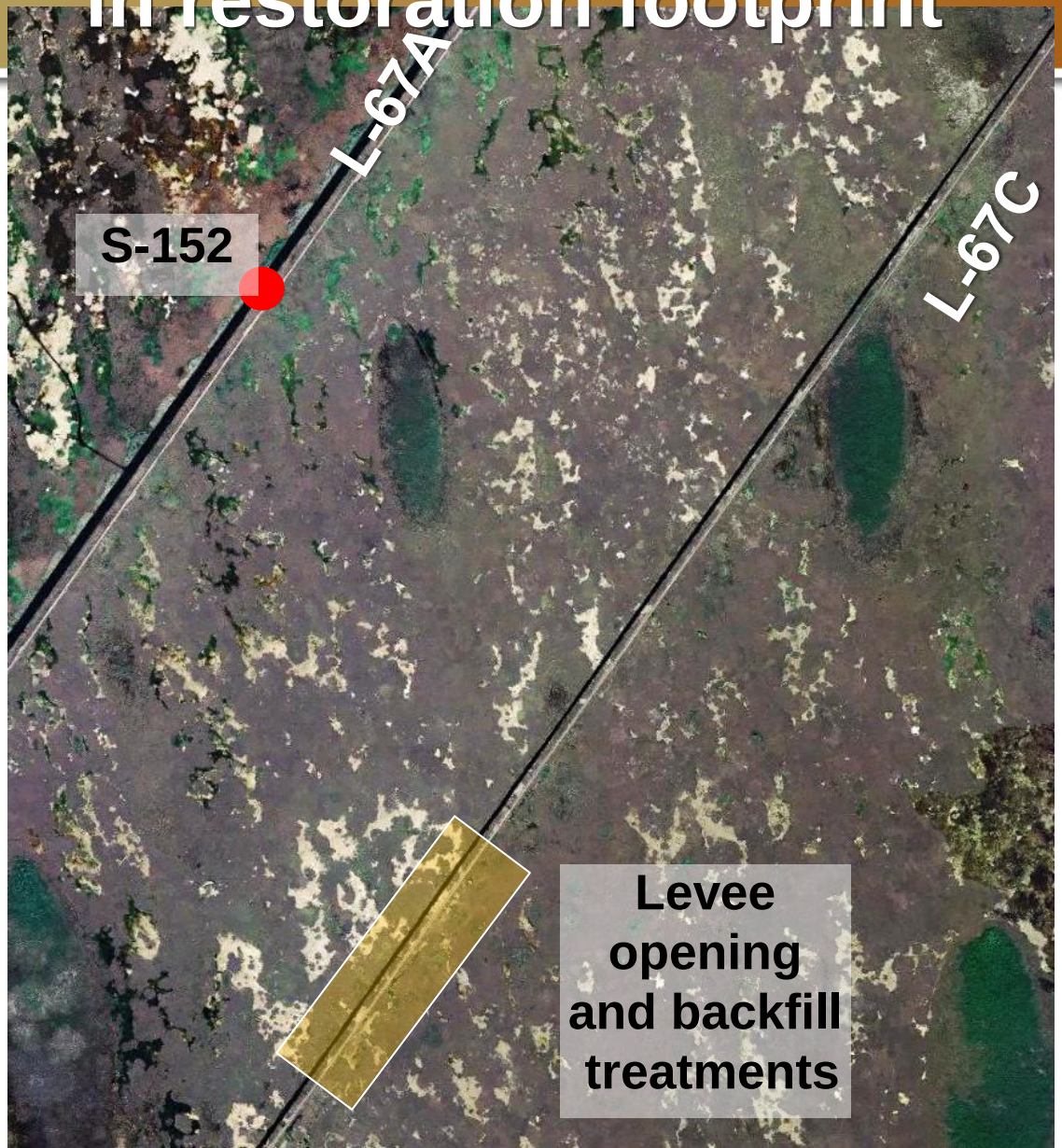
Part Two – Ridge and Slough Results

Jud Harvey

U.S. Geological Society

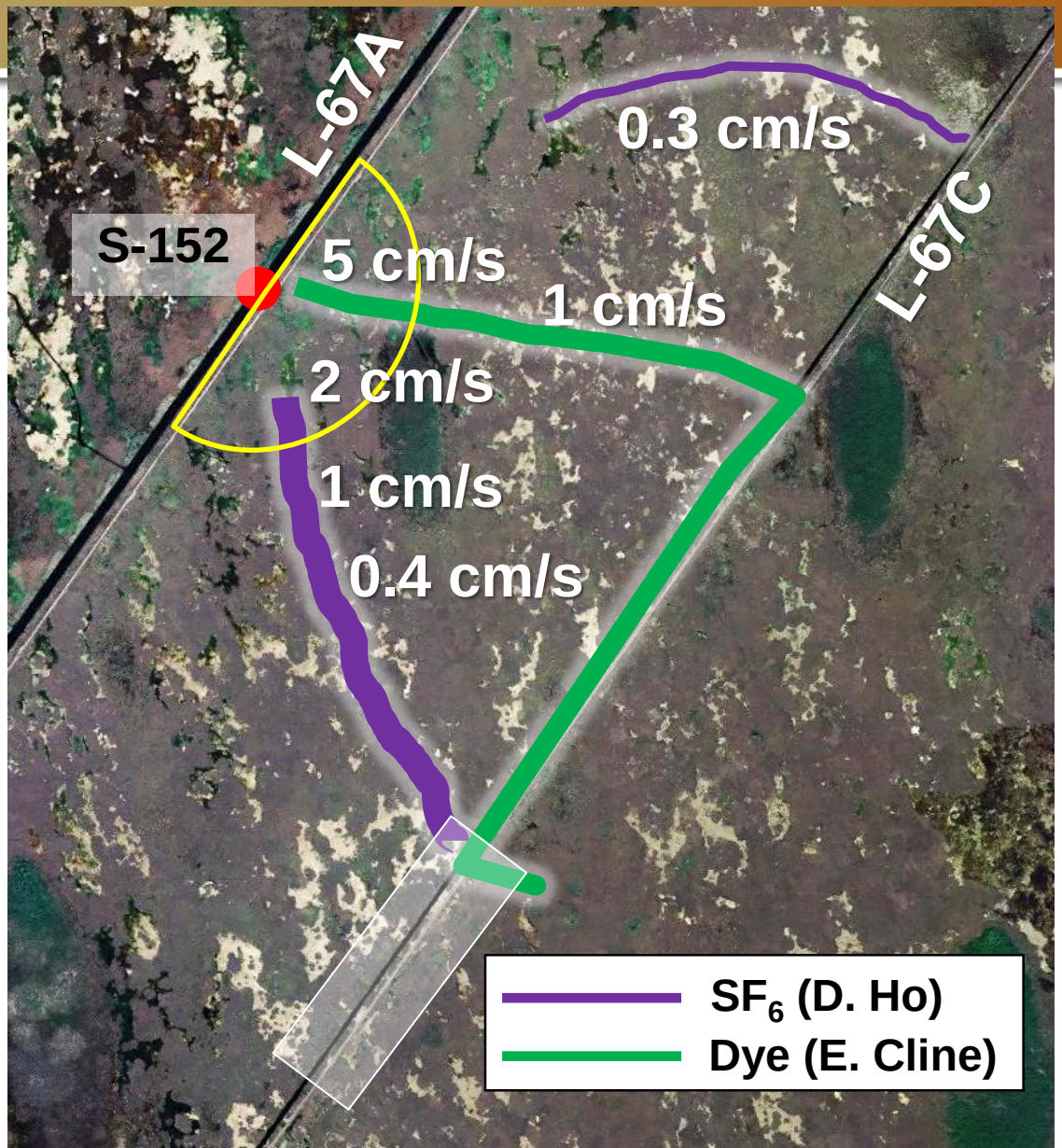
DPM – degraded and centrally located in restoration footprint



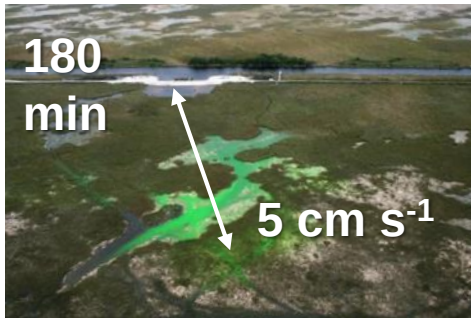
- sawgrass percentage = 87%
- flow velocity = 0.003 m/s
- microtopographic difference ridge-slough = 17 cm

