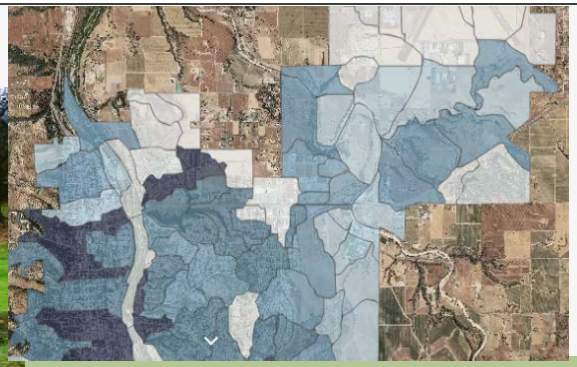
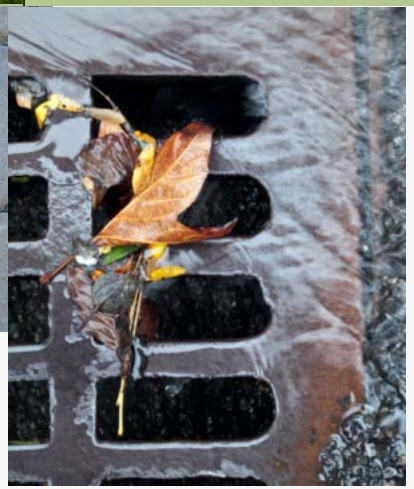


Pragmatic model design and BMP verification for better stormwater decisions

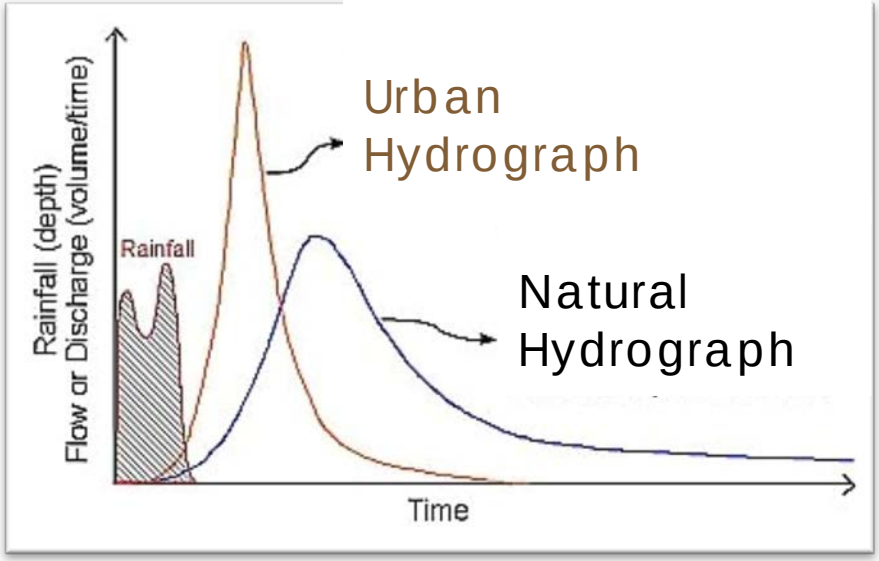


SWAMP Data Science Symposium
Sacramento, CA
June 30, 2017

2ND NATURE
ecosystem science + design

Stormwater impacts

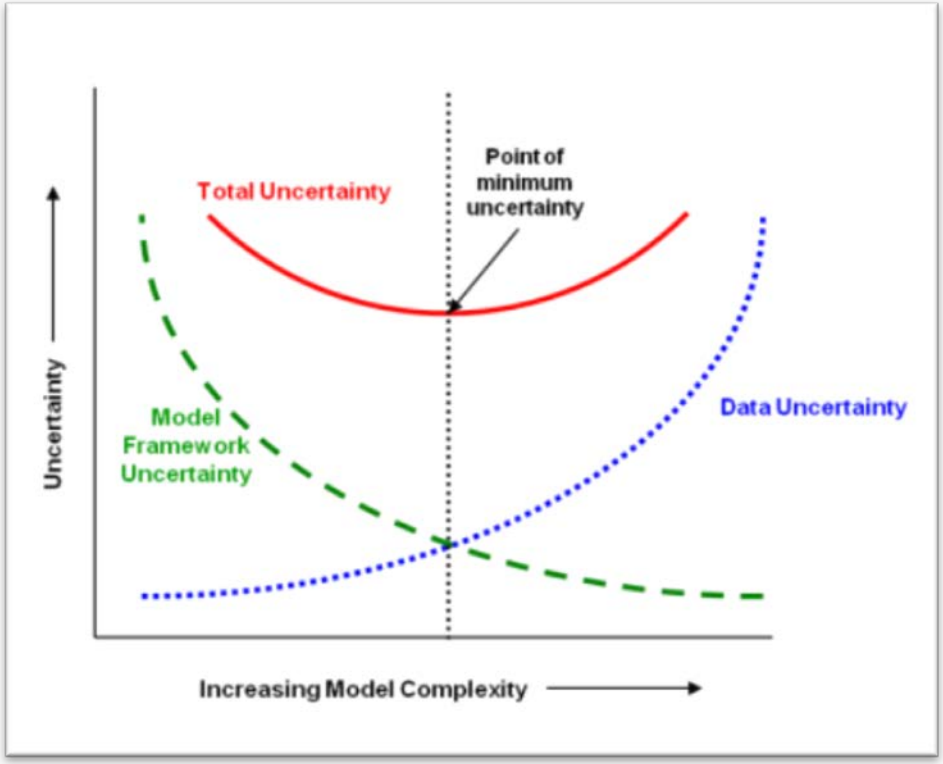
- Pollutant delivery
- Habitat degradation
- Loss of GW recharge
- Low flow reductions
- Stream aesthetics



- How do we make decisions about what to do relative to level of impact/benefit potential?

