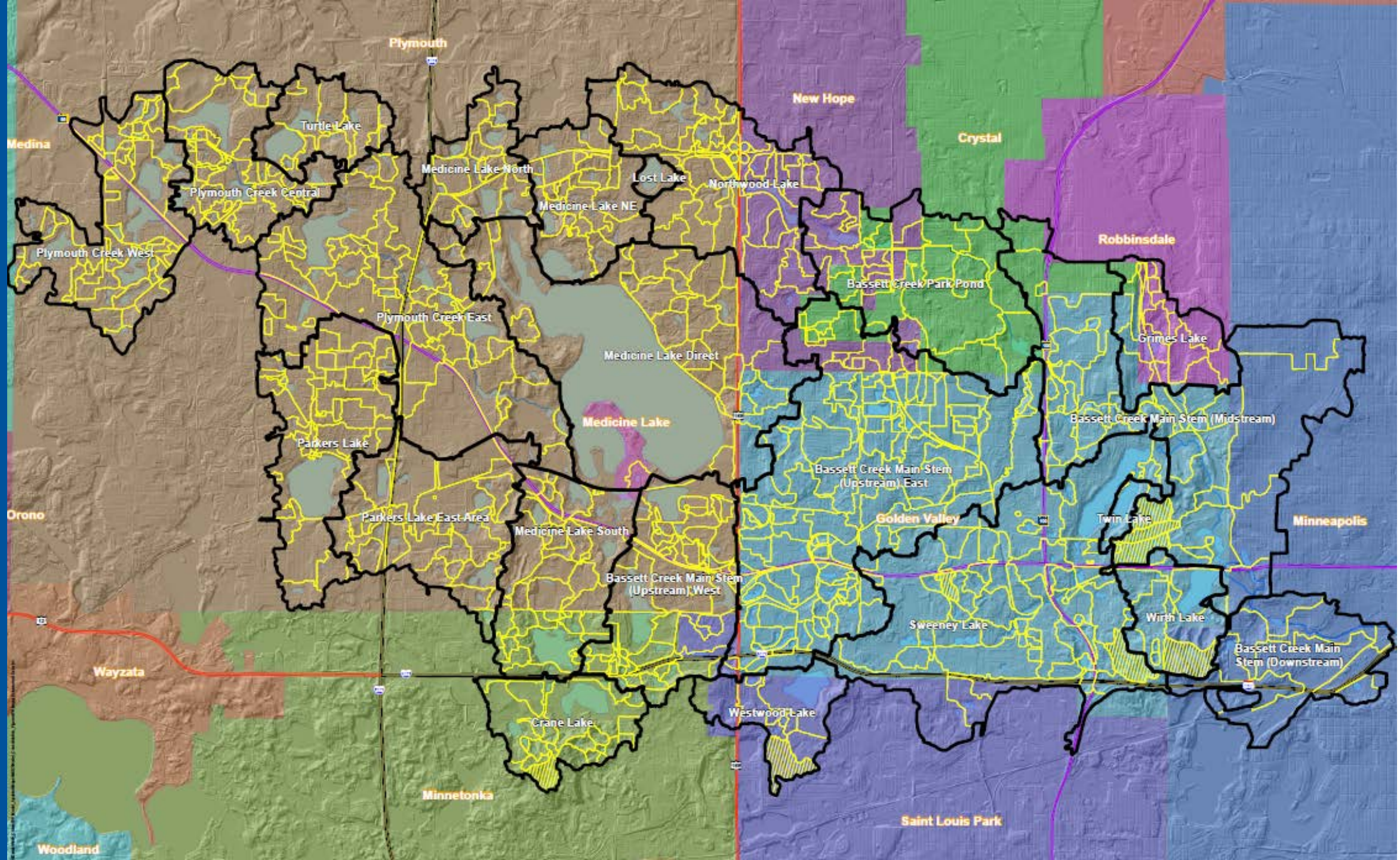
watershed-wide P8 modeling, hot spots and pond prioritization

December 21, 2017 Commission meeting

objectives for Bassett Creek watershed-wide modeling

- update water quality modeling, watershed-wide, for tracking progress towards TMDL implementation goals
- provide a tool for evaluating the effect of proposed projects
- determine treatment effectiveness for permit requirements and prioritize BMP maintenance


Plymouth
New Hope
Crystal
Medina
Turtle Lake
Medicine Lake North
Lost Lake
Northwood Lake
Plymouth Creek Central
Medicine Lake NE
Robbinsdale
Plymouth Creek West
Bassett Creek Park Pond
Plymouth Creek East
Grimes Lake
Medicine Lake Direct
Medicine Lake
Bassett Creek Main Stem (Midstream)
Parkers Lake
Bassett Creek Main Stem (Upstream) East
Orono
Parkers Lake East Area
Golden Valley
Twin Lake
Minneapolis
Medicine Lake South
Bassett Creek Main Stem (Upstream) West
Sweeney Lake
Wirth Lake
Wayzata
Bassett Creek Main Stem (Downstream)
Westwood Lake
Crane Lake
Minnetonka
Saint Louis Park
Woodland

