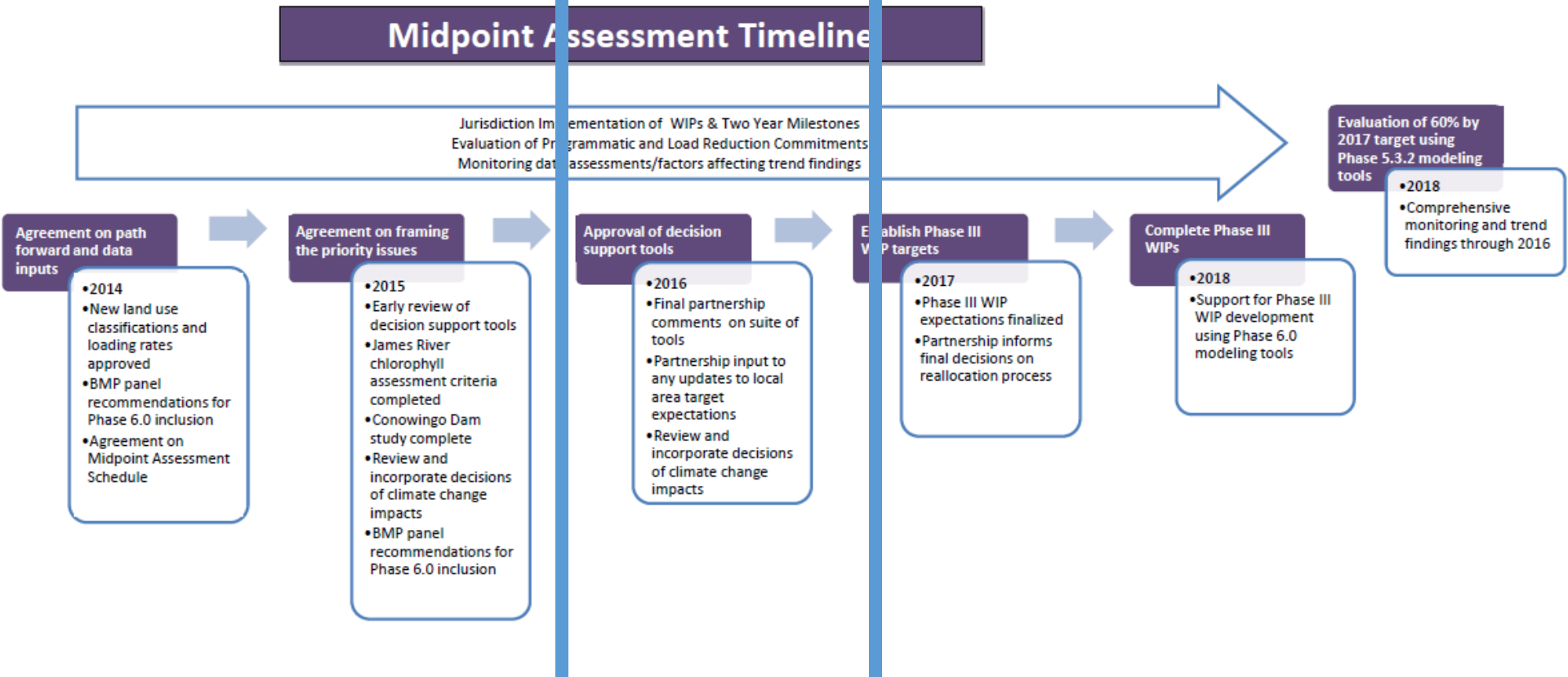
Phase 6 Watershed Model Overall Schedule and Urban Components

Gary Shenk

USGS Chesapeake Bay Program Office

Presentation to the Urban Stormwater WG 6/16/15



CREATE The Models

3 months of development to go

REVIEW The Models

Expect changes
Nothing guaranteed

USE The Models

Calibration Timeline

- **October 2014** – Rough Draft of major changes to nutrient processing in Scenario Builder will need to be complete. Continued sensitivity refinement
- **February 2015** - draft targets for draft land Uses
- **March 2015** – All major partnership decisions are made on changes to scenario builder processing and data. Scenario builder final modifications begin.
- **April 2015** - final targets approved by Modeling Workgroup for draft land uses
- **Early October 2015** – All inputs are final and delivered to the WSM by the scenario builder team for the final calibration run. Final targets are based on this information.
- **December 2015** - Phase 6 draft model is complete.
- **December 2015 – December 2016** - Evaluation followed by fine tuning during the next year. Key scenarios available
- **September 2016** – Final comments on the draft Phase 6 model
- **December 2016** - All models are final. The partnership decision-making process begins to discuss how these new models will be used in the WIP3 process

