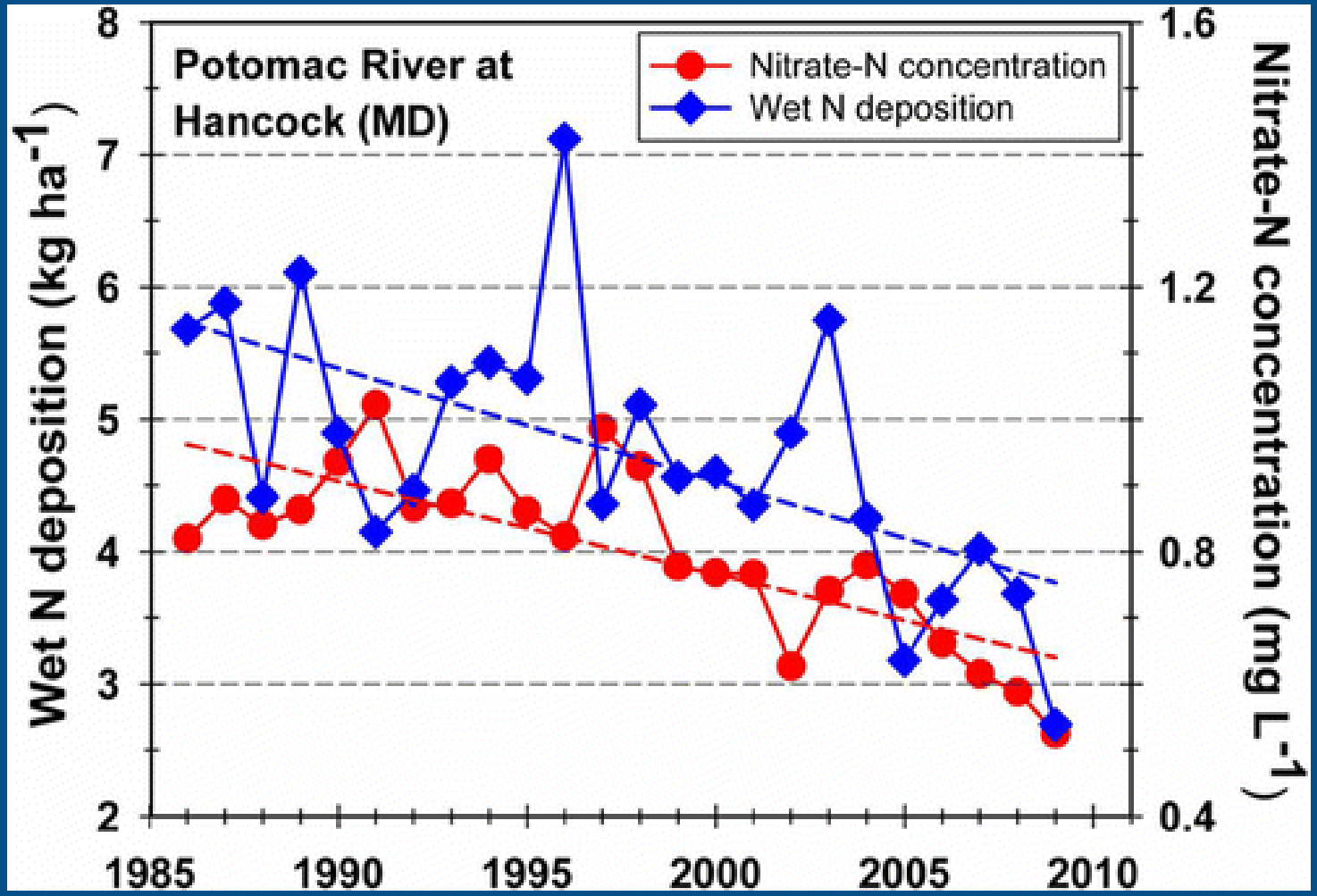


Used to order the influence of different sectors

CONSIDERATIONS

- Used data from published studies, not from local TMDLs
- Used edge of small stream data, not edge of field data
- Did not include studies that were solely evaluating buffer effects
- Only considered those reporting TN and/or TP and/or TSS; nutrient species will be broken out in the model, and additional literature will inform how the species are broken out
- Studies were grouped by within CB, outside CB or mixed (e.g.: OH, PA, MD); within the CB was considered twice as relevant as outside the CB; additional categories may be added
- Scaled across the CB by weighting by the difference from the mean of atmospheric deposition for TN

DATE OF STUDIES USED



Studies considered were post-1995.

Keith N. Eshleman, Robert D. Sabo, and Kathleen M. Kline. Surface Water Quality Is Improving due to Declining Atmospheric N Deposition. Environmental Science & Technology 2013 47 (21), 12193-12200.

http://www.umces.edu/al/project/improvements-surface-water-quality-due-declining-atmospheric-n-deposition

TIMELINE

- December 31, 2014 - Sparrow and literature review results for draft land uses
- January 28, 2015 – Input from Modeling Workgroup on draft targets for draft land uses
- April 30, 2015 - final targets approved by Modeling Workgroup for draft land uses
- Oct 1, 2015 - Once the final land uses are approved, we will finalize targets using a Sparrow update, final sensitivities, and other information

ROLE OF WORKGROUPS

Chesapeake Bay Program committees, goal implementation teams, workgroups or action teams	Meeting Date
Modeling Quarterly Review	9/30/2014, 1/29/2015, 4/22-23/2015
Modeling Team Meeting	9/15/2014, 1/20/2015, ongoing weekly
Land Use Workgroup	9/25/2014; 2/26/2015
Watershed Technical Workgroup	10/2/2014, 3/5/2015
Forestry Workgroup	10/1/2014, 3/4/2015
Wetlands Expert Panel	11/12/2014
Urban Stormwater workgroup	10/21/2014, 12/16/2014, 3/3/2015
Agricultural Workgroup	10/9/2014, 10/22/2014, 2/19/2015, 3/18-19/2015 ?
Agricultural Modeling Subcommittee	9/16/2014,12/16/2014, 2/12/2015, 2/18/2015, 3/13/2015 ?

- Panel, workgroup documents and recommendations, and available literature are critical sources of data in addition to the full literature review
- Modeling workgroup approves the final Phase 6 model

NEXT STEPS

- Work on land uses where there was little/no information in the lit reviews
- Finalize land uses
- Set literature review loads as relational within Sparrow land uses loading rates
- Address scale issues of Edge of Field, Edge of Small Stream and Edge of Stream in literature review data.
- Determine differences in loads by depth (surface, interflow, groundwater)
- Determine differences in loads by nutrient species
- QA/QC checks including verifying data outliers

KEEPING UP TO DATE – WEBPAGES

- Land Use Loading Rates
  https://www.chesapeakebay.net/about/wmp_for_mpa_effort/land_use_loading_rates

- Additional information on Mid-Point Assessment
  http://www.chesapeakebay.net/groups/group/water_quality_goal_implementation_team/wmp_for_the_mpa