updates to P8 modeling in Bassett Creek

2012-2013

- compiled/updated TMDL and management plan modeling
- consolidated into eleven separate models
- ~600 ponds/structural practices watershed-wide
- field surveyed 30 “higher priority” ponds
- simulated 2000-2011, checked against WOMP data

updates to P8 modeling in Bassett Creek

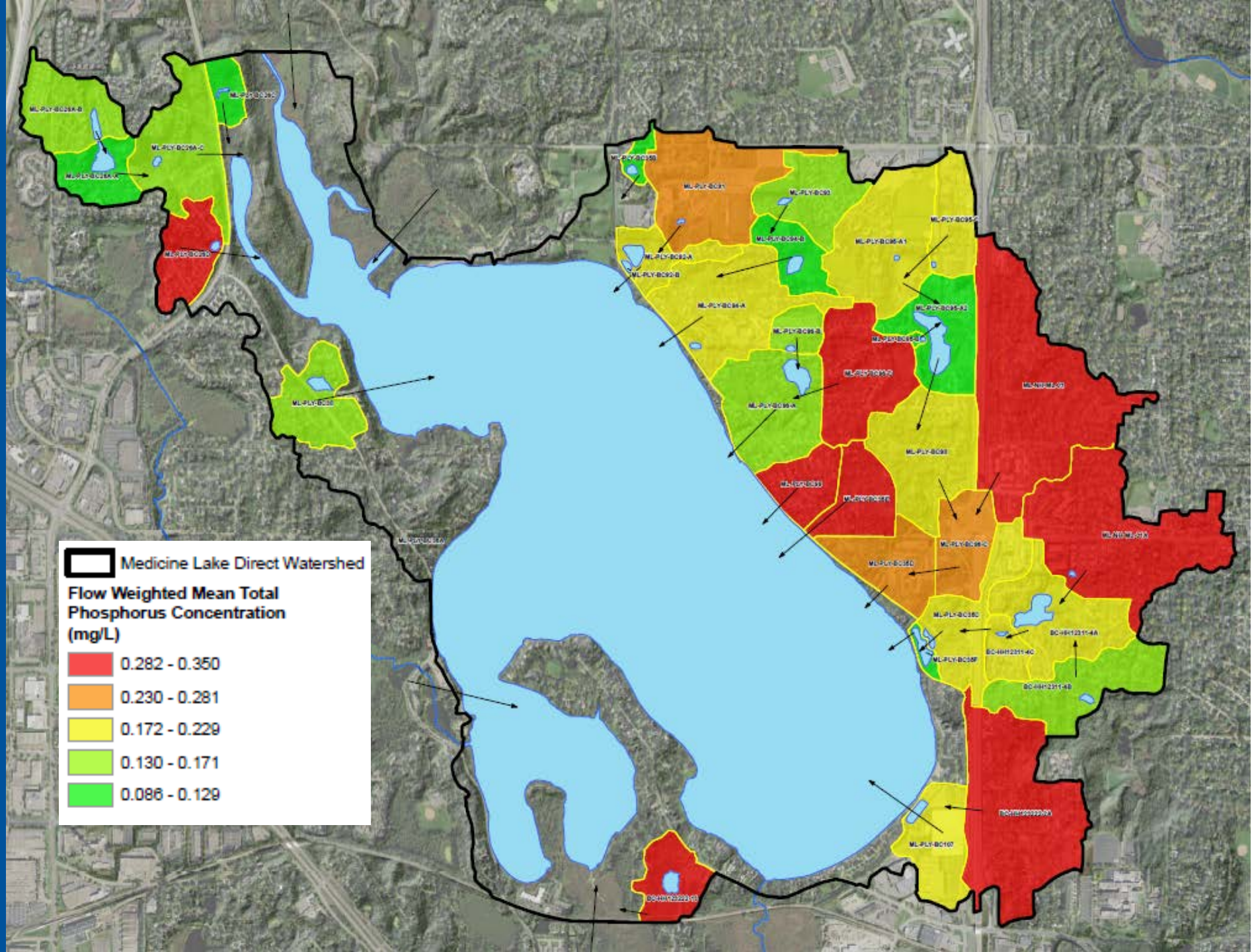
since 2014

- refined watershed delineations, addressed comments
- incorporated additional/new practices & projects
- used for feasibility studies and CIP projects
- **mapped stormwater loading "hotspots" and pond prioritization for maintenance**