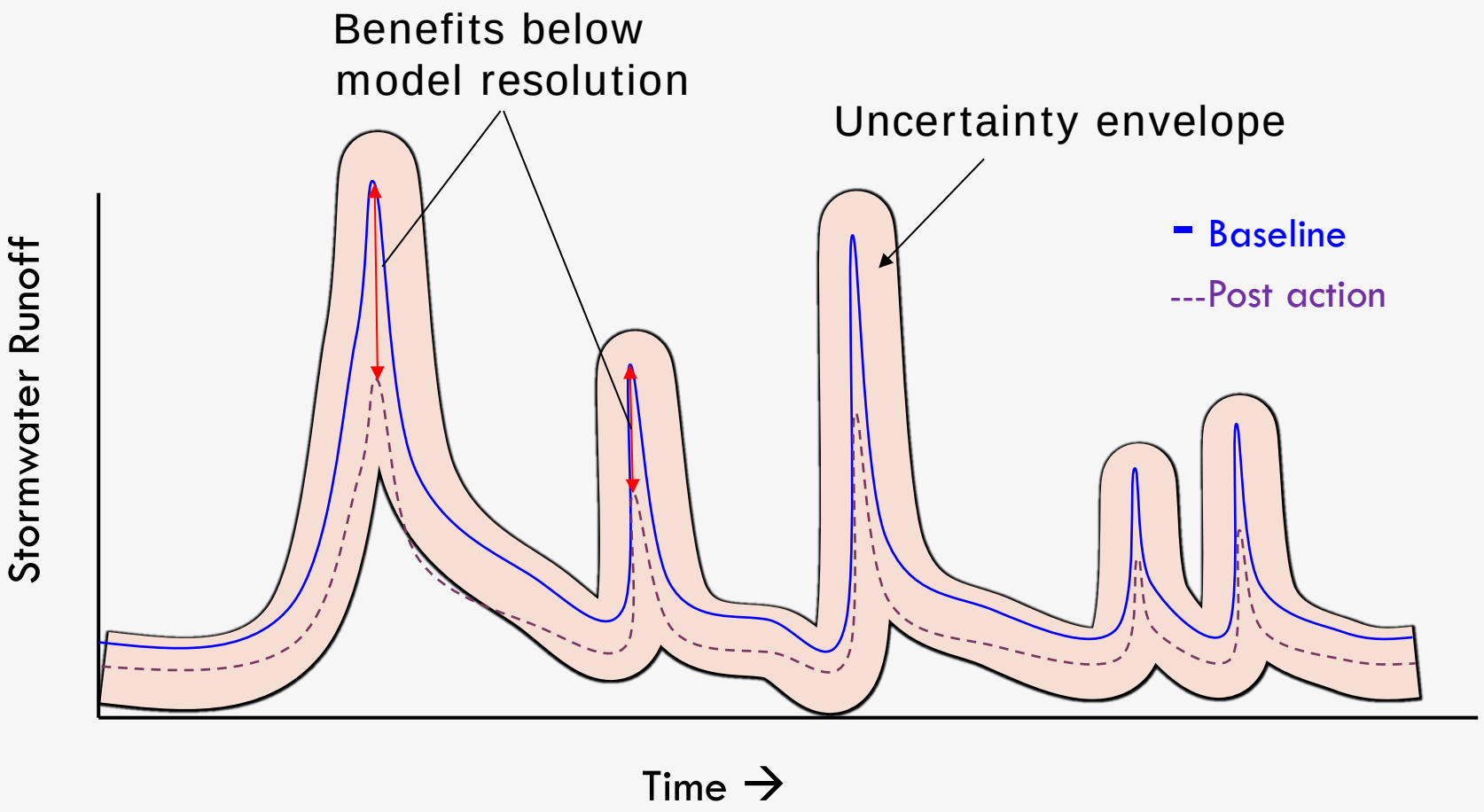
Seeking the modeling sweet spot

- We can't measure everywhere all the time, models help fill the gaps
- All models are wrong, but some are useful
- Let purpose drive specification/application mode of the model
- Let intended users drive the design