Choi and Harvey, in prep., Restoration Ecology

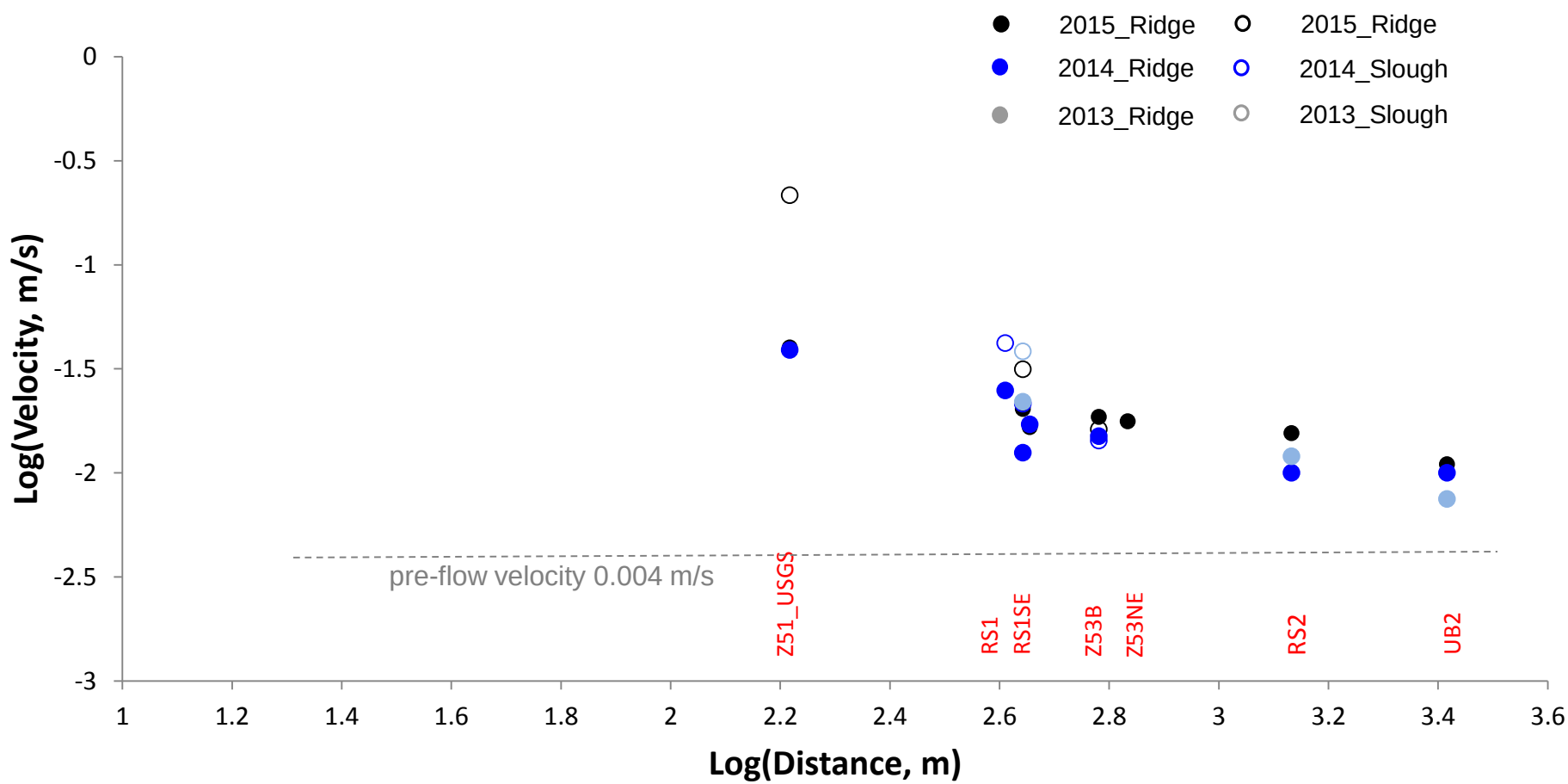
Flow field resolved with water tracers



Dye tracer, 2013



DPM: a test-bed for managing high flows to improve outcomes



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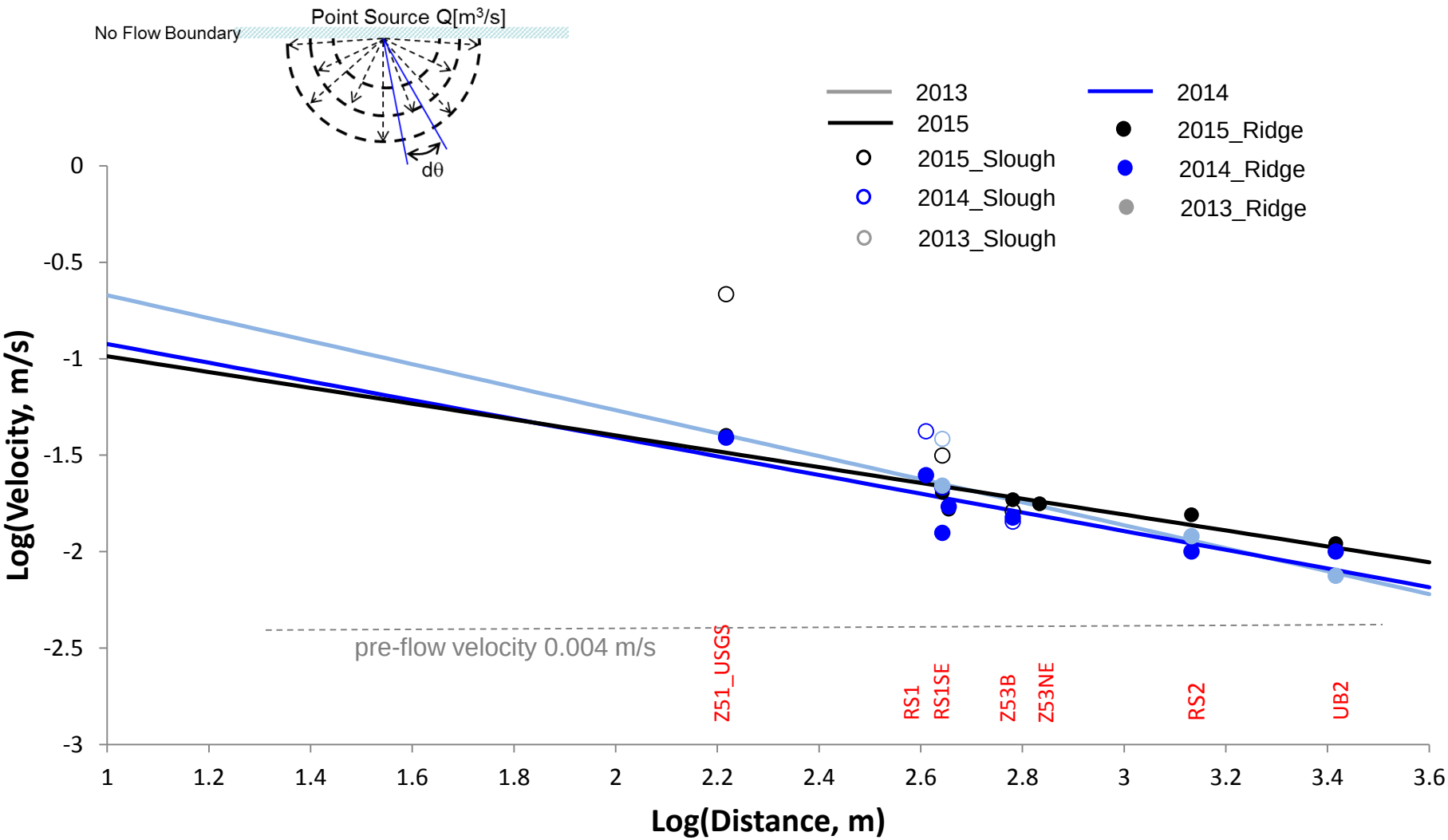
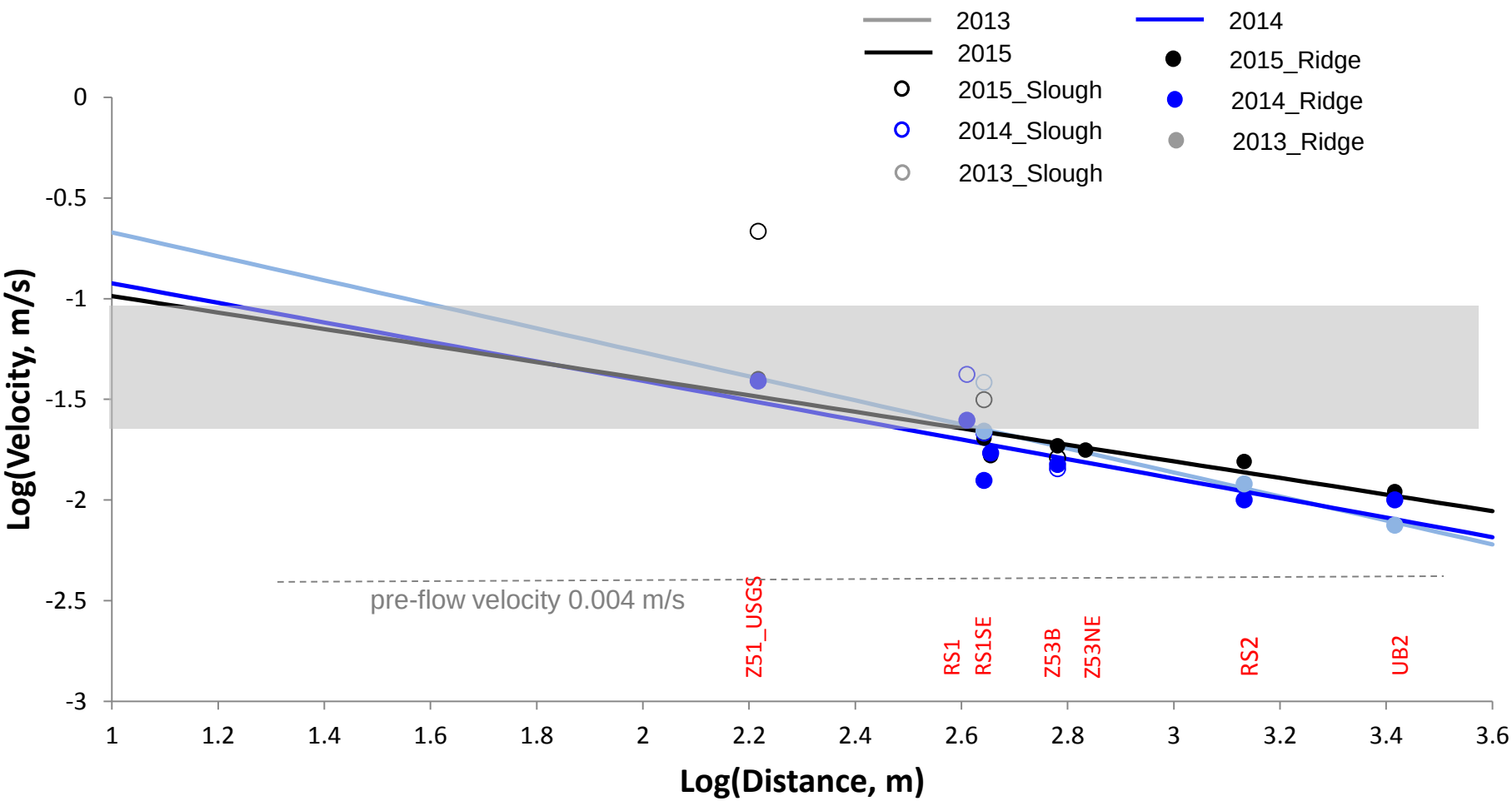