Phase 6

Nutrients

Initial Calibration Load =

Estimated Average Load + **Sensitivity** * **Δ Inputs**

Estimate Spatial Average EOS Based on land use and inputs

BMPs

*

Estimate watershed delivery variance based on landscape parameters

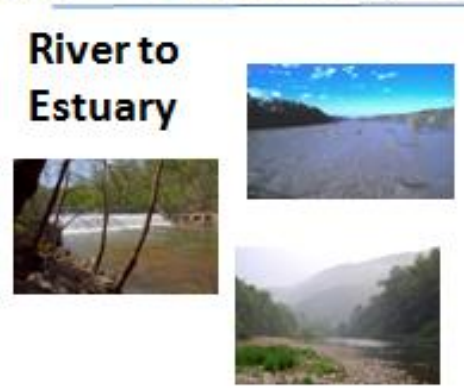
Watershed Delivery Variance Centered on 1

*

Estimate small stream effects

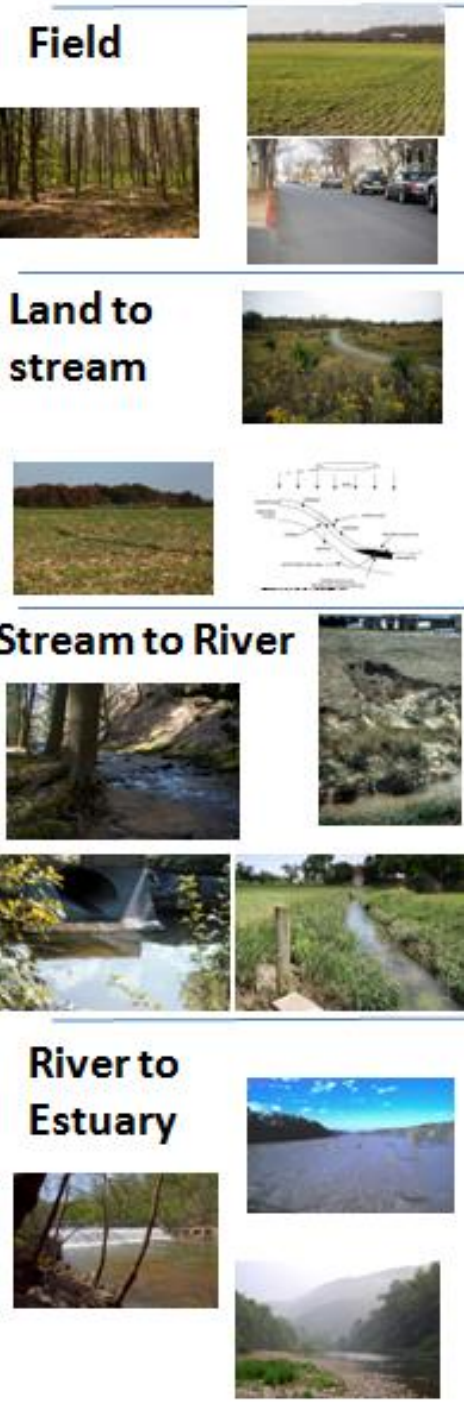
Stream Delivery

*



Directly Simulated in HSPF

River Delivery



Phase 6

Initial Calibration Load =

Multiple models

Multiple Lines of Evidence → **Estimated Average Load** + **Sensitivity** * **Δ Inputs**

*

BMPs ← Scenario Builder

*

Estimated with Sparrow
Estimated by Land Data team → **Watershed Delivery Variance Centered on 1**