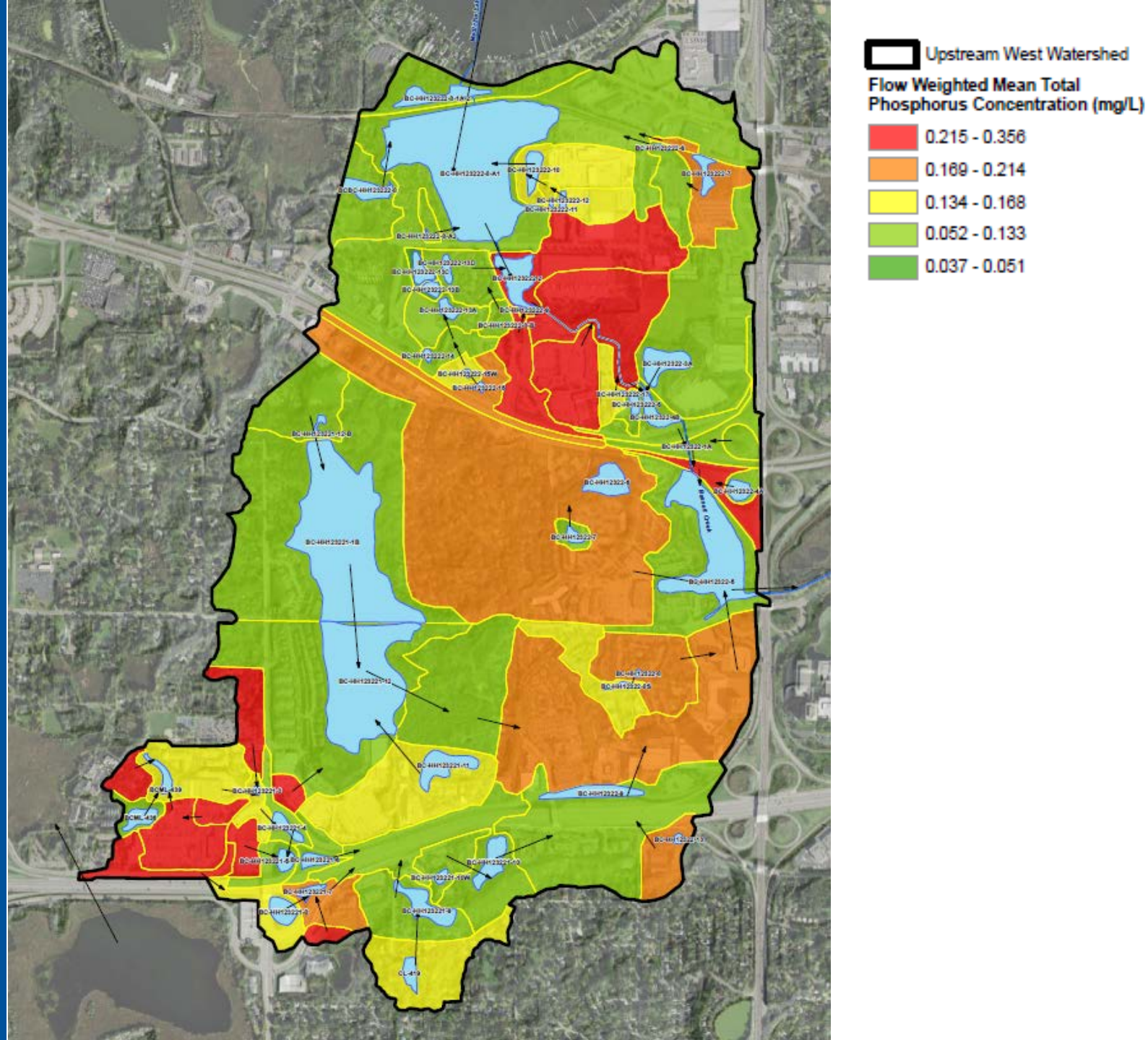
map stormwater loading “hotspots”

targets areas for future BMP implementation by showing subwatersheds with higher pollutant loadings to receiving waters

“hot spots” example 1: Medicine Lake Direct watershed modeling



“hot spots” example 2: Bassett Creek watershed modeling



pond prioritization

creates inspection lists/maps to help municipalities target ponds as “highest priority” for maintenance to protect downstream resources

MS4 permit

pollution prevention/ good housekeeping for municipal operations

pond assessment procedures and schedule

- develop procedures and a schedule for determining TSS and TP treatment effectiveness of permittee's ponds constructed/used for stormwater treatment
- schedule (which can exceed permit term) based on measurable goals and priorities established by permittee