DPM: "optimal" flow conditions achieved in only a very small area



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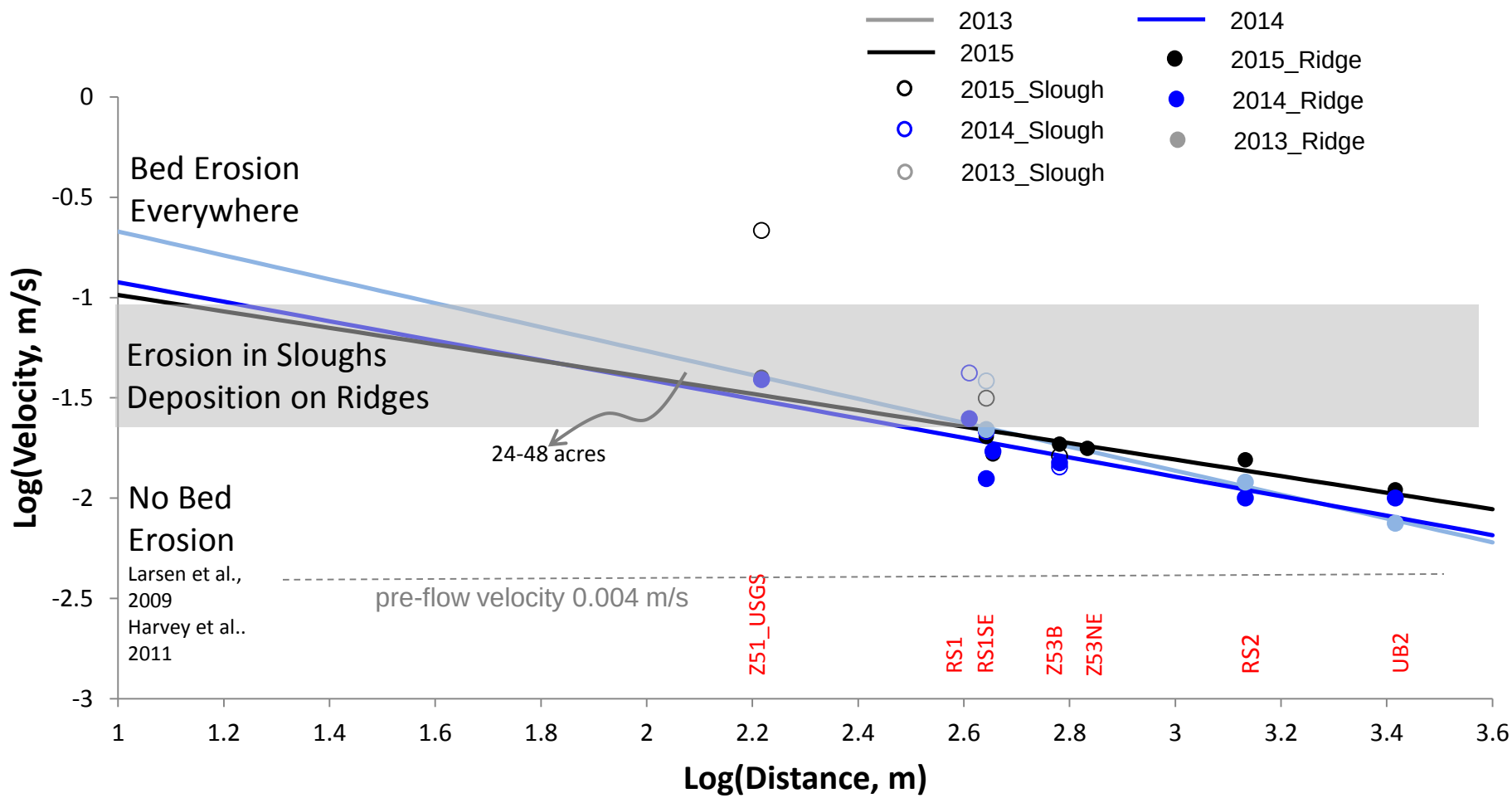
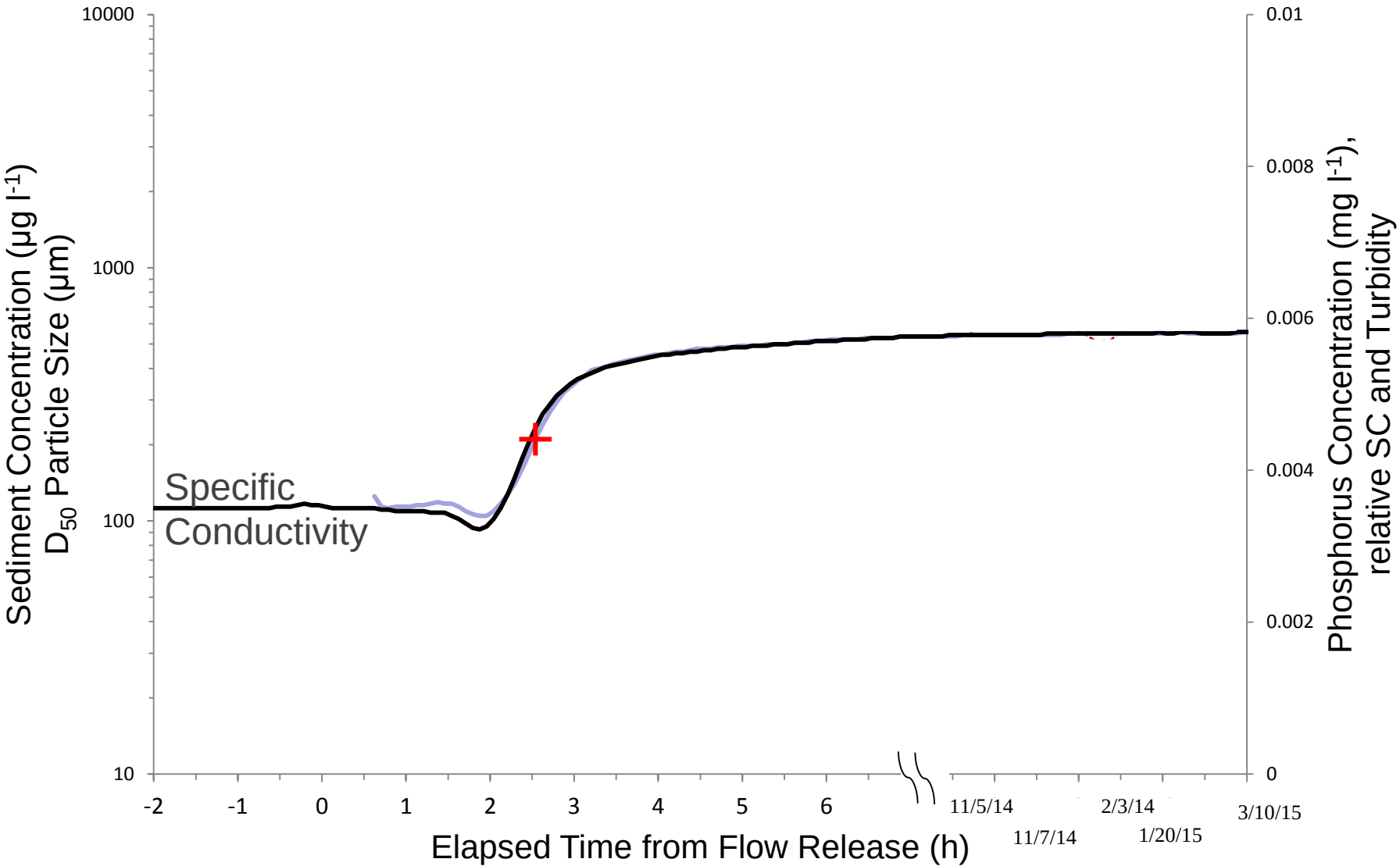