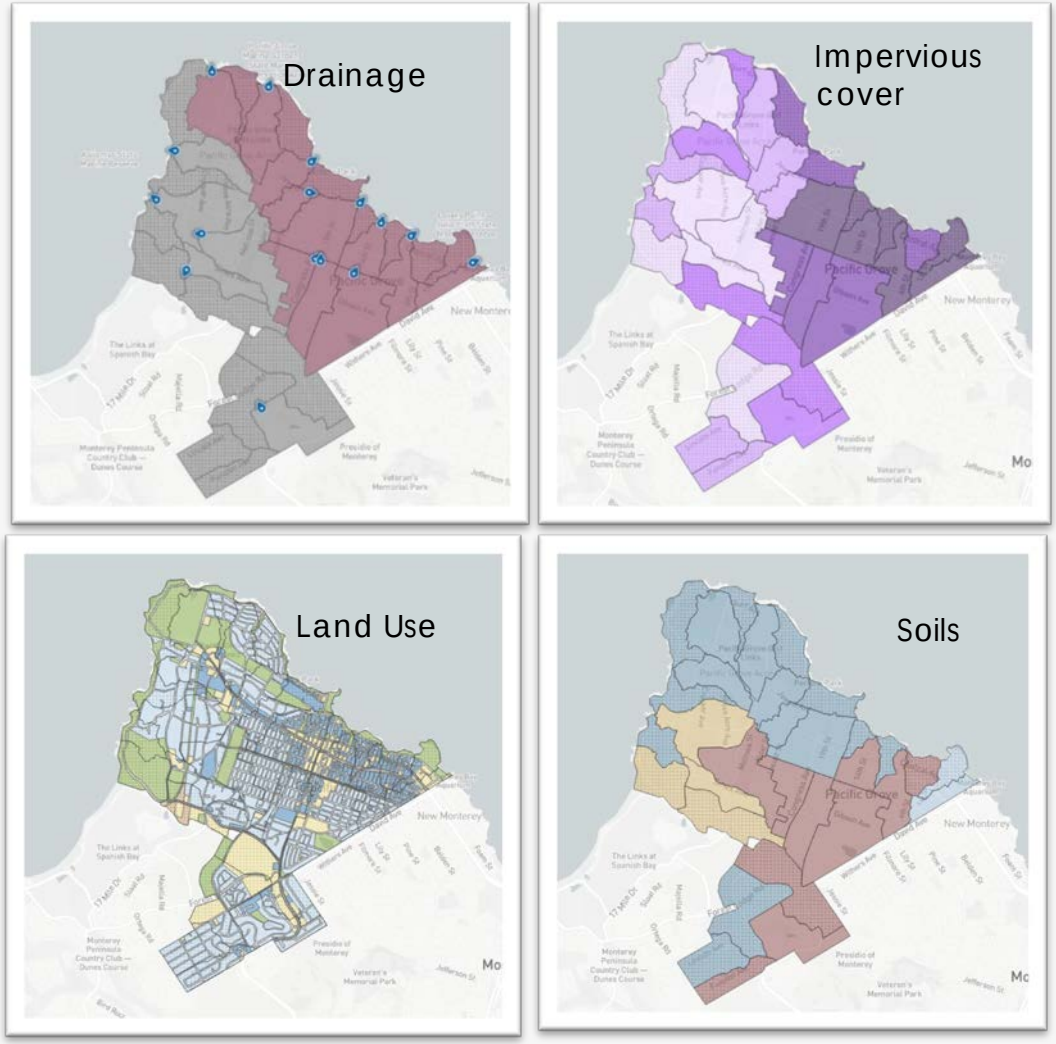
From: EPA Guidance on the Application of Environmental Models, 2009

Costs of model complexity



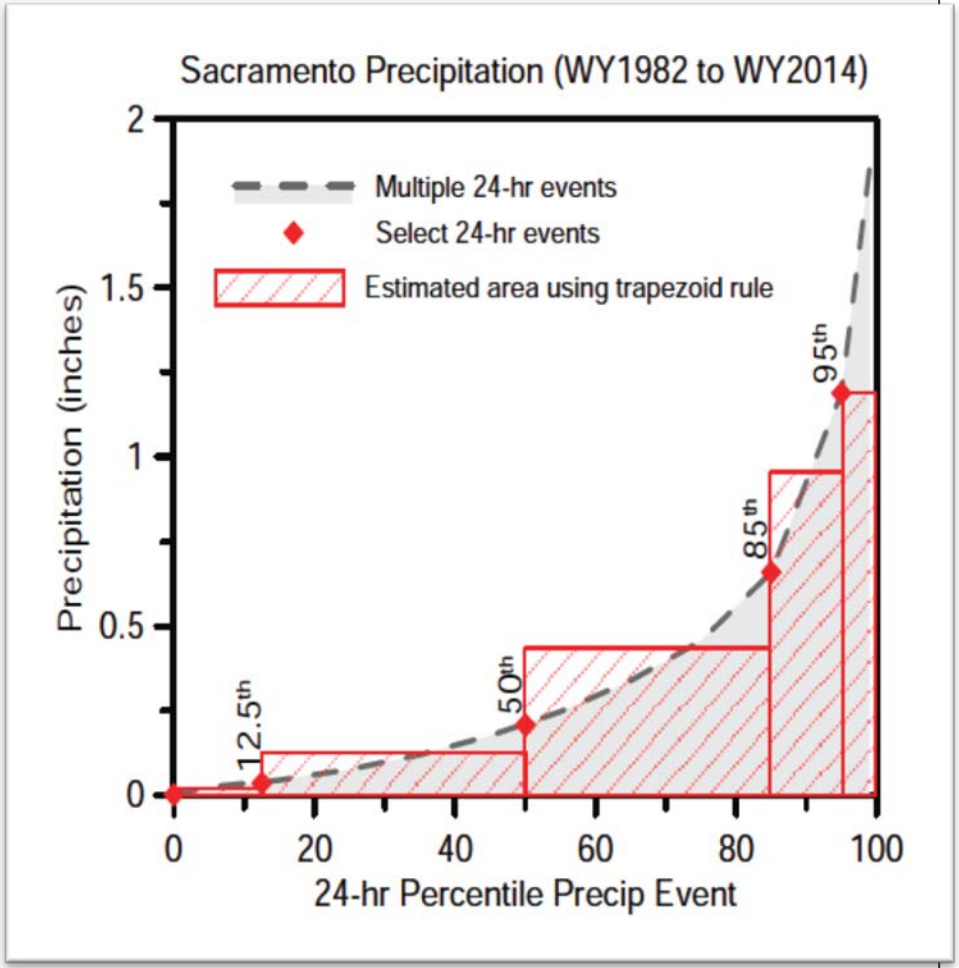
Data off the shelf

- Leverage publicly available data to greater use
- Create the spatial framework for ongoing multi-benefit assessment



Probability of rain

- Match the modeling scale (time + space) to information needs
- Account for sources of variability that are not the focus of inquiry.