assessment prioritization ranking

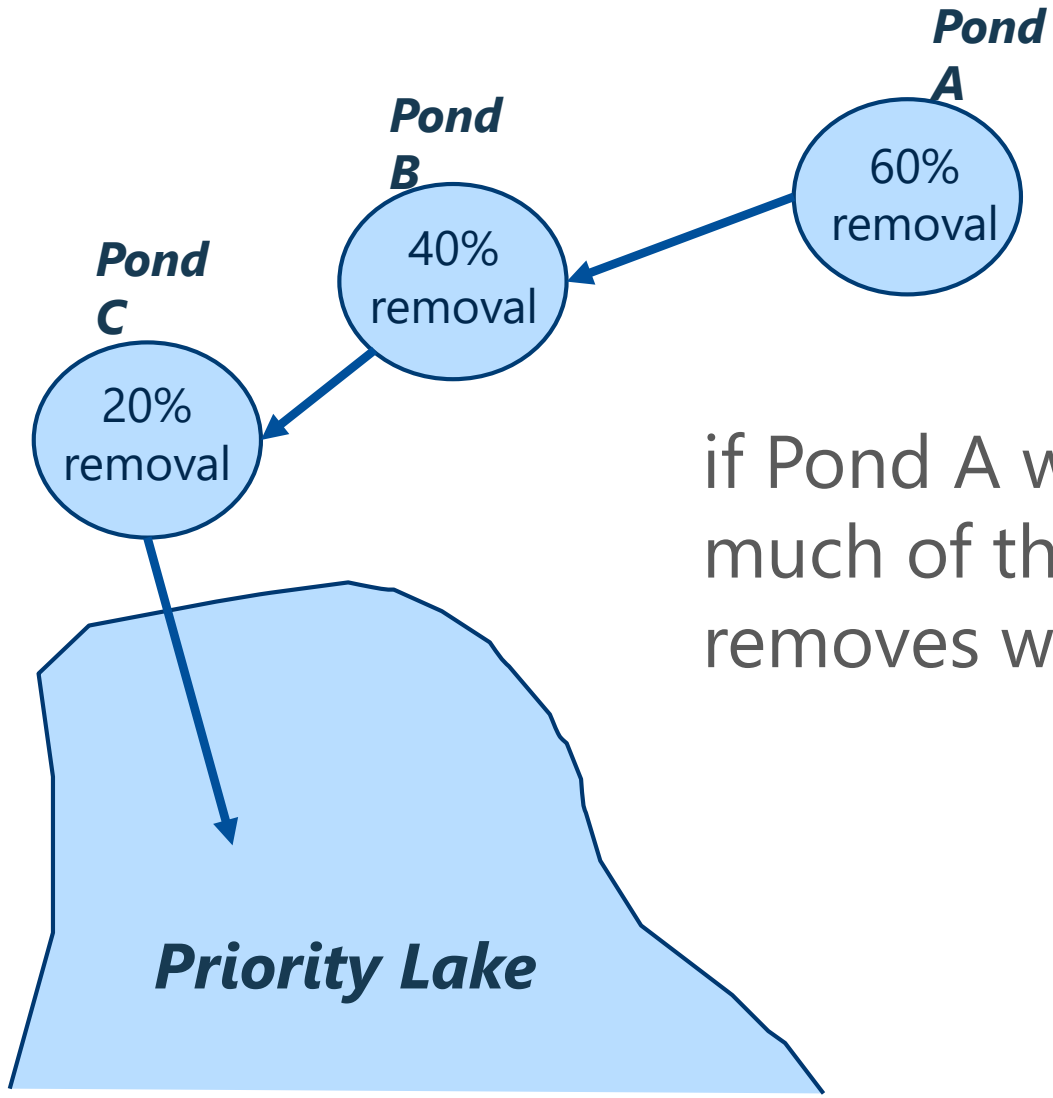
ranking methodology:

two essential factors that guide maintenance priority:

water quality impact of feature [**effective removal**]

how quickly the feature is filling due to sedimentation [**percent-filled per year**]

ranking methodology: effective removal

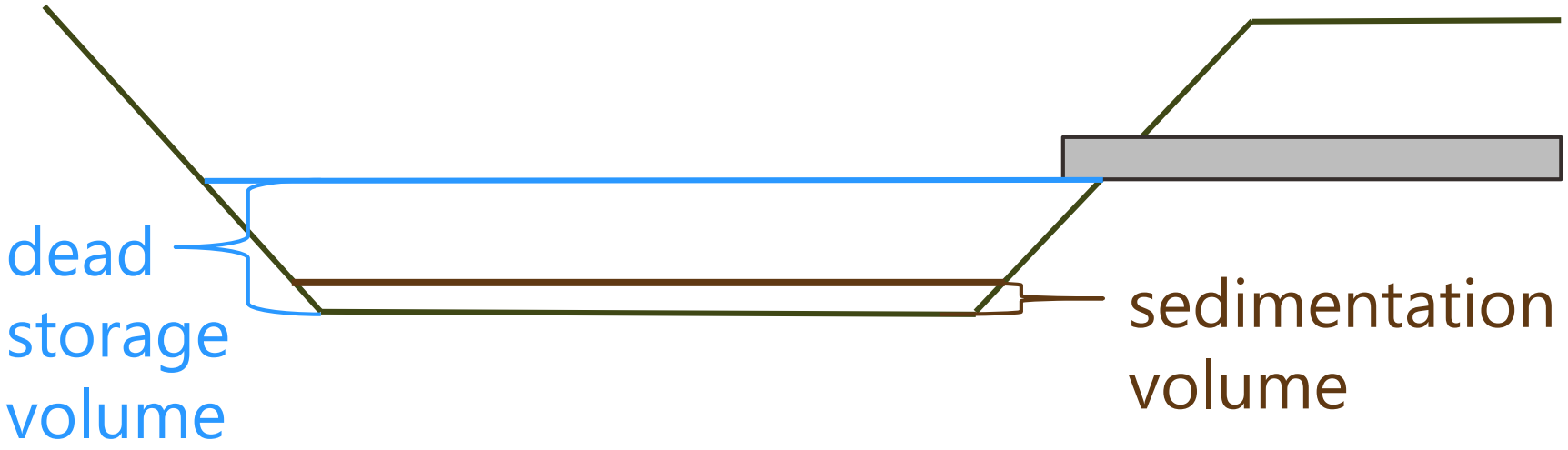


if Pond A were gone, how much of the load that Pond A removes would reach the lake?