High flow accelerates periphton sinking, bed floc turnover (slough clearing)

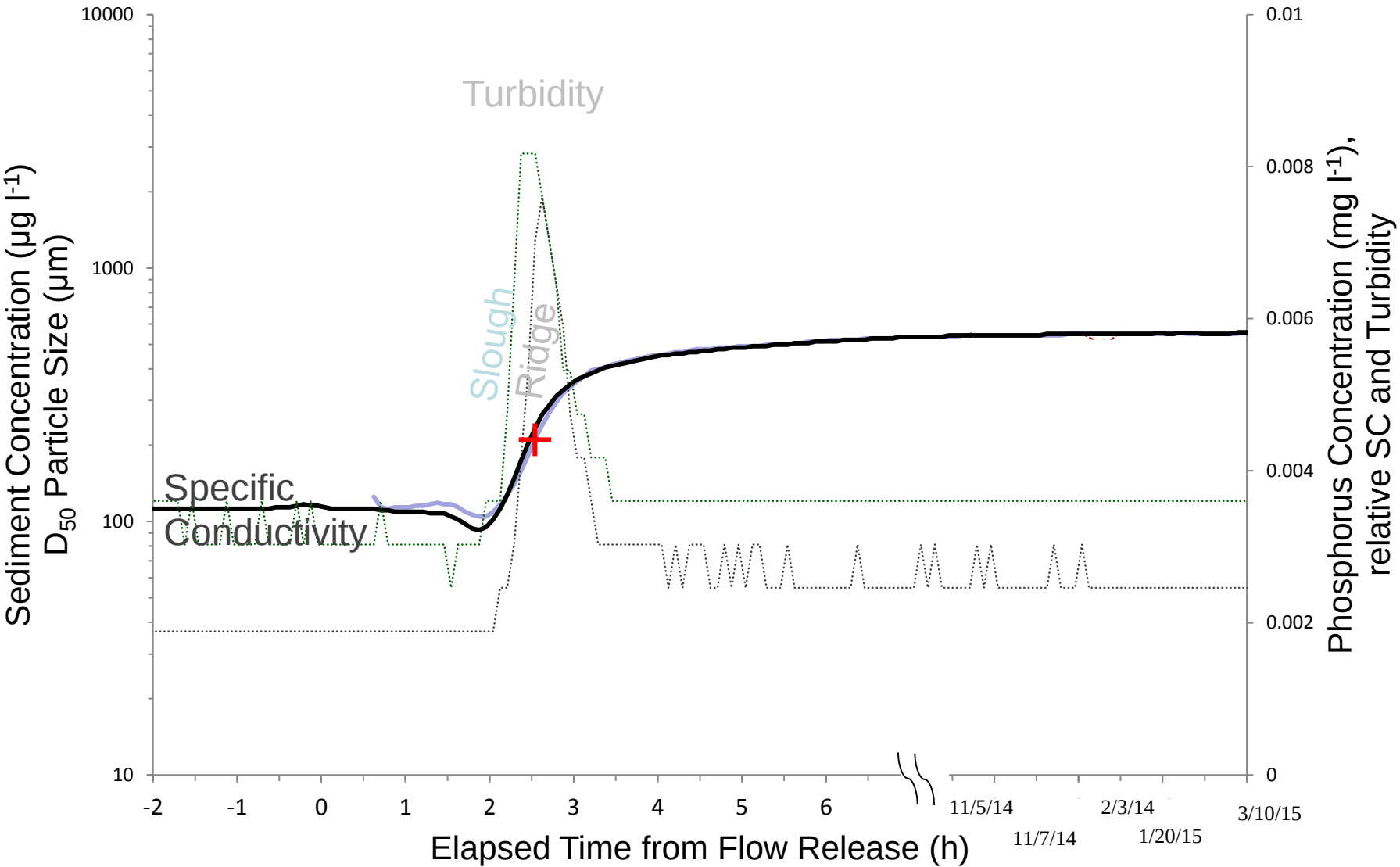
Data and video from C. Saunders - SFWMD

Ridge flow speed
before flow release
during flow release
Depth (cm)
Horizontal Velocity (cm/s)
0
10
20
30
40
50
60
0
1
2
3
4
5
Slough flow speed
before flow release
during flow release
Depth (cm)
Horizontal Velocity (cm/s)
0
10
20
30
40
50
60
0
1
2
3
4
5
USGS

