

Ebullition-Facilitated NAPL Transport: Case Studies where Screening Evaluations Changed the Remedial Path

Lisa Reyenga
June 2024



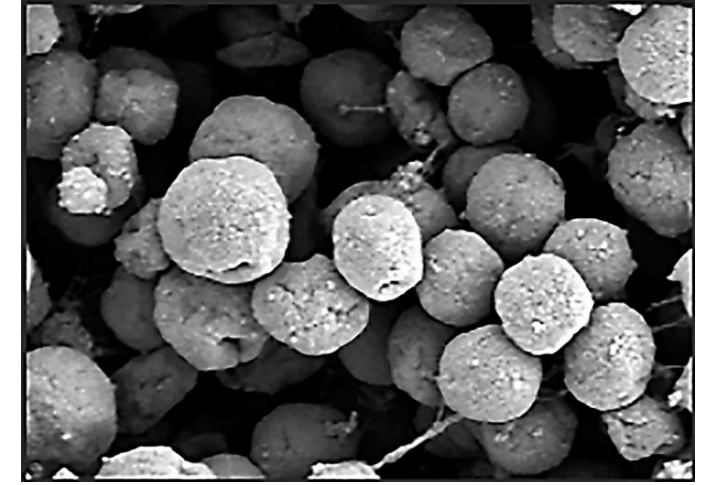
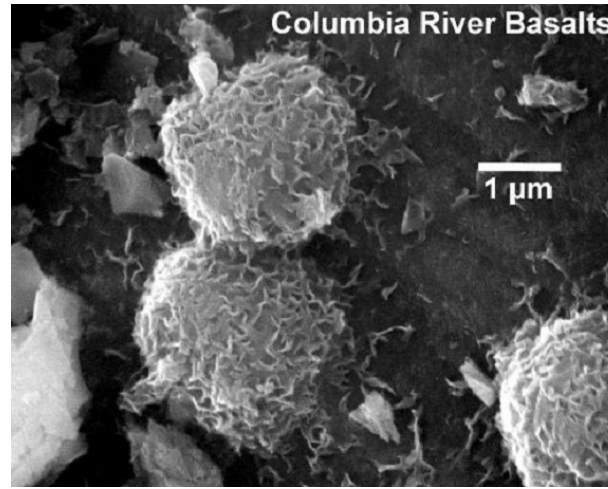
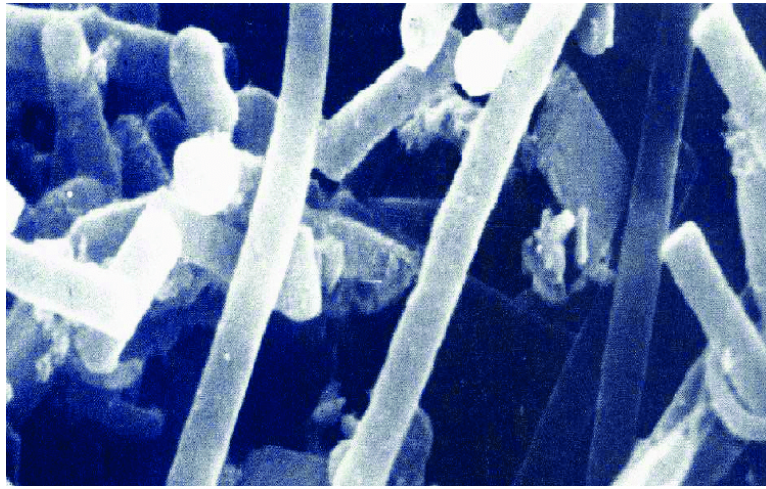
what are other
words for
ebullition?



outburst, gush, effervescence,
blowup, eruption, fermentation,
fit, paroxysm, frothing,
bubbling



 Thesaurus.plus



Methanogenic bacteria break down organic material
and produce methane gas.