ranking methodology: %-filled per year

"percent filled per year" quantifies how quickly ponds & wetlands are filling with sediment.

computed based on P8 results:



[sed. vol] / [dead storage vol.] = % filled per year

assessment prioritization ranking process

1. calculate effective removal (previous slides);
2. calculate percent-filled per year (previous slides);
3. independently rank both parameters; and
4. combine independent ranking to form final prioritization rank (equal weighting)

assessment prioritization ranking process (cont'd)

3. independently rank both parameters; and

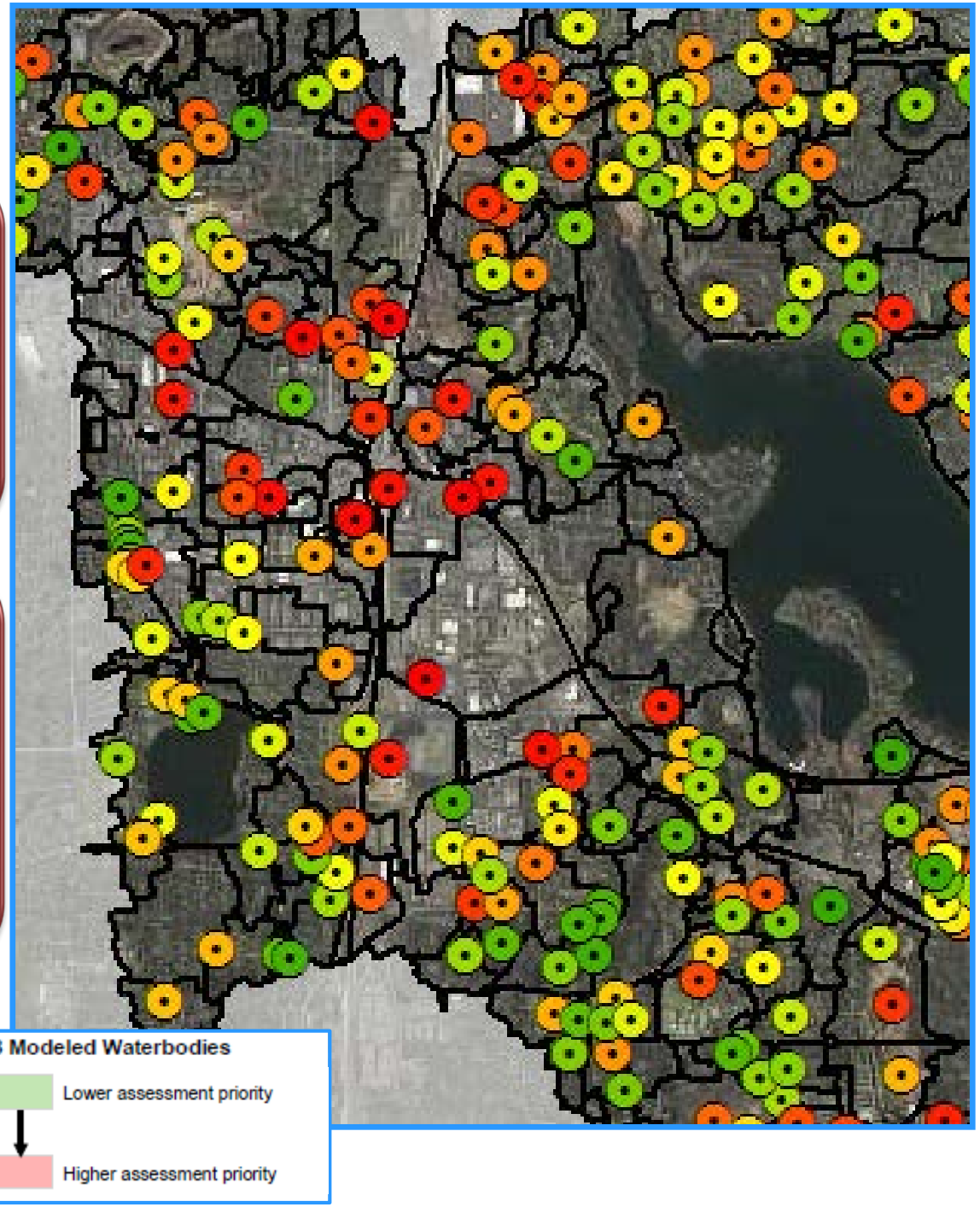
4. combine independent ranking to form final prioritization rank (equal weighting)