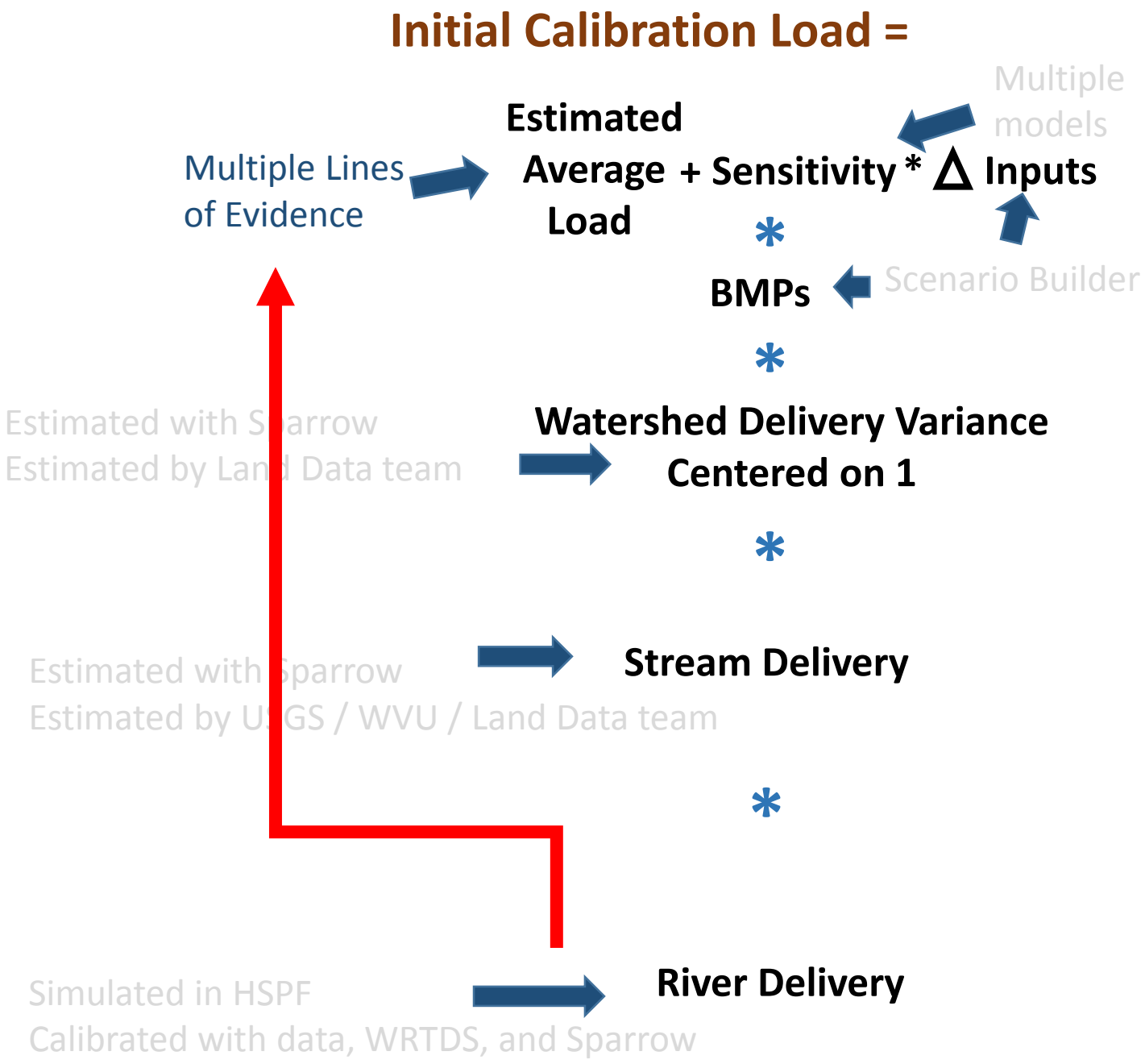
*

Estimated with Sparrow
Estimated by USGS / WVU / Land Data team → **Stream Delivery**

