DEVELOPMENT OF PHASE 6 LAND USE EXPORT RATE TARGETS

Land Use Workgroup

February 26, 2015

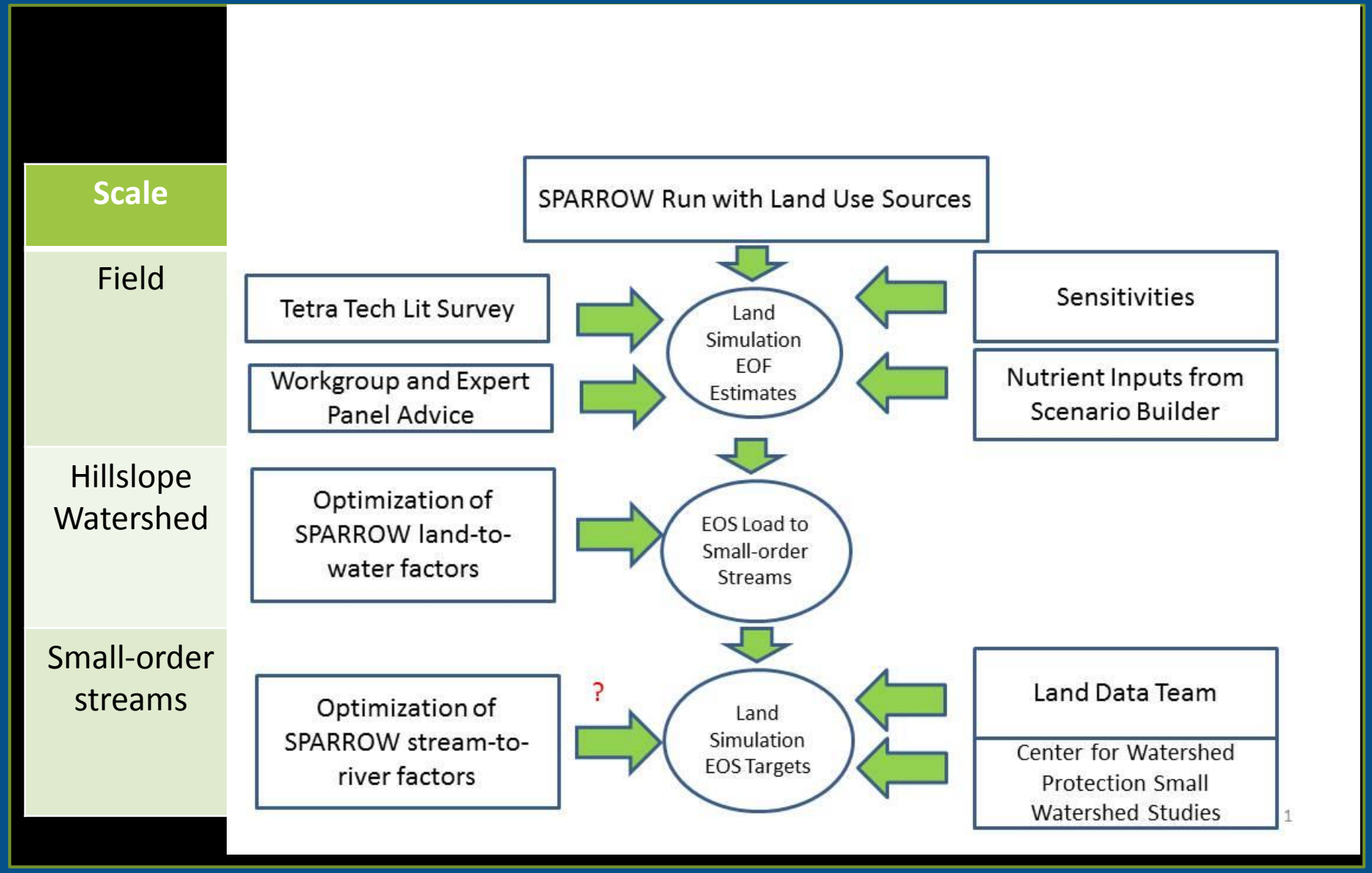
Olivia Devereux

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



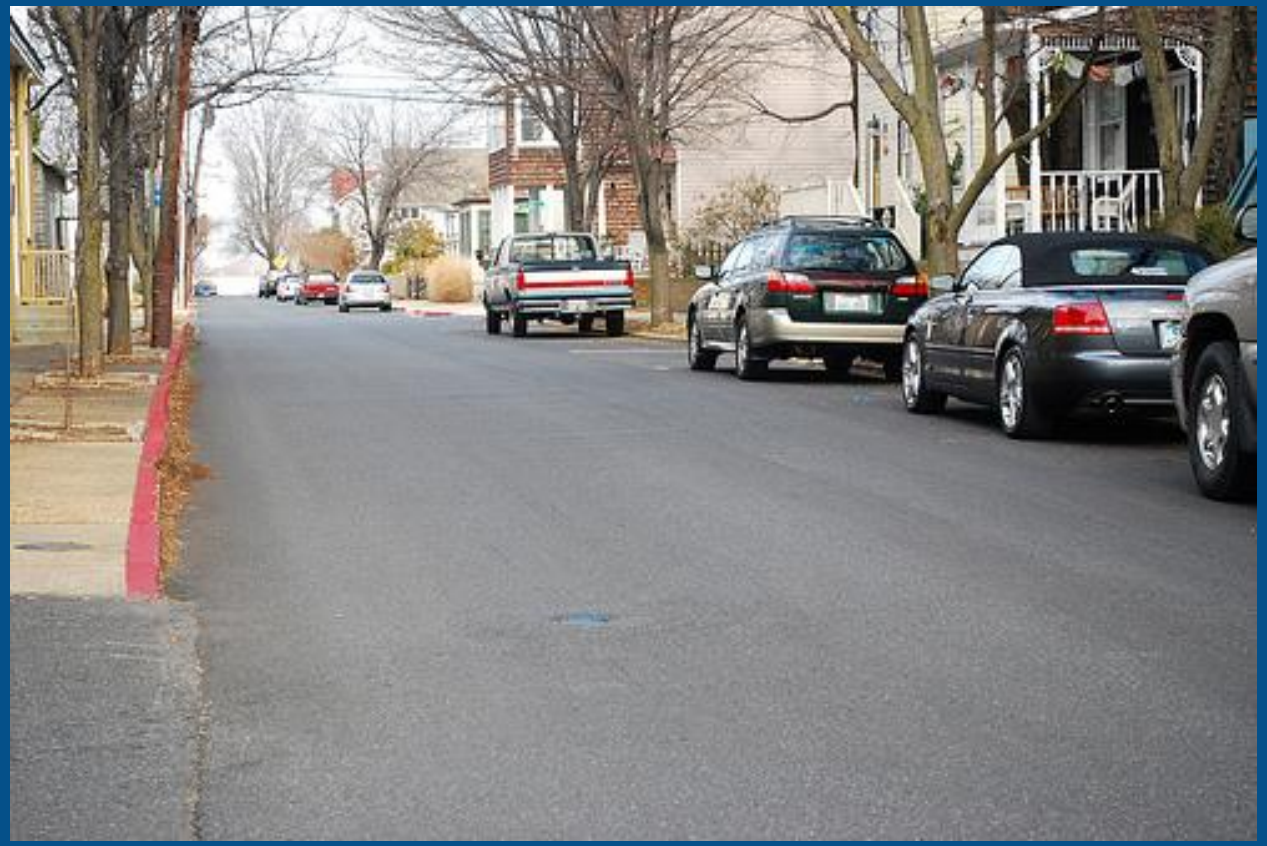
REASONS TO DIFFERENTIATE LAND USES

- 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).

PHASE 6 DRAFT LAND USES—DEVELOPED

All are also divided by federal, MS4-regulated, and Combined Stormwater Sewer (CSS)

- Impervious
  - Roads
  - Buildings, parking lots, etc.
- Tree canopy
- Pervious
  - Turf
  - Open space
- Construction
- Extractive



PHASE 6 DRAFT LAND USES—NATURAL

- Forests
  - True Forest
  - Harvested
  - *Disturbed (e.g.: insect, fire)*
- Water
- Wetlands
  - *Tidal emergent ?*
  - *Fresh emergent ?*
  - *Non-tidal woody ?*

- Decisions not yet final, but are anticipated to be final next week
- *Disturbed:* Not enough literature to support a different loading rate
- Wetlands Expert Panel making progress, but not yet finished determining land uses

AGRICULTURAL LAND USES
STILL IN DEVELOPMENT AND ACTIVELY BEING REWORKED

Literature Review = 9

Level 1	Level 2	Level 3
2.1 Commodity crops	??	??
	2.1.1 Corn - With manure	2.1.1.1 Grain - fallow
		2.1.1.2 Grain - fall sm grain
	2.1.2 Soybeans - With Manure	2.1.2.2 Fall sm grain
	2.1.3 Small grains-with manure	2.1.3.3 Sm grain - fallow
	2.1.4 Corn - Without manure	2.1.4.2 Grain - fall sm grain
2.2 Hay and Legume and forage	2.2.2 Non-legume Forage	2.2.2.1 Non-Legume Forage with manure
	2.2.3 Pasture and pastured cropland	2.2.3 Pasture and pastured cropland
2.3 Specialty & Other crops	2.3.3 High cover	2.3.3.1 High nutrient input