Device Name	Percent filled per year (%)	Annual Effective TSS Removal (lbs/yr)	**Rank:** Percent filled per year (%)	**Rank:** Annual Effective TSS Removal (lbs/yr)	**Rank Sum**	**Final Rank** (1 = highest priority)
NB-07	11.43%	15,159	1	17	18	1
PL-P7	5.26%	15,264	5	16	21	2
BC47	1.81%	23,729	17	11	28	3
BC-HH12322-6	2.78%	14,039	10	19	29	4
BC27A-1B	4.64%	12,465	6	26	32	5

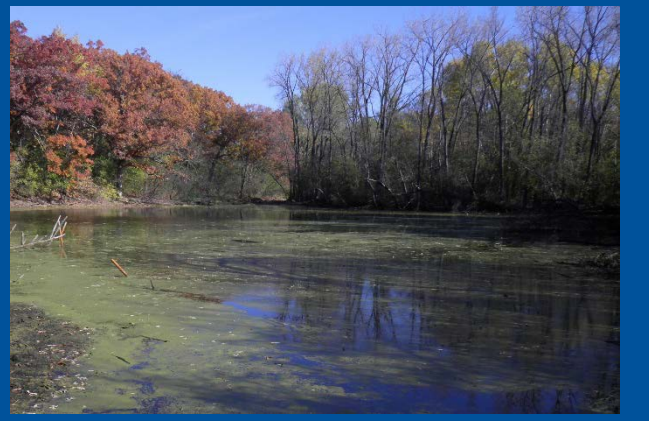
assessment prioritization ranking results

ranked 600+ stormwater ponds and wetlands

priority often related to development / BMP density*



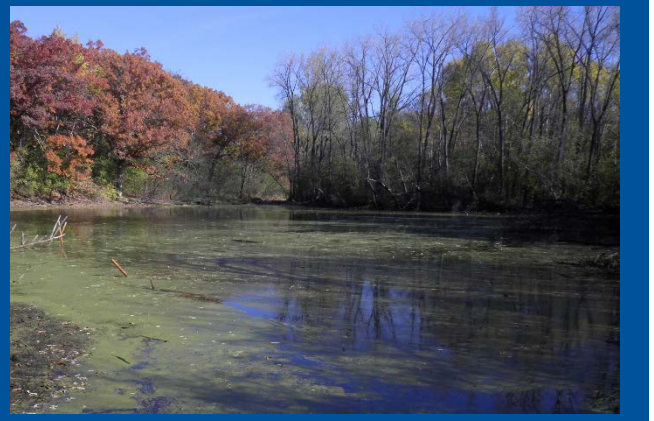
summary



consistent, watershed-wide modeling provides method for

- BCWMC and MS4s to properly account for stormwater management effects on impaired waters—"measurable goals"
- track progress and prioritize BMP implementation—capital improvements planning