Keep it simple, keep it spatial

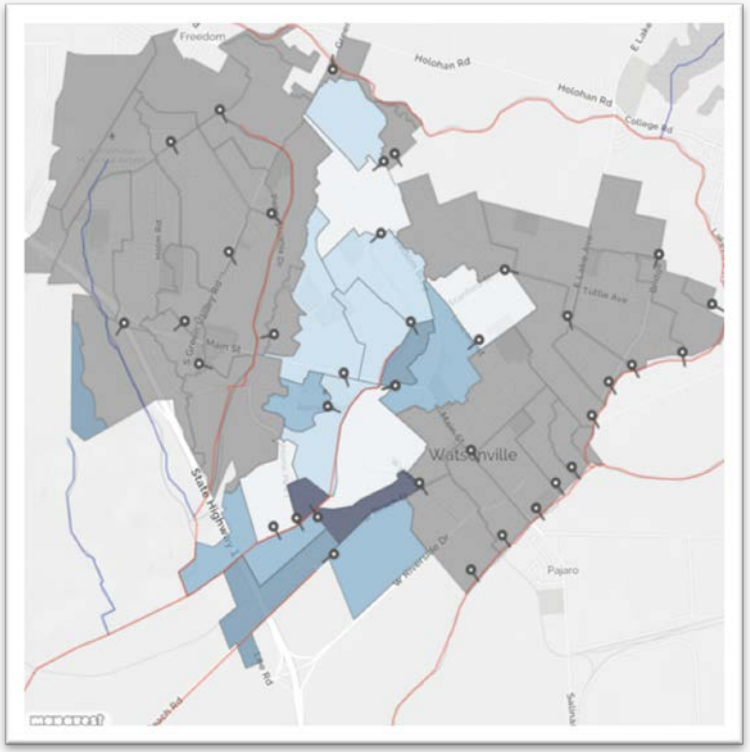
Runoff generation + non-structural LID

Site Scale

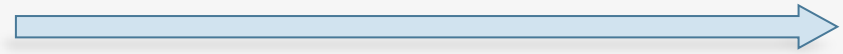
Runoff routing to decentralized and centralized BMPs