Specific conductivity times arrival of high-flow source water

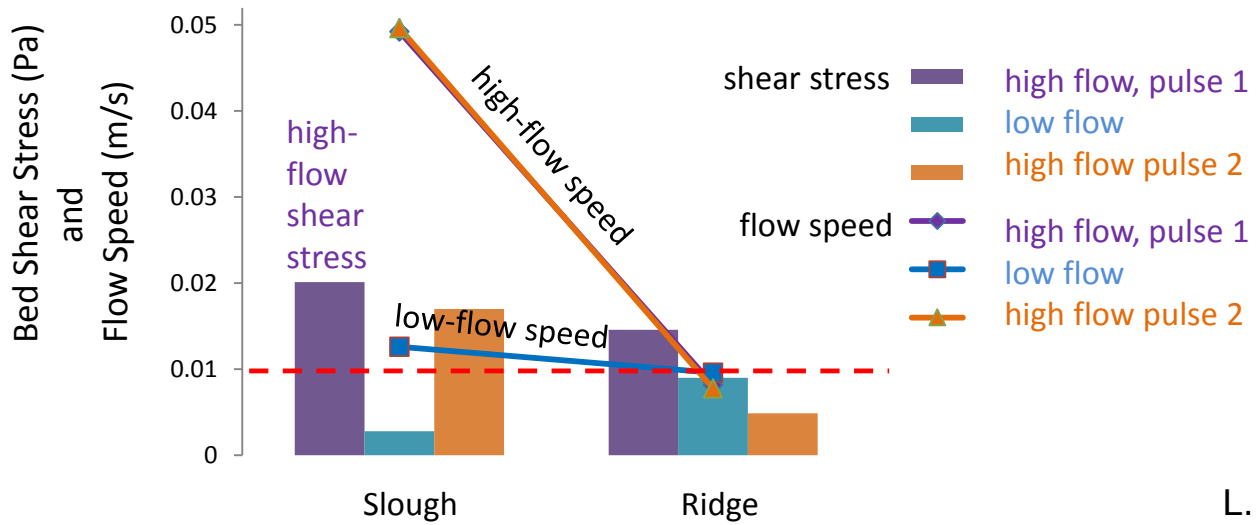


Suspended particles arrive as a "spike" on leading edge of flood wave



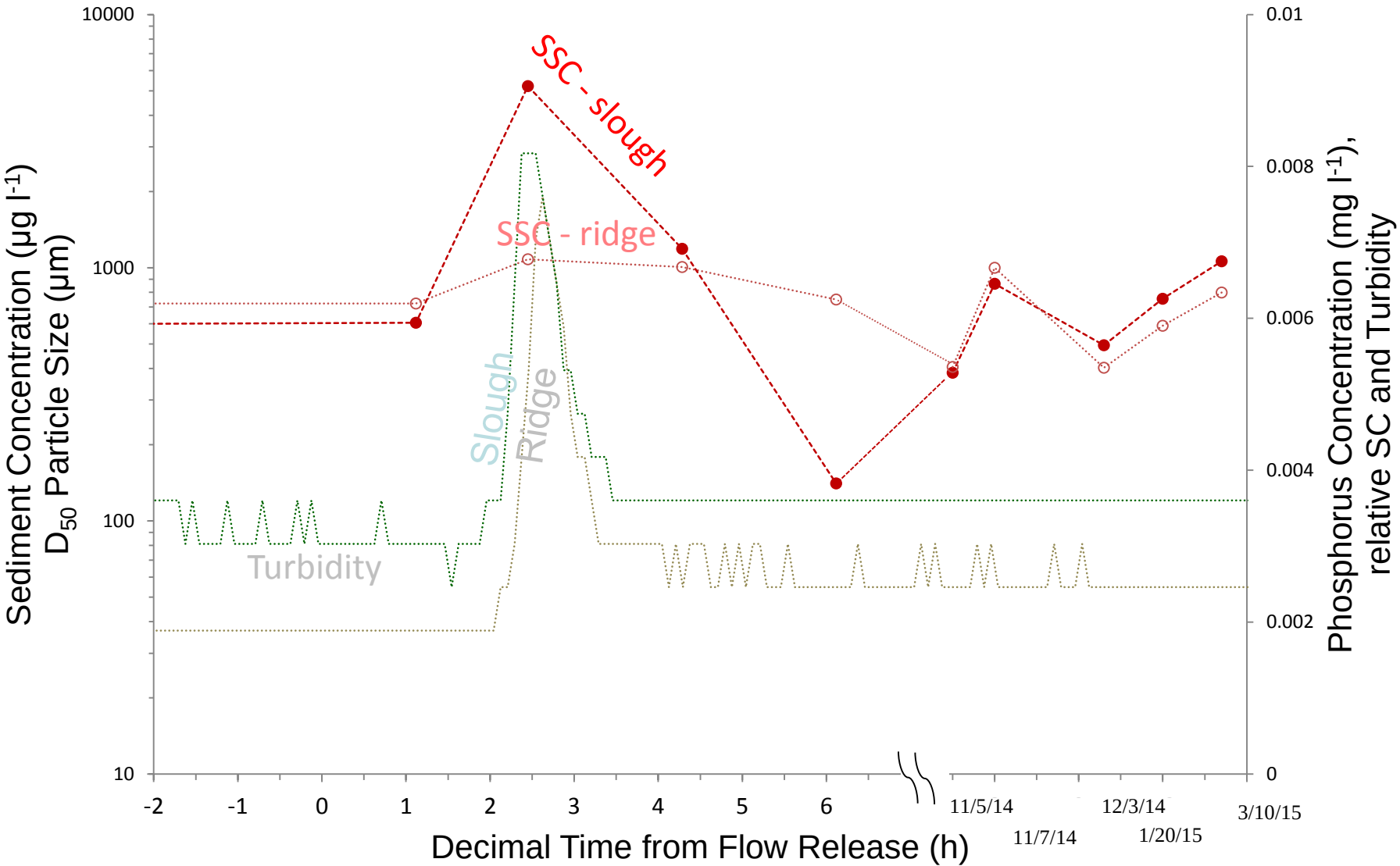
Low flow High Flow

Average Mass Metaphyton	Low-Flow	High-Flow
per stem (grams)	0.090 (0.011 S.E.)	0.003 (0.0005 S.E.)
per surface area (grams cm^{-2})	0.004 (0.0005 S.E.)	0.0001 (0.00002 S.E.)