summary

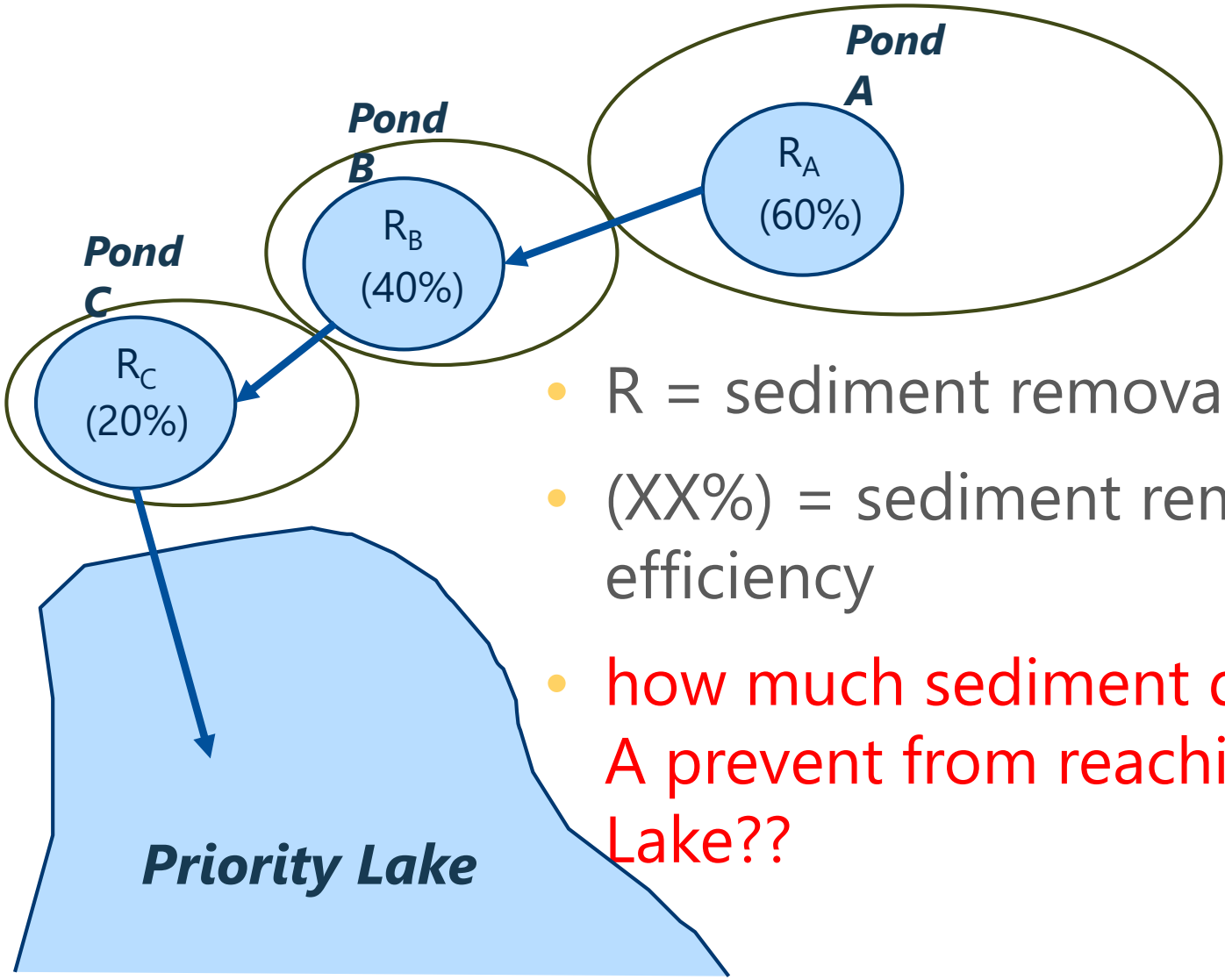


benefits of modeling for pond assessments

- identifies BMPs with limited treatment effectiveness and/or vulnerability to deterioration over time
- enables permittees to prioritize or schedule maintenance activities

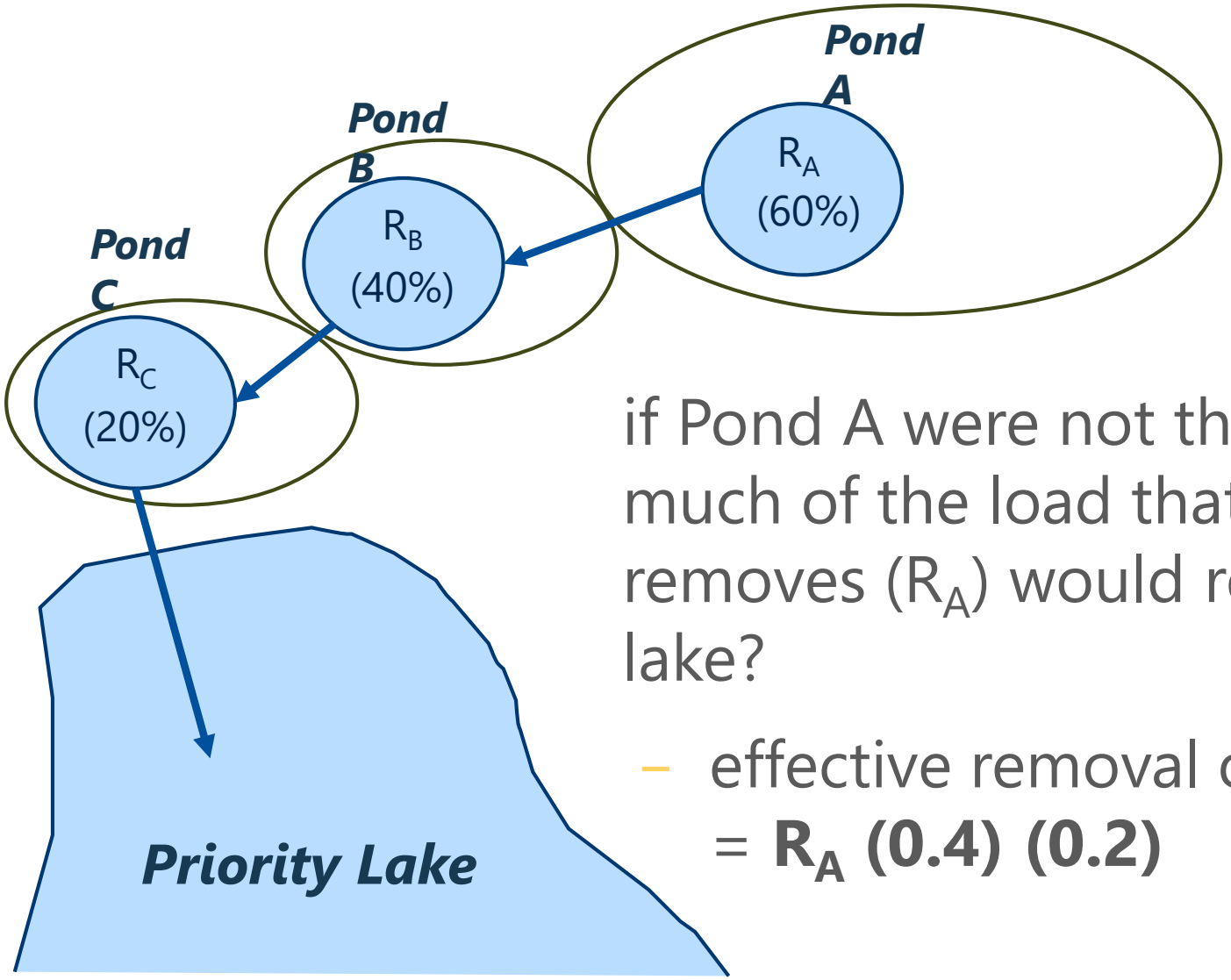
Questions?