*

Simulated in HSPF
Calibrated with data, WRTDS, and Sparrow → **River Delivery**

Phase 6 Calibration



TN Target Development

Decision Point #1

Global Model:
e.g. Sparrow

Crop
X Lbs/A/Yr

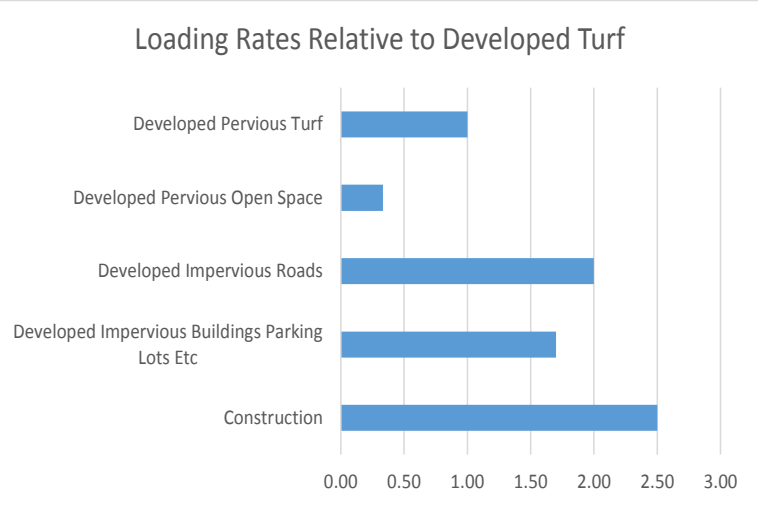
Pasture/Hay
Y Lbs/A/Yr

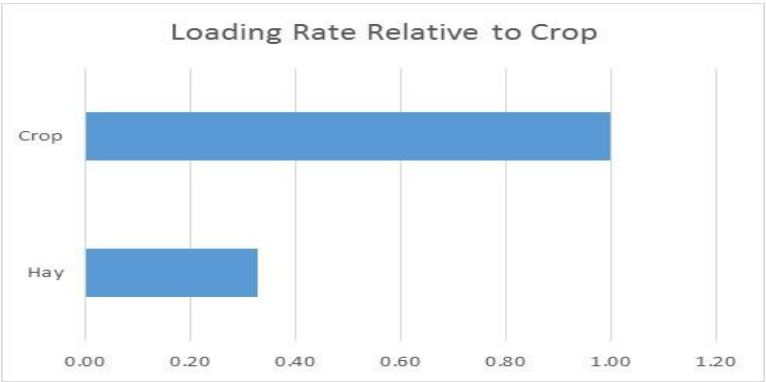
Urban
Z Lbs/A/Yr

Natural
A Lbs/A/Yr

Decision Point #2

Land use specific information:
Literature and models





Decision Point #3

Map the land uses

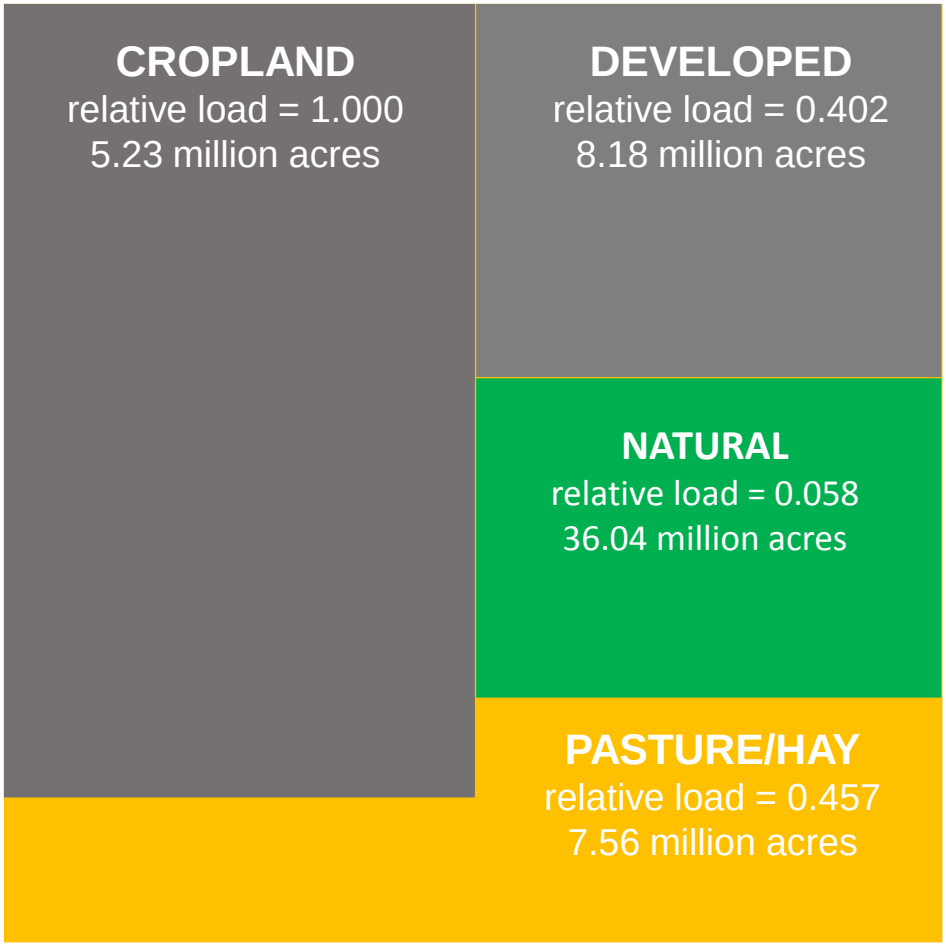
Crop

Hay

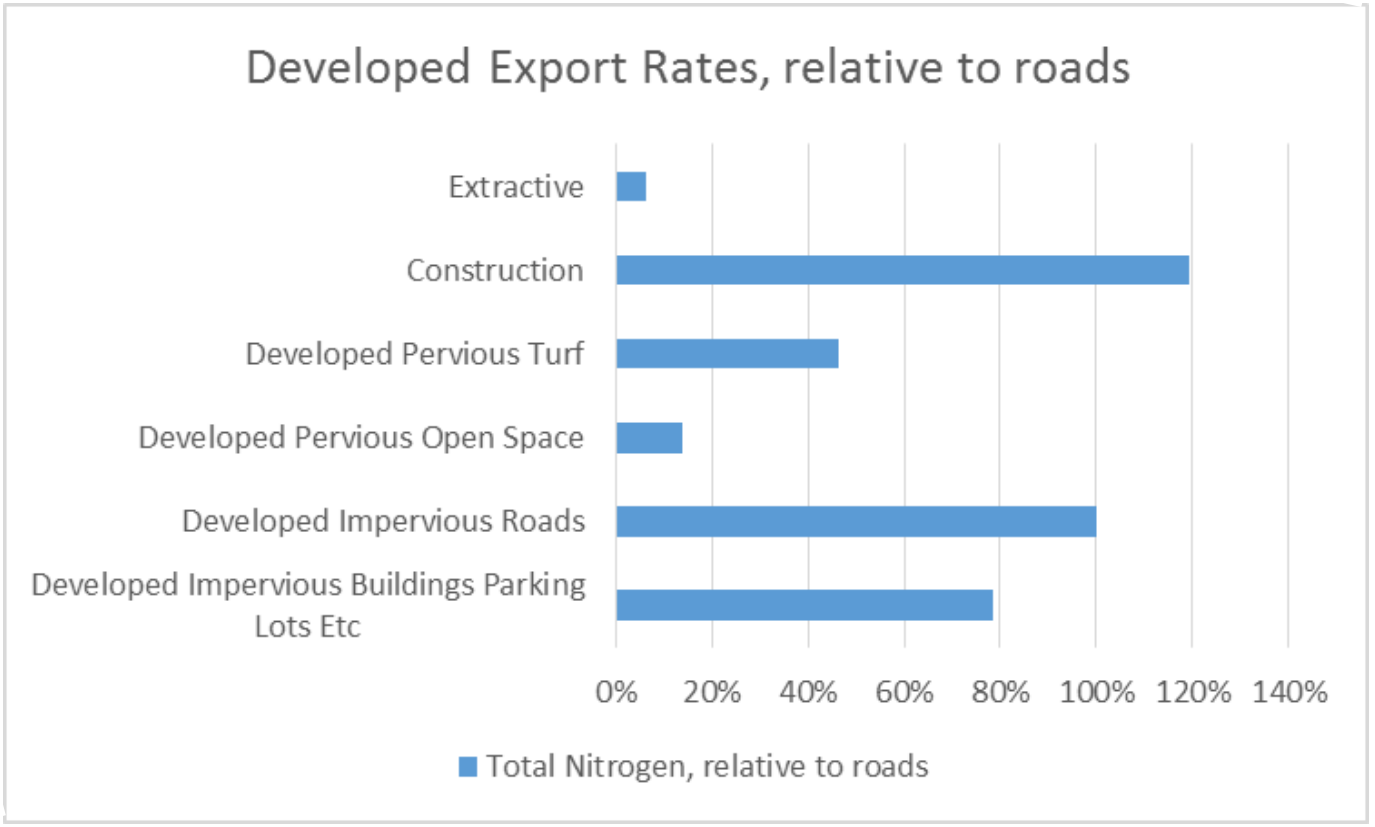
Pasture

Level 3
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
2.1.2.1 Fall fallow
2.1.2.2 Fall sm grain
2.1.3.1 Sm grain - Dbl Crop Beans
2.1.3.2 Forage
2.1.3.3 Sm grain - fallow
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
2.1.2.1 Fall fallow
2.1.2.2 Fall sm grain
2.1.5.1 Sm grain - Dbl Crop Beans
2.1.5.2 Forage
2.1.5.3 Sm grain - fallow
2.2.1.1 Alfalfa and Other Legumes with manure
2.2.1.2 Alfalfa and Other Legumes without manure
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
2.3.1.1 High nutrient input
2.3.1.2 Medium and low nutrient input
2.3.2.1 High nutrient input
2.3.2.2 Medium and low nutrient input
2.3.3.1 High nutrient input
2.3.3.2 Medium and low nutrient input
2.4.1.1 CAFO (regulated)
2.4.1.2 AFO (unregulated)
2.5.1 Impervious
2.5.2 Pervious

Total Average Nitrogen Load



Developed TN Relative Rates



50 Land uses

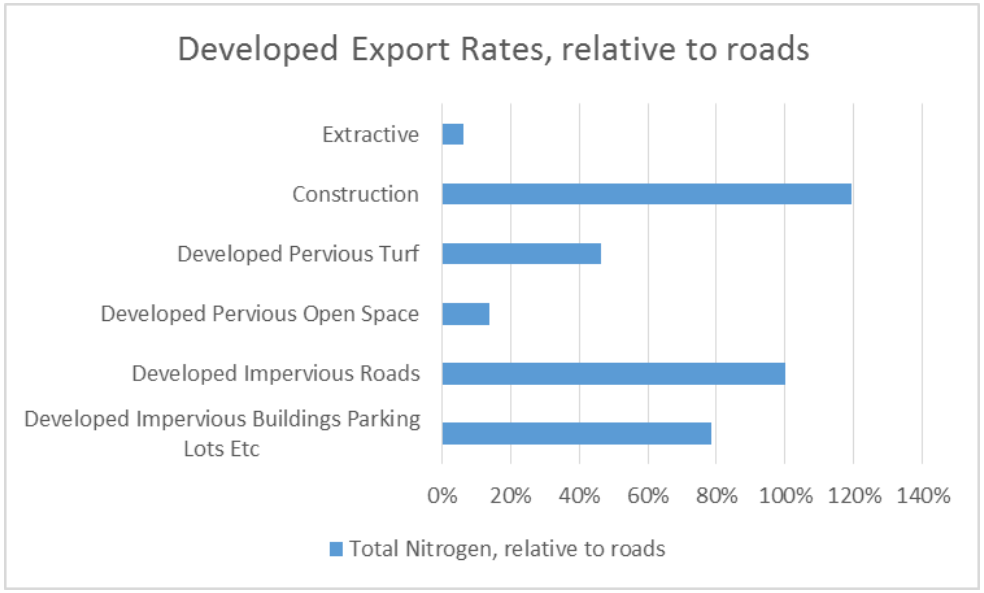
LoadSourceId	LoadSource	TrueLandUse	LoadSourceShortName	Sector	LoadSourceMinor	LoadSourceMajor