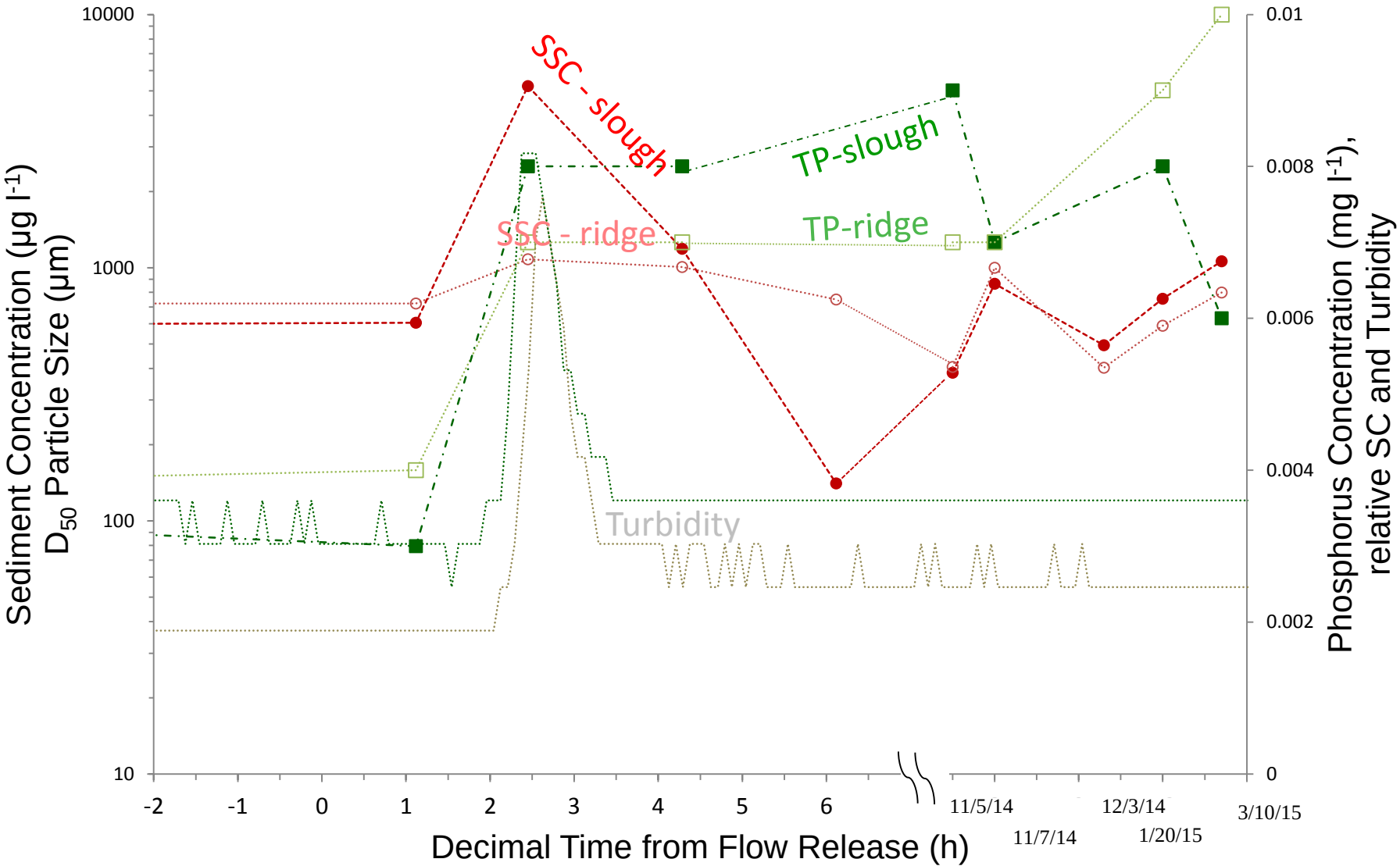


L. Larsen and A. Hurst (Berkeley)

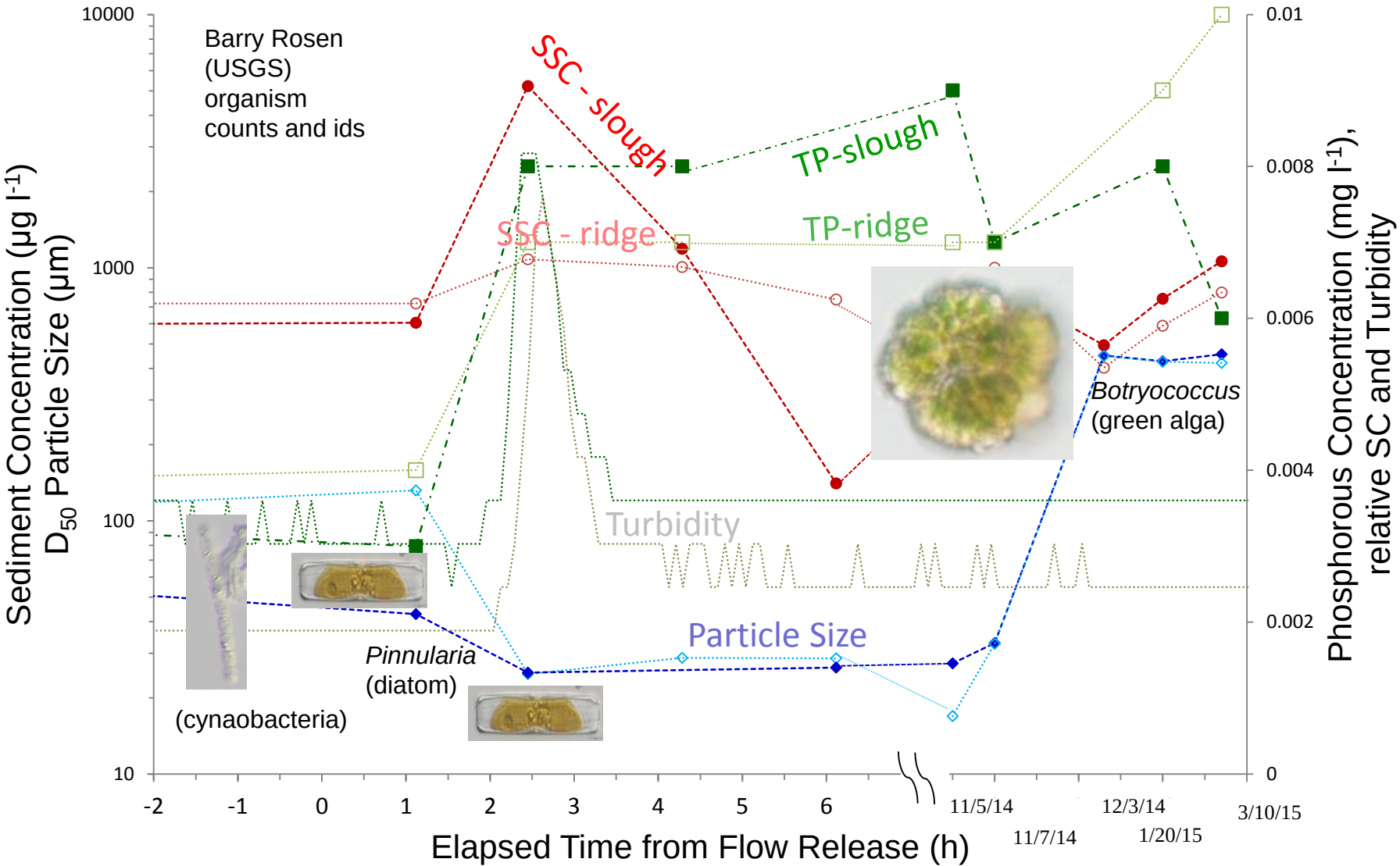
Particles transported in sloughs deposited on ridges



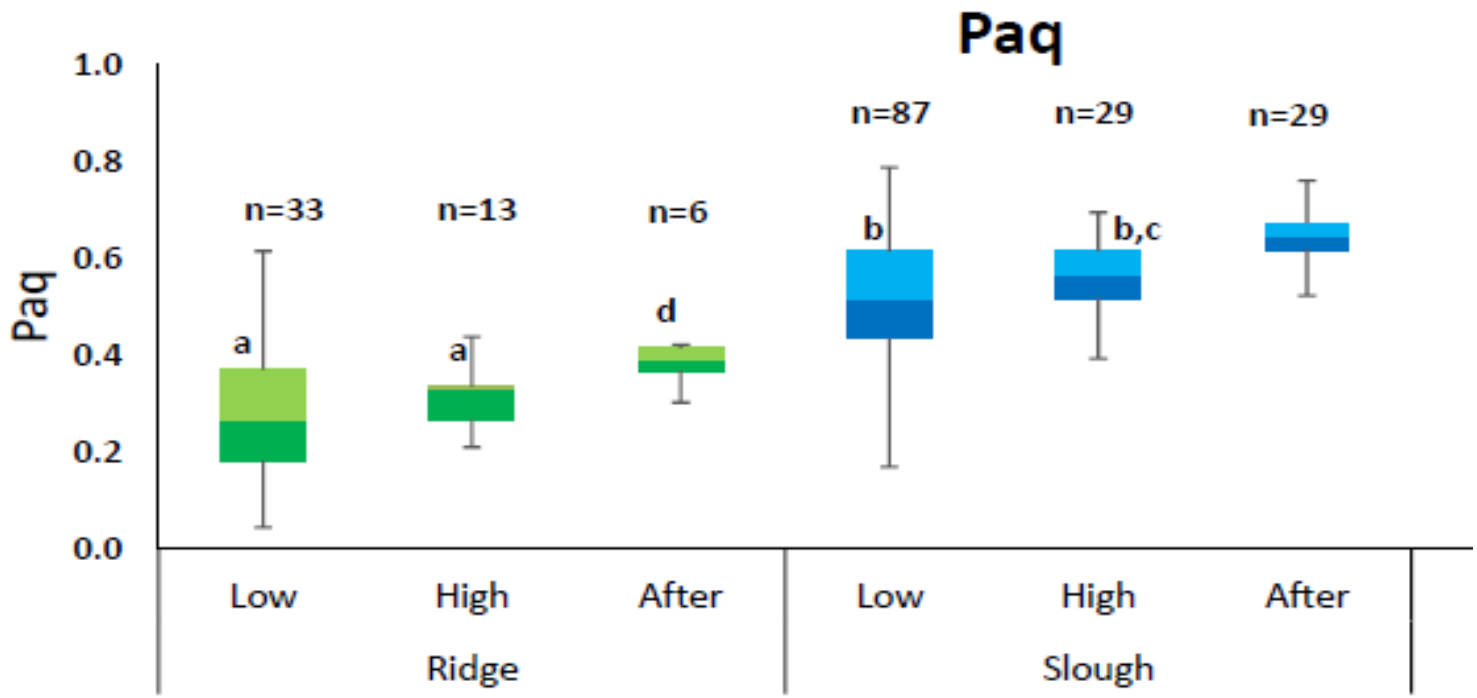
Suspended particles became more P-enriched



System evolved towards larger, more P-rich particles in transport



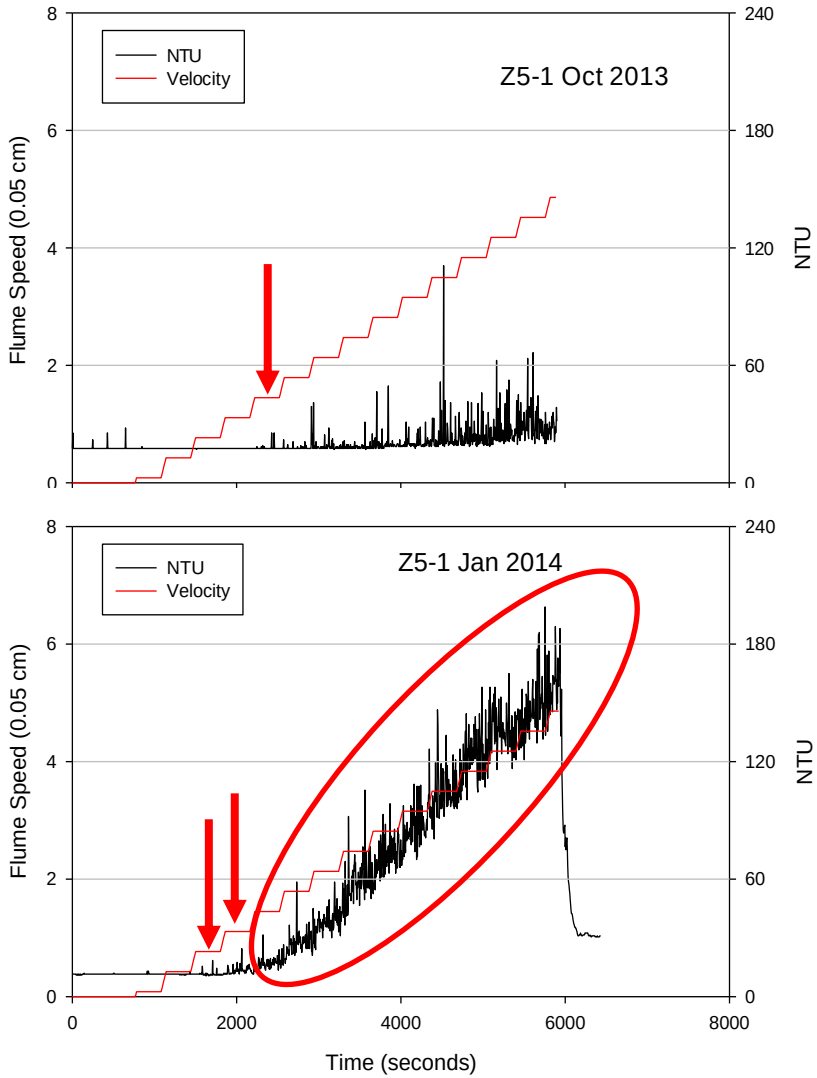
Ridge floc became more "slough-like"