Urban Catchment Scale

Routing to downstream catchments + delivery to receiving waters



Drainage, MS4 Scale



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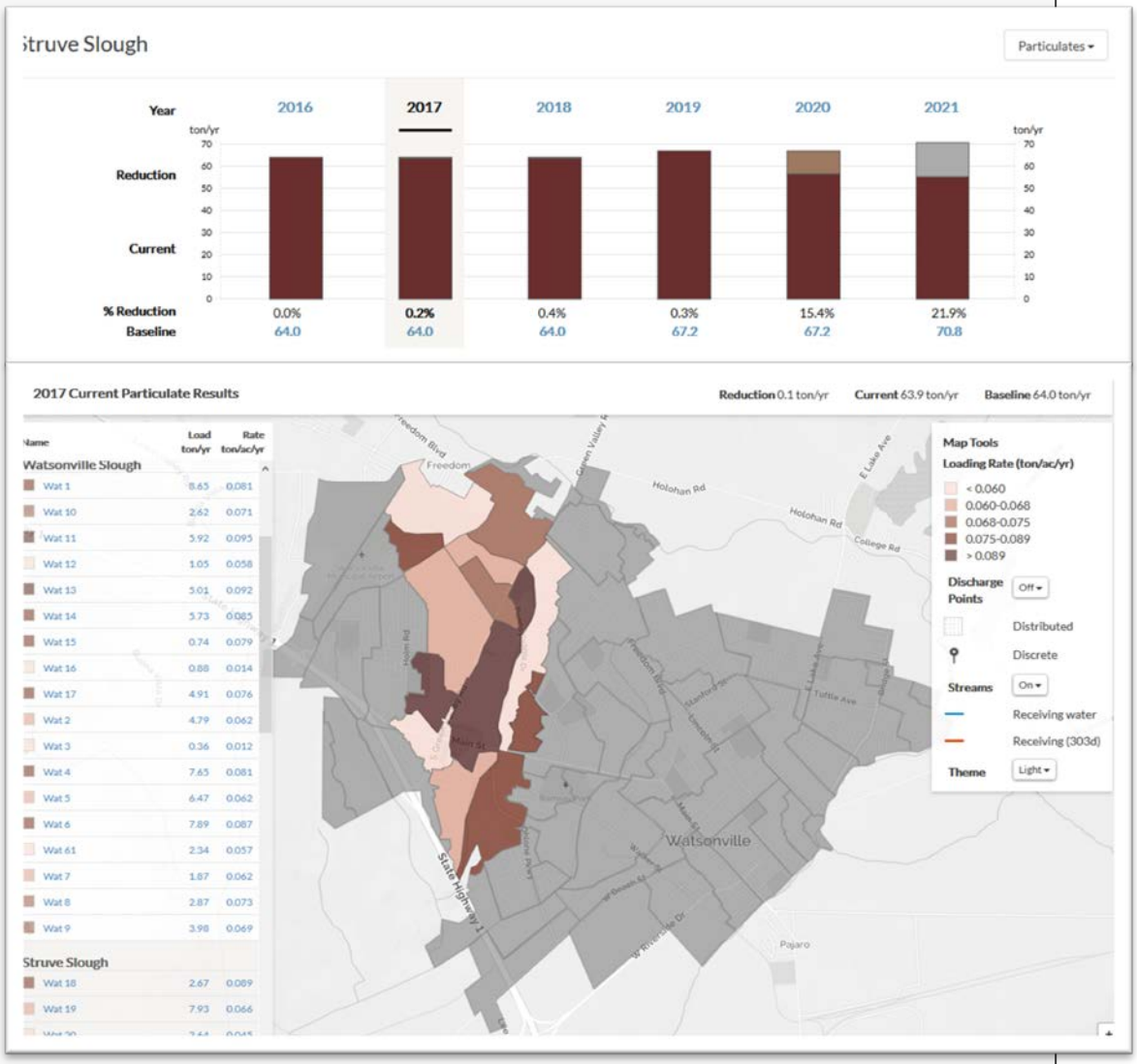
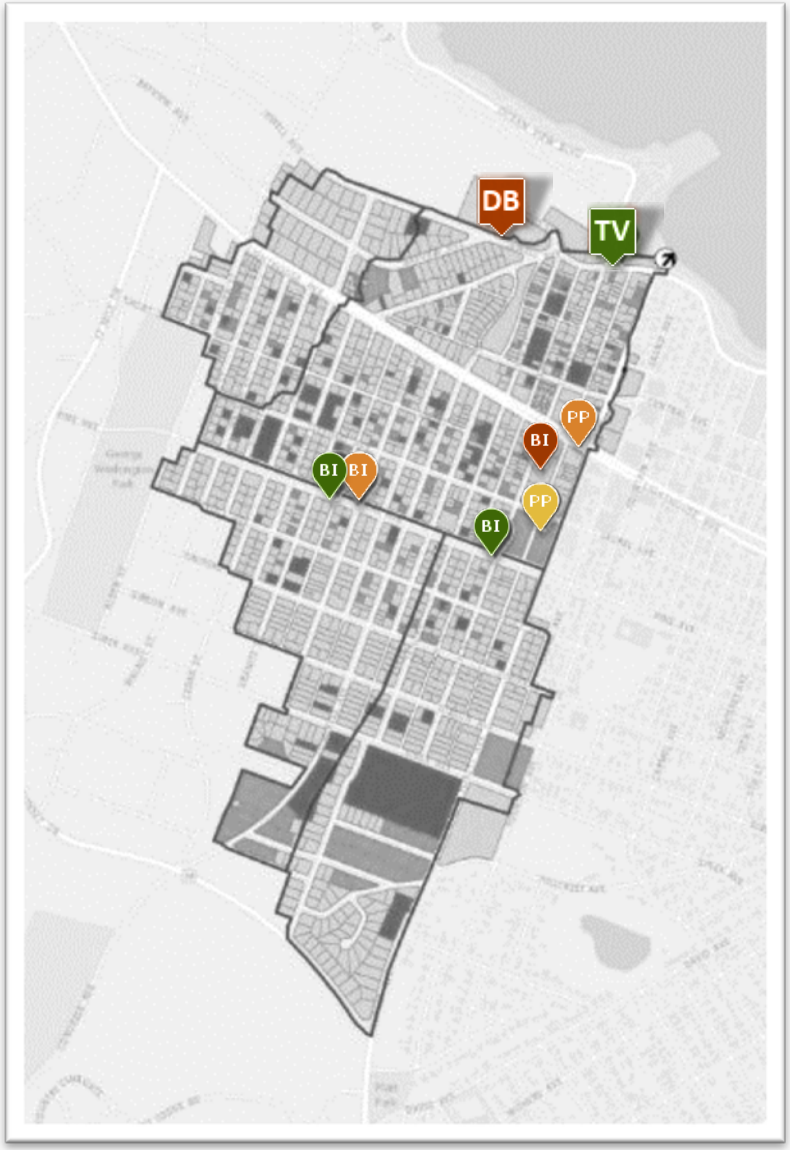
Keep it simple, keep it spatial

- Spatial outputs support prioritization
- Tracking progress over time supports permit compliance/reporting