1	Ag Open Space	1	aop	Agriculture	Other Ag	Agriculture
2	Full Season Soybeans	1	soy	Agriculture	Row Crops	Agriculture
3	Grain with Manure	1	gwm	Agriculture	Row Crops	Agriculture
4	Grain without Manure	1	gom	Agriculture	Row Crops	Agriculture
5	Legume Hay	1	lhy	Agriculture	Hay	Agriculture
6	Silage with Manure	1	swm	Agriculture	Row Crops	Agriculture
7	Silage without Manure	1	som	Agriculture	Row Crops	Agriculture
8	Small Grains and Grains	1	sgg	Agriculture	Row Crops	Agriculture
9	Small Grains and Soybeans	1	sgs	Agriculture	Row Crops	Agriculture
10	Specialty Crop High	1	sch	Agriculture	Row Crops	Agriculture
11	Specialty Crop Low	1	scl	Agriculture	Row Crops	Agriculture
12	Other Agronomic Crops	1	oac	Agriculture	Row Crops	Agriculture
13	Other Hay	1	ohy	Agriculture	Hay	Agriculture
14	Pasture	1	pas	Agriculture	Pasture	Agriculture
15	Farmstead	1	far	Agriculture	Other Ag	Agriculture
16	Riparian Pasture Deposition	0	rpa	Agriculture	Riparian Pasture	Agriculture
17	Permitted Feeding Space	1	fsp	Agriculture	Feeding Space	Regulated Agriculture
18	Non-Permitted Feeding Space	1	fnp	Agriculture	Feeding Space	Agriculture
19	Non-Regulated Buildings and Other	1	nnr	Developed	Impervious Developed	Non-Regulated Stormwater
20	Non-Regulated Roads	1	nir	Developed	Impervious Developed	Non-Regulated Stormwater
21	Non-Regulated Tree Canopy	1	ntc	Developed	Pervious Developed	Non-Regulated Stormwater
22	Non-Regulated Turf Grass	1	ntg	Developed	Pervious Developed	Non-Regulated Stormwater
23	MS4 Tree Canopy	1	mtc	Developed	Pervious Developed	Regulated Stormwater