- **Paq is a ratio of fatty acid chain lengths – higher values (>0.4) correspond to slough derived OM (vascular plants only), lower values (<0.3) are ridge-derived**

R. Jaffe(FIU) and C. Saunders (SFWMD)

Bed floc became more erodible with flow

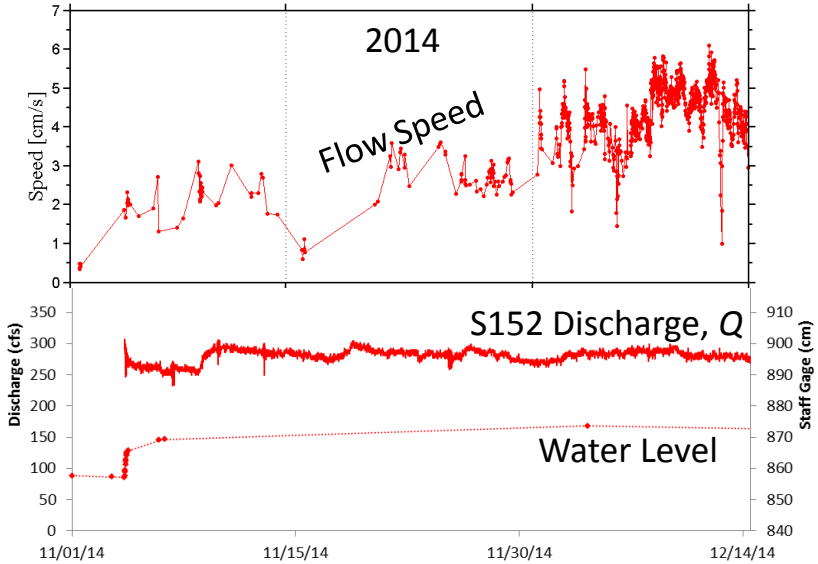


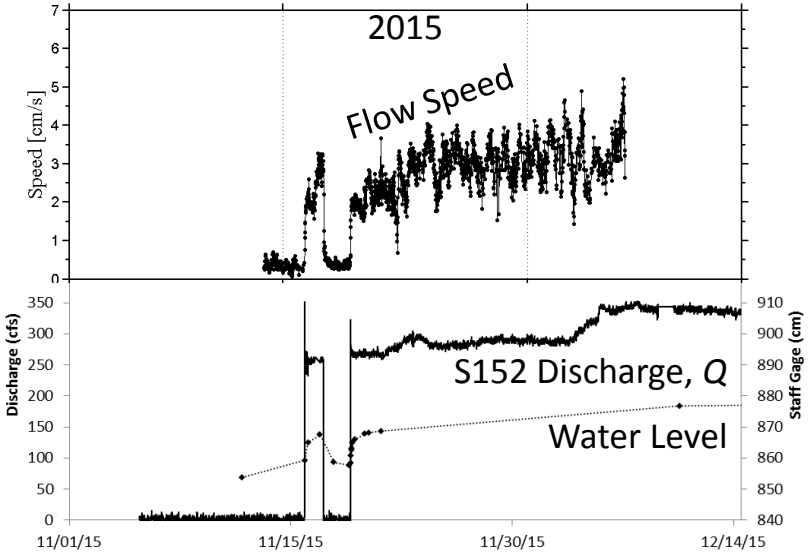
150-m

Describe one graph first then show additional sites

S. Newman and C. Saunders (SFWMD)

Feedbacks: slough clearing increases flow/sediment transport…more flow





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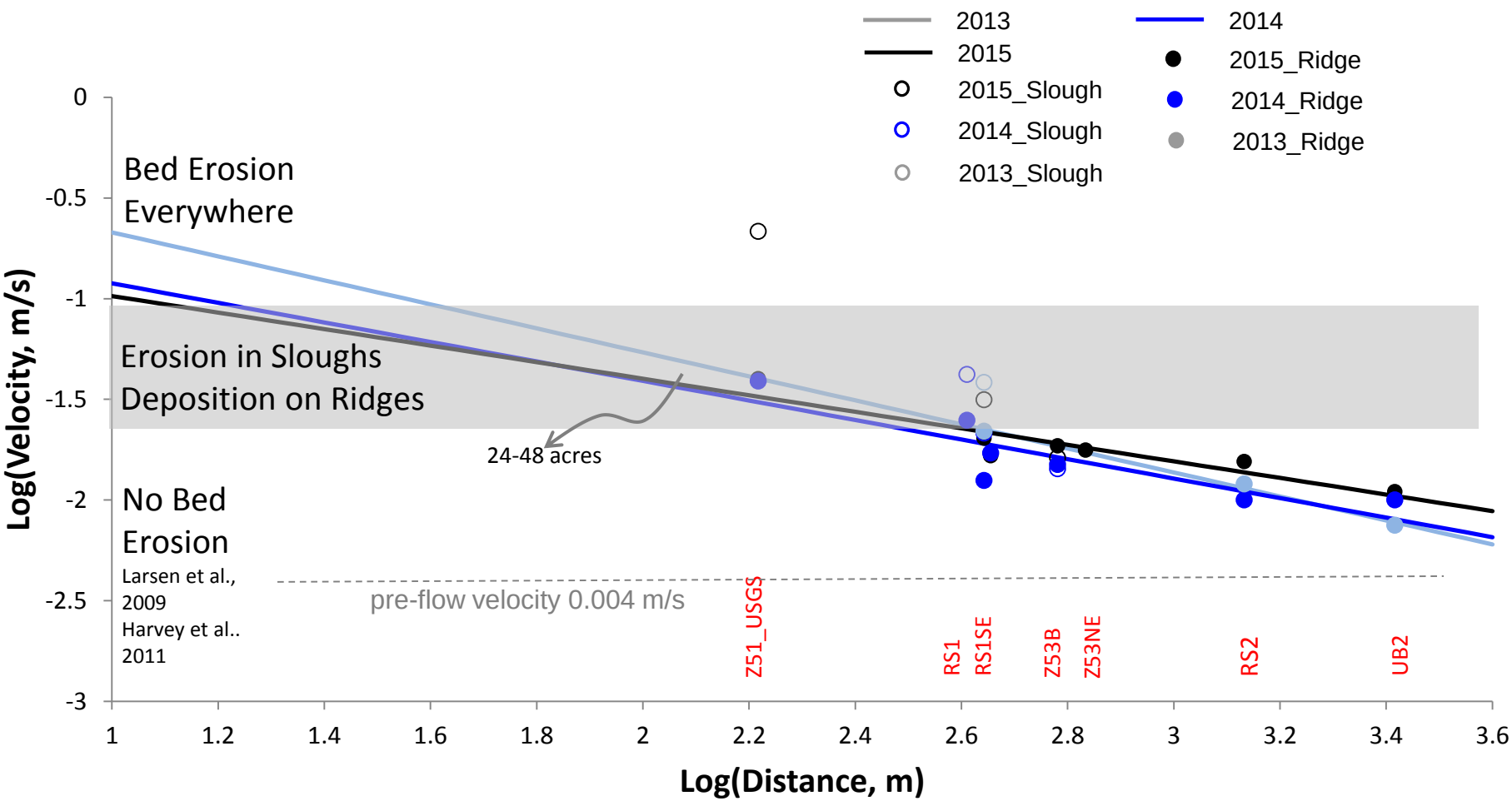
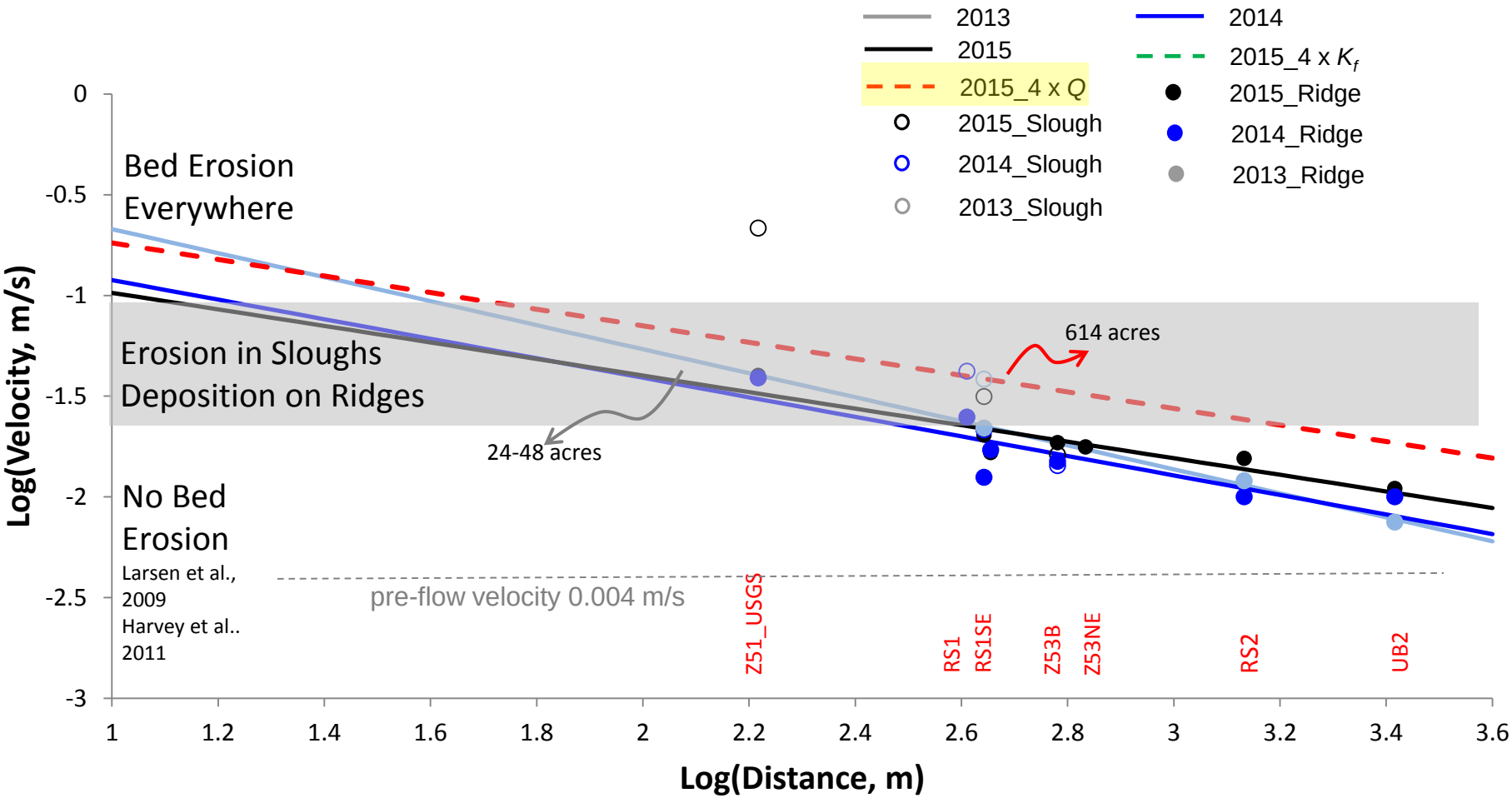
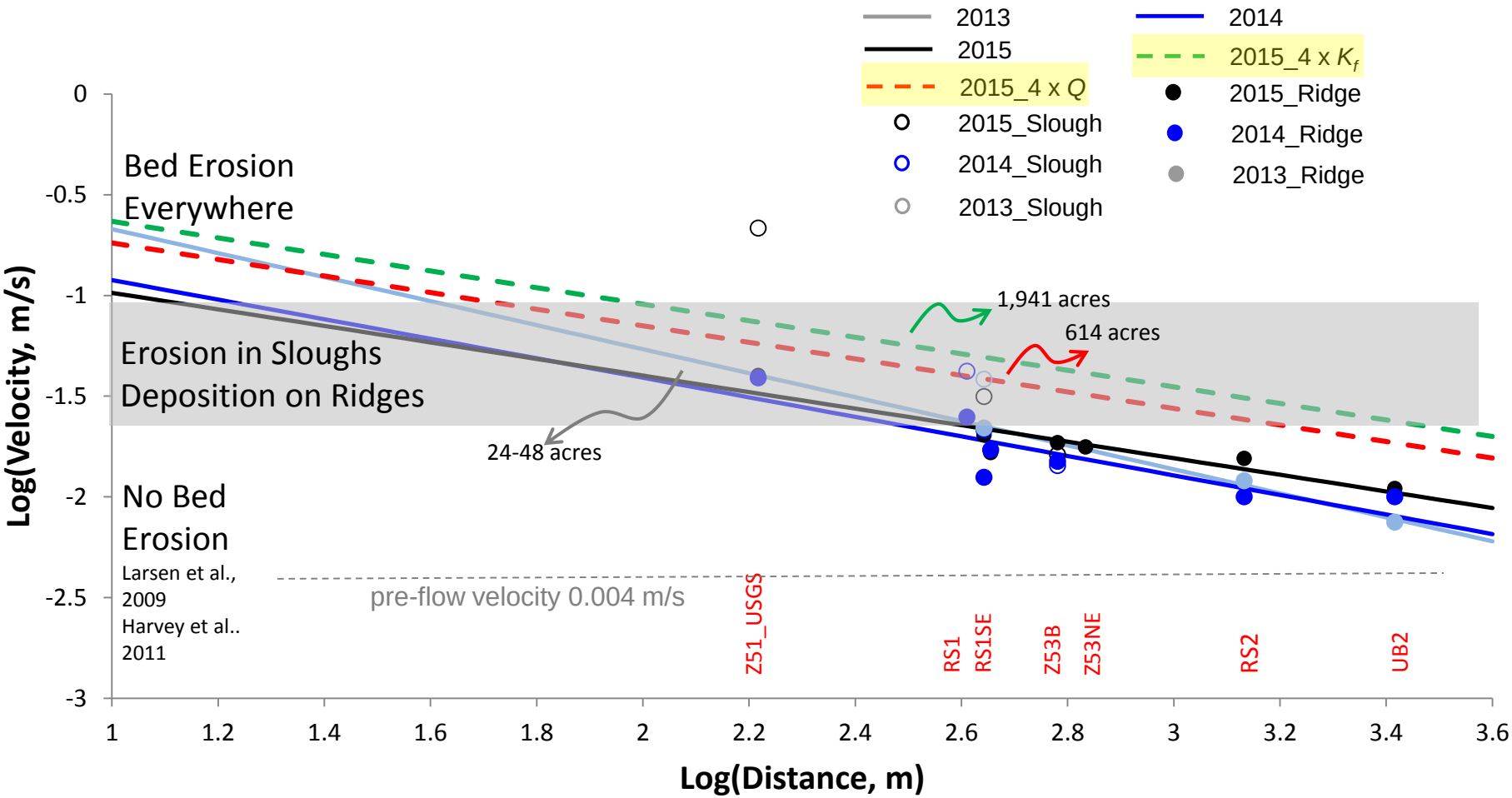


But…"optimal" conditions sensitive to *Q*, discharge at S-152 structure



Even more sensitive to % sawgrass
Slough connectivity is self-reinforcing



How will restored flow influence outcomes for ecosystem

- **Short-duration pulse:** Highest SSC (10x increase) and TP (3 x increase) mobilized from bed and metaphyton and deposited on ridges.
- limited influence because mobilized sediment quickly deposited and sediment sources quickly deplete. Sensitive to *Q* and slough %.

- **Sustained high flow:** Periphyton sinking to bed, break up, and transport that increased slough-to-ridge sediment exchange.
- Triggers slough clearing, a self-reinforcing process (slough clearing increases flow, which transports greater sediment), relative effects of high flow and canal water source not yet clear.