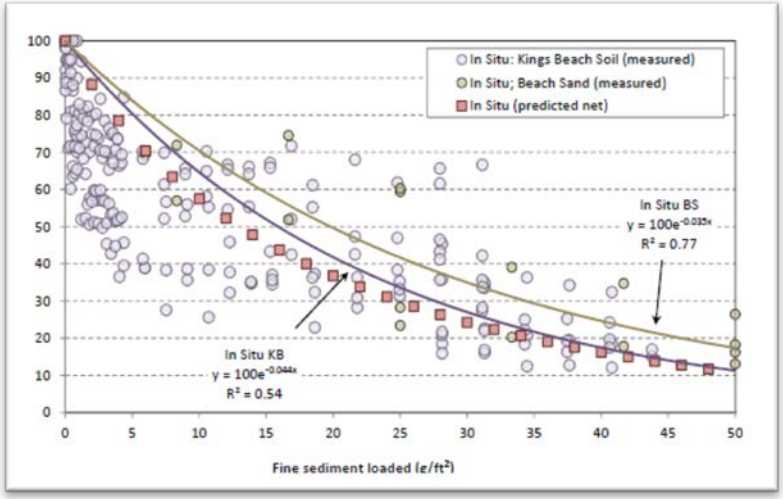
As simple as possible, but no simpler

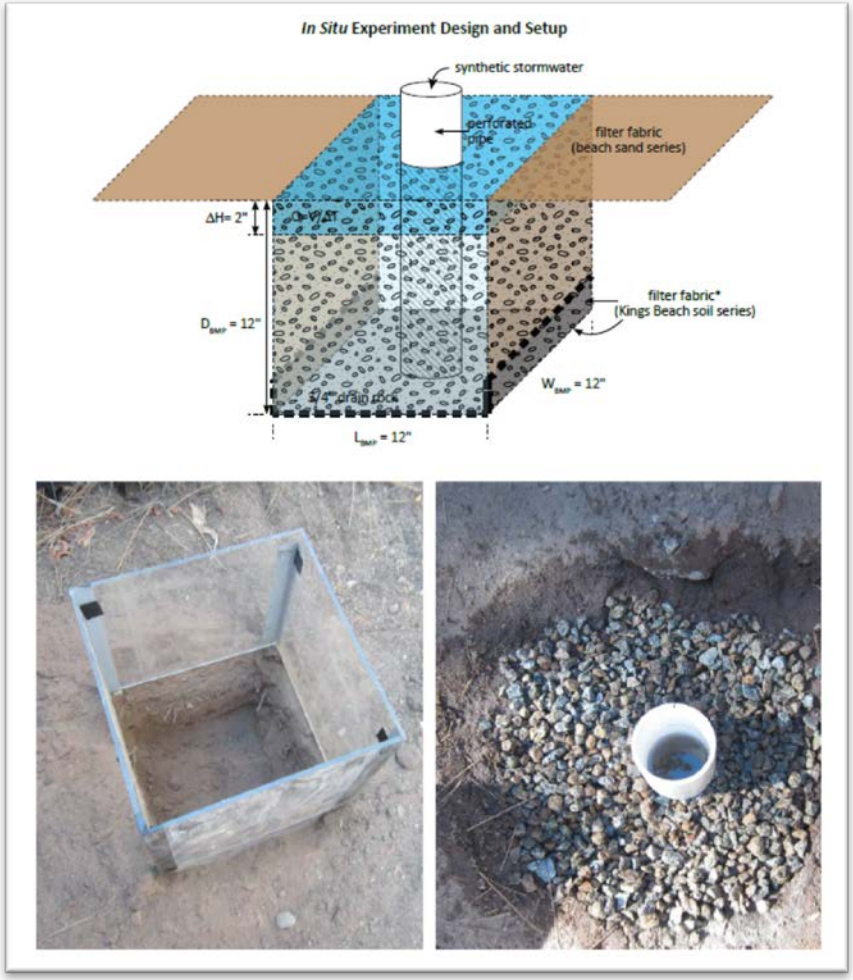
- Focus detail on that we most need to know about
- BMP locations, types, performance condition
- Green = full function,
  Red = maintenance required



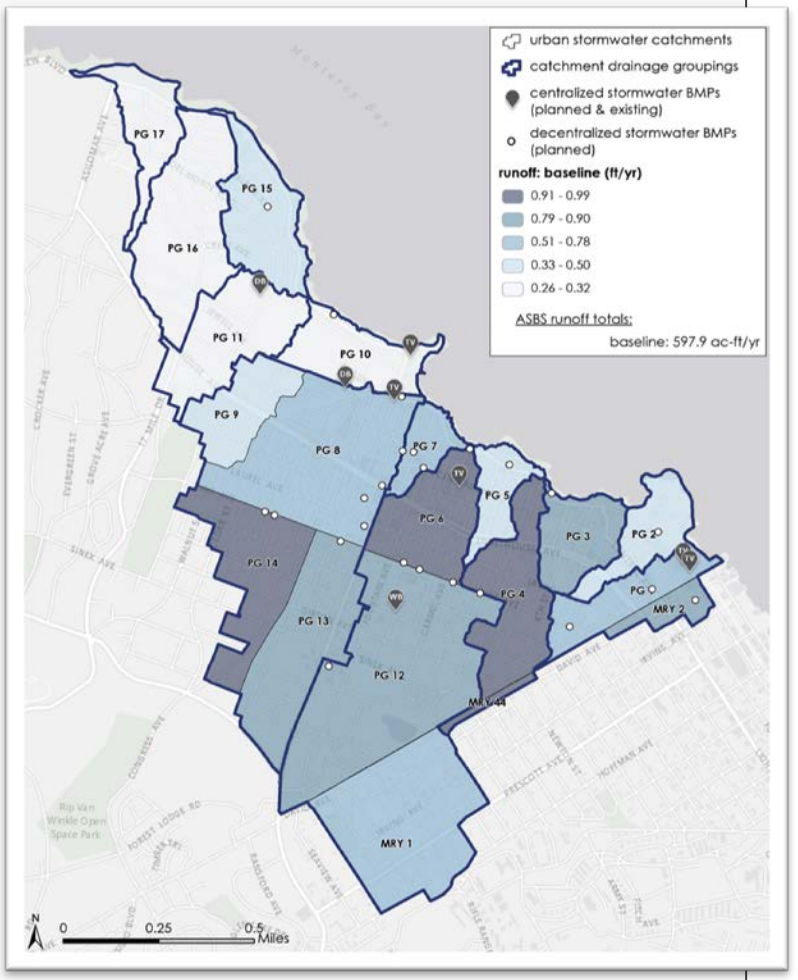
Quantifying BMP performance

- Infiltration BMPs clog up and stop working
- Soil types, media, configurations, loading rates tell us how quickly they do