ranking methodology: effective removal



- R = sediment removal (lbs)
- (XX%) = sediment removal efficiency
- how much sediment does Pond A prevent from reaching the Lake??

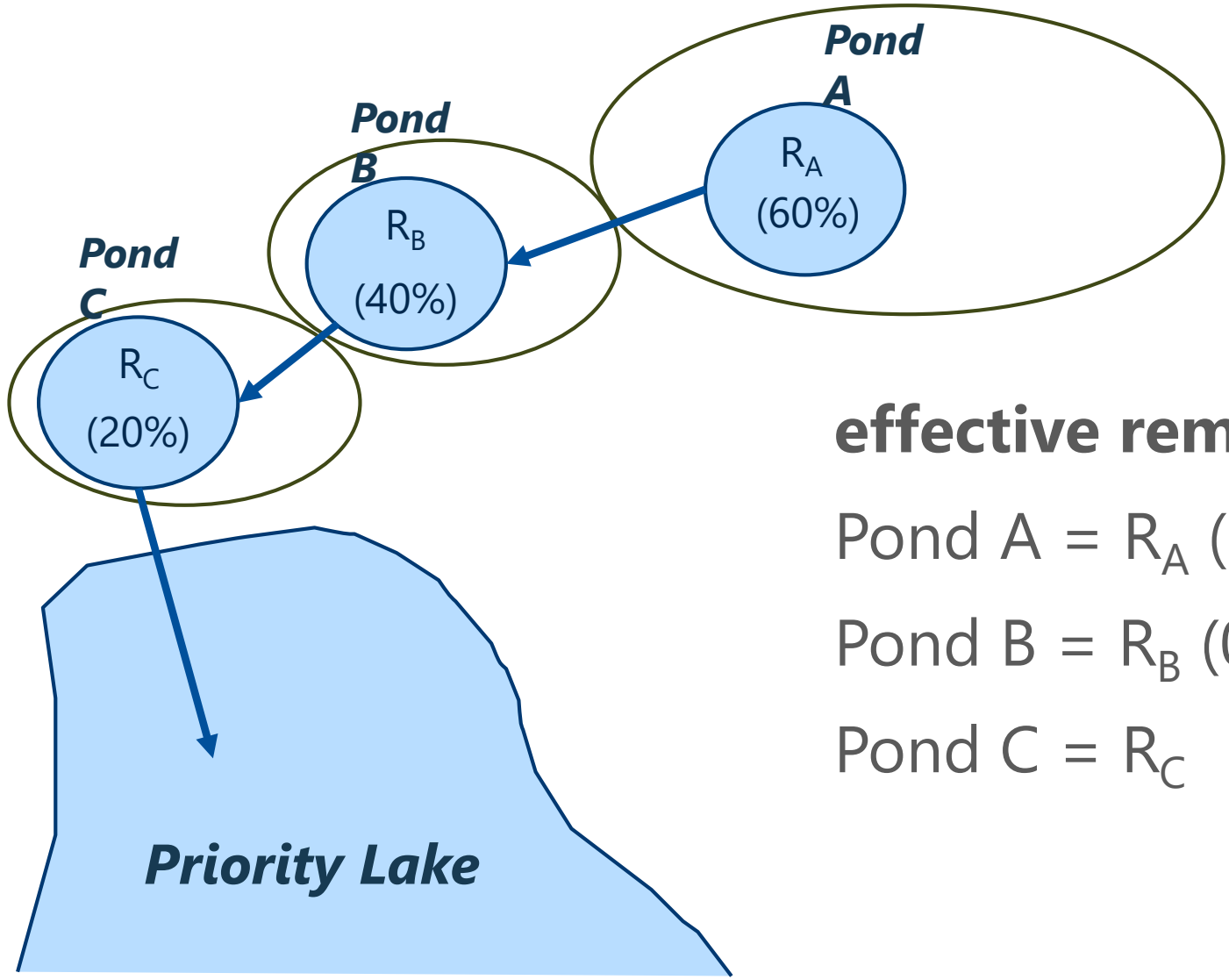
ranking methodology: effective removal



if Pond A were not there, how much of the load that Pond A removes (R_A) would reach the lake?

- effective removal of Pond A = **R_A (0.4) (0.2)**

ranking methodology: effective removal



effective removal:

Pond A = R_A (0.4) (0.2)

Pond B = R_B (0.2)

Pond C = R_C