Proposed = 34

Level 1	Level 2	Level 3
2.1 Commodity crops	2.1.1 Corn - With manure	2.1.1.1 Grain - fallow
		2.1.1.2 Grain - fall sm grain
		2.1.1.3 Silage - fallow
		2.1.1.4 Silage - fall sm grain
	2.1.2 Soybeans - With Manure	2.1.2.1 Fall fallow
		2.1.2.2 Fall sm grain
	2.1.3 Small grains-with manure	2.1.3.1 Sm grain - Dbl Crop Beans
		2.1.3.2 Forage
		2.1.3.3 Sm grain - fallow
	2.1.4 Corn - Without manure	2.1.4.1 Grain - fallow
		2.1.4.2 Grain - fall sm grain
		2.1.4.3 Silage - fallow
		2.1.4.4 Silage - fall sm grain
	2.1.5 Soybeans - Without Manure	2.1.2.1 Fall fallow
		2.1.2.2 Fall sm grain
	2.1.6 Small grains-Without manure	2.1.5.1 Sm grain - Dbl Crop Beans
		2.1.5.2 Forage
		2.1.5.3 Sm grain - fallow
2.2 Hay and Legume and forage	2.2.1 Alfalfa and Other Legumes	2.2.1.1 Alfalfa and Other Legumes with manure
		2.2.1.2 Alfalfa and Other Legumes without manure
	2.2.2 Non-legume Forage	2.2.2.1 Non-Legume Forage with manure
		2.2.2.2 Non-legume Forage without manure
	2.2.3 Pasture and pastured cropland	2.2.3 Pasture and pastured cropland
2.3 Speciality & Other crops	2.3.1 Vines	2.3.1.1 High nutrient input
		2.3.1.2 Medium and low nutrient input
	2.3.2 Low cover	2.3.2.1 High nutrient input
		2.3.2.2 Medium and low nutrient input
	2.3.3 High cover	2.3.3.1 High nutrient input
		2.3.3.2 Medium and low nutrient input
2.4 Animals	2.4.1 Animal Impervious	2.4.1.1 CAFO (regulated)
		2.4.1.2 AFO (unregulated)
2.5 Farmstead	2.5.1 Impervious	2.5.1 Impervious
	2.5.2 Pervious	2.5.2 Pervious

NUTRIENT INPUT DIFFERENCES

- If desired, we can preserve:
  - Legume and non-legume forage, pasture and hay
  - Manured vs. non-manured

- Data to support land use target differences between Manured and Non-Manured and Legume can come from the different rules for applying nutrients and AgChem export rate sensitivities, in addition to the limited data from the literature review

- For manured, Ag Census provides percent of crops receiving manure.
  - Need to determine a valid method to project the ratio of manure eligible : non-manured crops

DRAFT AGRICULTURAL LAND USES (13)

- Crops
  - Corn with and without manure
  - Soybeans with and without manure
  - Small grains with and without manure
- Specialty and other crops
- Animal production areas
  - Load allocation and Wasteload Allocation
- Hay and Pasture and Forage
  - Leguminous alfalfa and other hay, pasture and forage
  - Non-leguminous hay, pasture and forage
  - Unfertilized open areas
- Farmsteads
  - Pervious and impervious

* Agricultural Land Use decisions are not yet made and are being determined using a separate track.

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

- Finalize land uses
- Determine differences between manure-eligible and nonmanured land uses
- Complete the refinements based on sensitivities to nutrient inputs
- 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.
- Finalize weighting of literature review data by location (e.g.: in vs. out of watershed)
- Work on land uses where there was little/no information in the lit reviews
- Incorporate additional literature reviews and data from agricultural grey literature, wetland panels, iTree Hydro and other sources
- Determine differences in loads by depth (surface, interflow, groundwater)
- Determine differences in loads by nutrient species
- QA/QC checks including verifying data outliers

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.

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

DATA SOURCES FOR ESTABLISHING TARGETS

- Panel and workgroup documents and recommendations (e.g.: Erosion and Sediment Control Expert Panel Report)
- Collaborative work with USGS-Sparrow
- Chesapeake Bay Program nutrient input sensitivities using the multiple model framework
  - APLE
  - APEX
  - AgCHEM
  - SPARROW
- Center for Watershed Protection small-scale sediment work
- Land data team riparian analyses
- Land data team impervious connectedness analysis
- STAC recommendations
- Chesapeake Bay Program Partnership Watershed Model Phase 5 background documentation, where relevant and reflects the latest science
- Mandel river calibration work.

REVIEWS OF SCIENTIFIC LITERATURE AND LOCAL TMDLS: DEVELOPED, NATURAL AND AGRICULTURAL LAND USES

TETRA TECH

MEMO

To:	Gary Shenk, EPA; Peter Claggett, USGS
Cc:	Tom Schueler, CSN
From:	Mark Sievers, Tetra Tech Inc.
Date:	March 31, 2014
Subject:	Land Use Loading Literature Review Task Summary and Results

The memo is separated into the following sections (click for hyperlink):

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PRELIMINARY DRAFT

Agricultural and Forest Land Use Loading Rate Literature Review—Summary and Results

January 13, 2015

PREPARED BY:

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ADDITIONAL INFORMATION GATHERING

- Wetland Literature Review (conducted in conjunction with the Wetland Expert Panel)
    - Review for wetland efficiency
    - Potential wetland land uses
    - Review for loading rates
- Agriculture “Grey” Literature (collected by Virginia Tech/CBW-ROC)
    - Unpublished, not peer reviewed
    - May include negative results
    - Negative results are generally considered to be systematically censored in peer-reviewed publications; meta-analysis from peer-reviewed sources may be systematically biased
- Forestry (iTree Hydro and Forestry Workgroup)