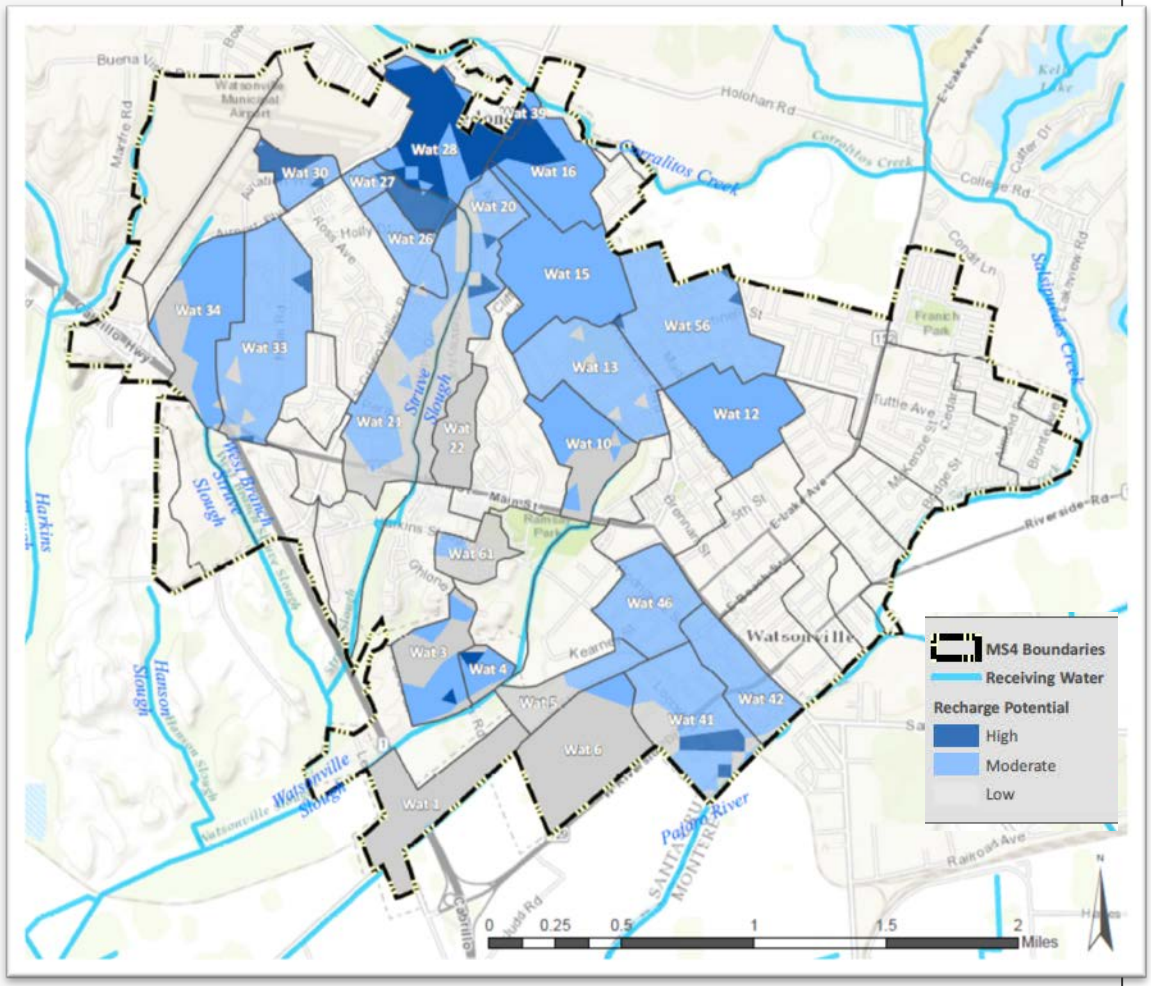
Planning scenarios, Pacific Grove ASBS



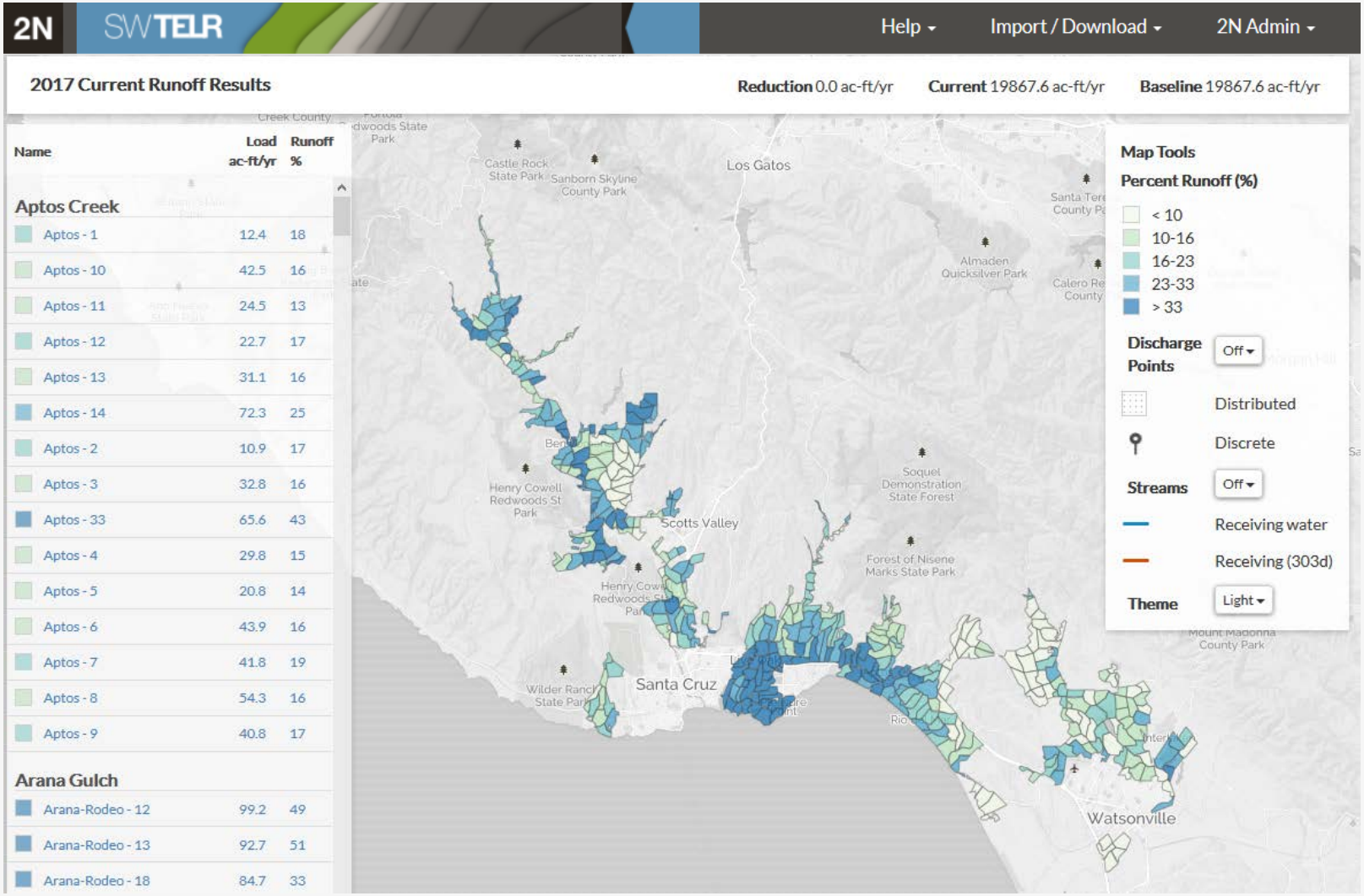
	Baseline	Planned	Reduction
Runoff (ac-ft/yr)	598	462	136 (23%)
Particulates (T/yr)	71.3	29	42 (60%)