24	MS4 Turf Grass	1	mtg	Developed	Pervious Developed	Regulated Stormwater
25	MS4 Buildings and Other	1	mnr	Developed	Impervious Developed	Regulated Stormwater
26	MS4 Roads	1	mir	Developed	Impervious Developed	Regulated Stormwater
27	MS4 Construction	1	mcn	Developed	Construction	Regulated Stormwater
28	CSS Roads	1	cir	Developed	Impervious Developed	Regulated Stormwater
29	CSS Tree Canopy	1	ctc	Developed	Pervious Developed	Regulated Stormwater
30	CSS Turf Grass	1	ctg	Developed	Pervious Developed	Regulated Stormwater
31	CSS Buildings and Other	1	cnr	Developed	Impervious Developed	Regulated Stormwater
32	CSS Construction	1	ccn	Developed	Construction	Regulated Stormwater
33	Abandoned Mines	1	abn	Developed	Extractive	Non-Regulated Stormwater
34	Active Mines	1	ext	Developed	Extractive	Non-Regulated Stormwater
35	Disturbed Forest	1	dfr	Natural	Forest	Forest
36	Harvested Forest	1	hfr	Natural	Forest	Forest
37	Forest	1	for	Natural	Forest	Forest
38	Floodplain Wetland	1	fwt	Natural	Wetland	Forest
39	Headwater Wetland	1	hwt	Natural	Wetland	Forest
40	Tidal Emergent Wetland	1	twt	Natural	Wetland	Forest
41	Open Space	1	osp	Natural	Open Space	Forest
42	Water	1	wat	Natural	Non-Tidal Water Deposi	Non-Tidal Water Deposition
50	Septic-30	0	s30	Septic	Septic	Septic
51	Septic-40	0	s40	Septic	Septic	Septic
52	Septic-50	0	s50	Septic	Septic	Septic
53	Septic-80	0	s80	Septic	Septic	Septic
60	Industrial	0	ind	Point Source	Wastewater	Wastewater
61	Municipal	0	mun	Point Source	Wastewater	Wastewater
62	Combined Sewer Overflow	0	cso	Point Source	Wastewater-CSO	Wastewater-CSO

