Land Use Loading Rates in the Phase 6 CBP Watershed Model

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Nutrient EOF Targets

- Purpose: Develop targets that:
  - Appropriately order the influence of different land uses in the same area
  - Appropriately account for differences in loading between the same land uses in different areas.

- Regional differences due to physiographic effects will be resolved through load balancing in the river calibration.

Phase 5

Sources of Data

- Literature Reviews
  - Beaulac & Reckhow (1982)
  - Sweeney (2001)
  - Lin (2004)
  - Primary Sources (about 30)
- Previous Modeling Studies
  - Phase 4.3
  - Sparrow

Phase 5

Average Targets

Land Use	TN	TP
Forest	2.0	0.15
Harvested Forest	20.0	0.80
Crop	23.0	2-2.5
Hay	6.0	0.4-0.8
Pasture	4.5	0.7
Urban	9.3	1.5
Extractive	12.5	3.5
Nursery	240	85

Phase 5

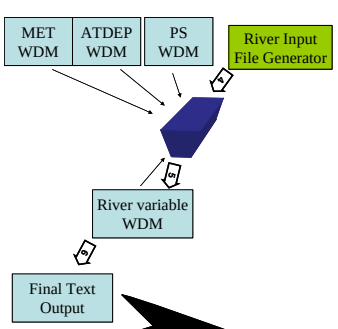
Differentiating

- Forest – Assume constant loss efficiency
- Crop –
  - median balance = median export
  - Zero balance = ½ median export
- Urban – Assume constant concentration
- No method of differentiation for
  - Alfalfa, construction, extractive, harvested forest, hay without nutrients, nurseries

Phase 5

Calibrate Regional Factors

River Calibration



- Assume the sensitivity of the simulation to each parameter
- Determine an appropriate adjustment direction for each parameter
- Take a small step in that direction