Groundwater recharge opportunities, City of Watsonville

Stormwater runoff + groundwater recharge potential

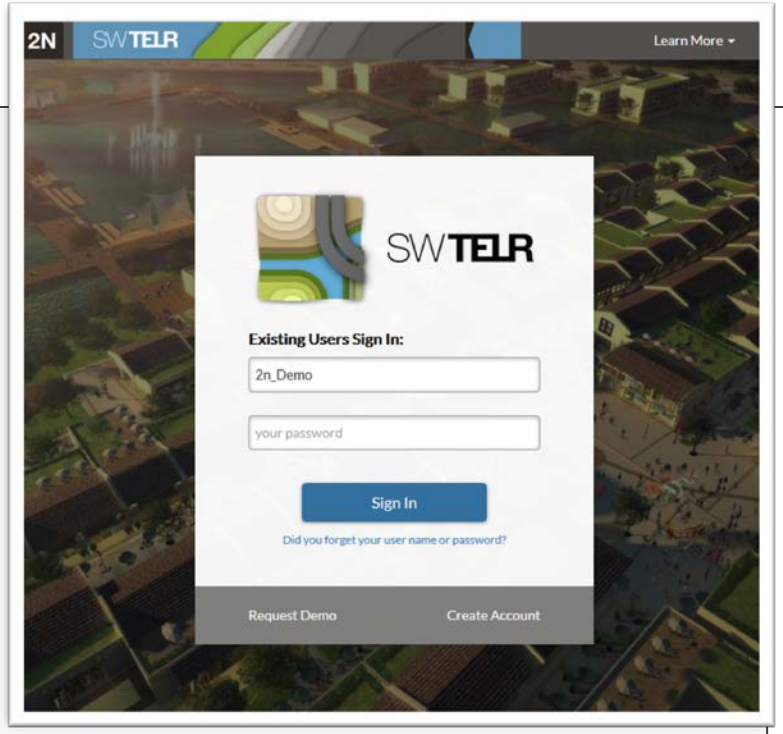


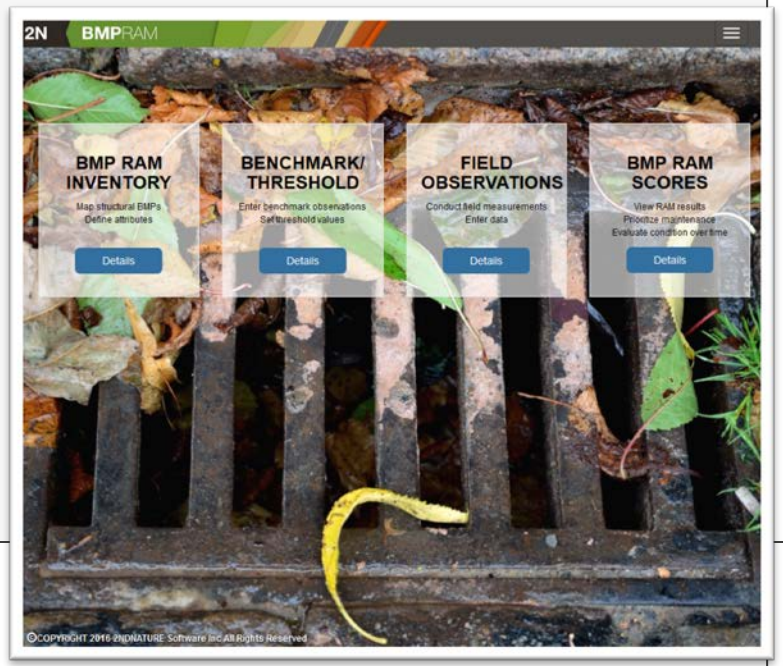
Regional MS4 compliance, County of Santa Cruz



Modeling for the masses

- Usable tools + transparent documentation = better decisions
- Empower those in a position to take action that reduces stormwater impacts





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