14 Developed Land uses

LoadSource	ShortName	LoadSourceMinor	LoadSourceMajor
Non-Regulated Buildings and Other	nnr	Impervious Developed	Non-Regulated Stormwater
Non-Regulated Roads	nir	Impervious Developed	Non-Regulated Stormwater
Non-Regulated Tree Canopy	ntc	Pervious Developed	Non-Regulated Stormwater
Non-Regulated Turf Grass	ntg	Pervious Developed	Non-Regulated Stormwater
MS4 Tree Canopy	mtc	Pervious Developed	Regulated Stormwater
MS4 Turf Grass	mtg	Pervious Developed	Regulated Stormwater
MS4 Buildings and Other	mnr	Impervious Developed	Regulated Stormwater
MS4 Roads	mir	Impervious Developed	Regulated Stormwater
MS4 Construction	mcn	Construction	Regulated Stormwater
CSS Roads	cir	Impervious Developed	Regulated Stormwater
CSS Tree Canopy	ctc	Pervious Developed	Regulated Stormwater
CSS Turf Grass	ctg	Pervious Developed	Regulated Stormwater
CSS Buildings and Other	cnr	Impervious Developed	Regulated Stormwater
CSS Construction	ccn	Construction	Regulated Stormwater

Really just 5 … with 3 overlays

	MS4	CSS	UnReg.
Construction	X	X	
Turf Grass	X	X	X
Tree Canopy	X	X	X
Roads	X	X	X
Buildings and Other	X	X	X



… or if you prefer…