- Calculate necessary EOS to unbias the calibration
- Adjust EOS by that amount

Phase 5

Phase 5

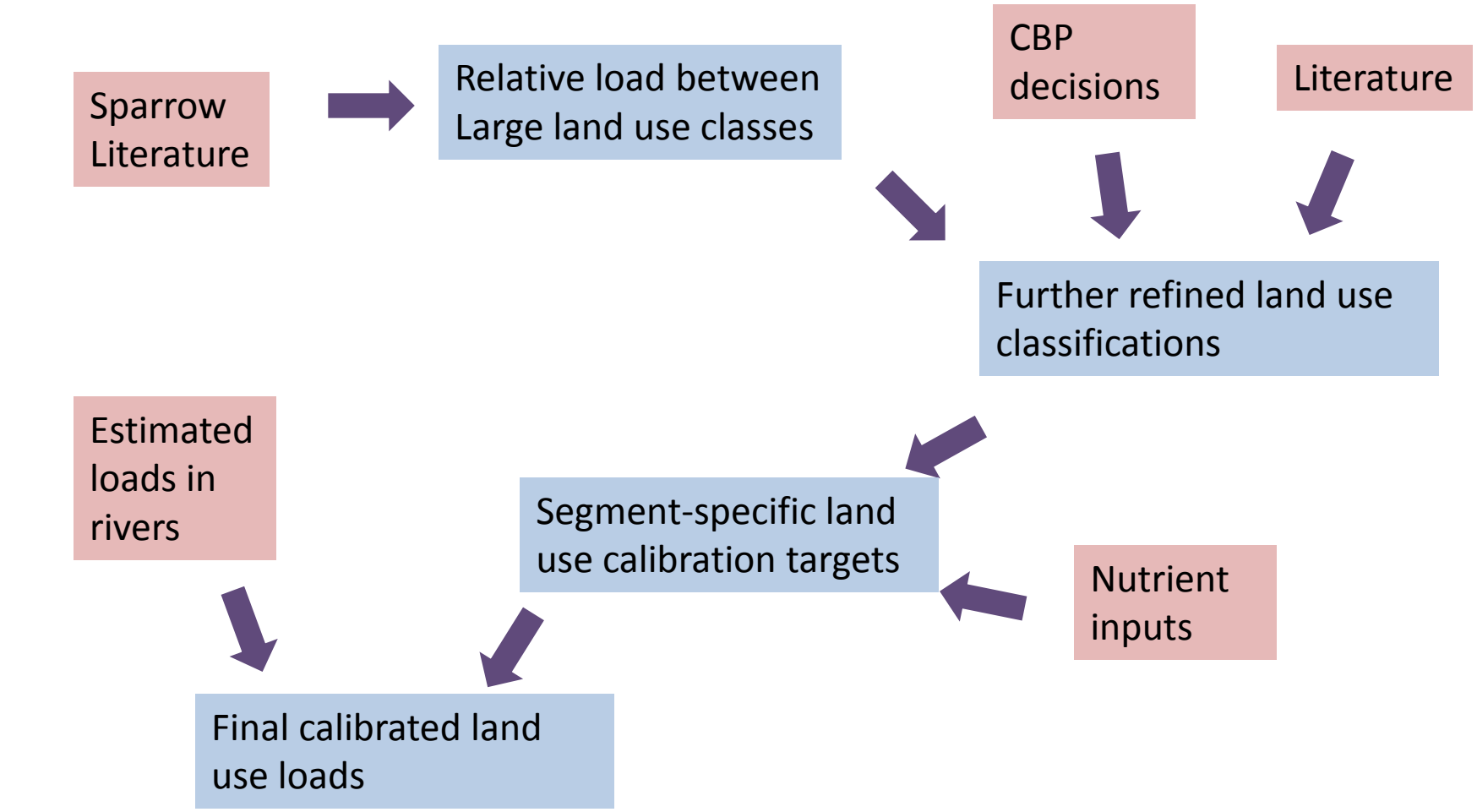
Phase 5 Process

- Initial targets from sparrow and literature
- Vary due to assumed sensitivity to inputs
- Determine regional factors

Phase 6 Process

- Initial targets from SPARROW and literature
- Vary due to assumed sensitivity to inputs
- Determine regional factors

Land Use Load Decisions – Phase 6



Resources

- Collaborative work with USGS-Sparrow
- Tetra Tech urban review
- Tetra Tech agricultural review
- Panel and workgroup documents and recommendations
- STAC recommendations
- Phase 5.3.2 background documentation
- CBP Sensitivity Work
- CWP small-scale sediment work
- Land data team riparian analyses
- Land data team impervious connectedness analysis
- ICPRB calibration work
- Tetra Tech synthesis work

Broad Class Targets from Sparrow

- Specific runs of the Sparrow model with CBP land use classes
  - Ratios between Urban:Ag:Forest:Open
  - Range related to uncertainty estimate

Specific Target Ranges from Literature

- Literature syntheses from P5
- TetraTech urban synthesis
- TetraTech agricultural synthesis
- Panel and workgroup documents and recommendations
- STAC recommendations
- Phase 5.3.2 documentation
- TetraTech synthesis

Vary by Segment Based on Inputs

- Phase 6 Multiple Model Sensitivity Work
  - Sparrow
  - APLE
  - APEX
  - AGCHEM
  - Watershed Studies
- TetraTech Synthesis

Determine Regional Factors

- Sparrow estimate of land-to-water processes
- CWP small-scale sediment work
- Land data team riparian analysis
- Land data team impervious connectedness
- ICPRB calibration work
- Calibration to water quality data

Loading Rate Process – Phase 6 improvements

- Initial targets from sparrow and literature
  - Specific run of sparrow
  - More literature
- Vary due to assumed sensitivity to inputs
  - Major effort to clearly define sensitivity in a multiple model ensemble framework
- Determine Regional Factors
  - Determine from watershed characteristics rather than just through calibration

Land Use Load Decisions – Phase 6