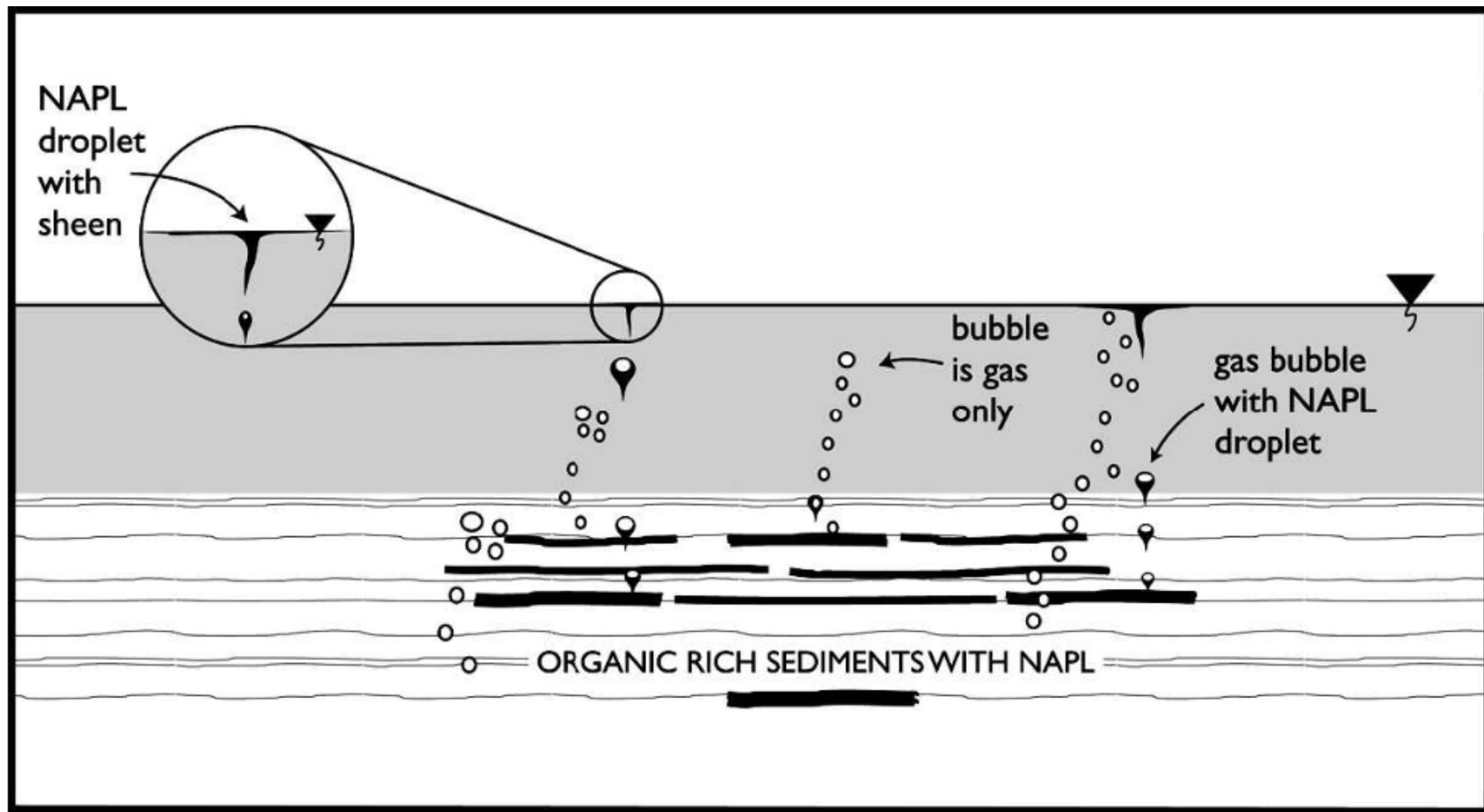
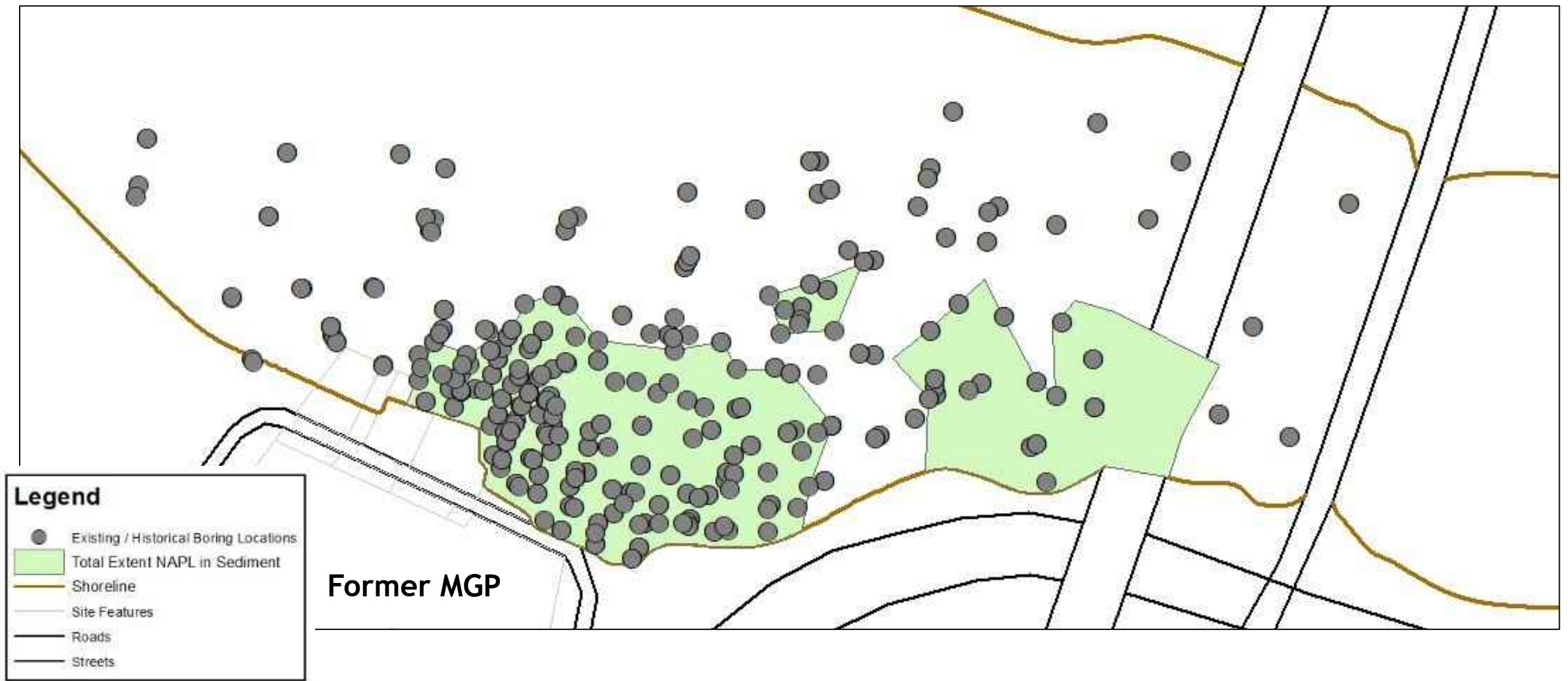


Image from McLinn and Stolzenburg 2009





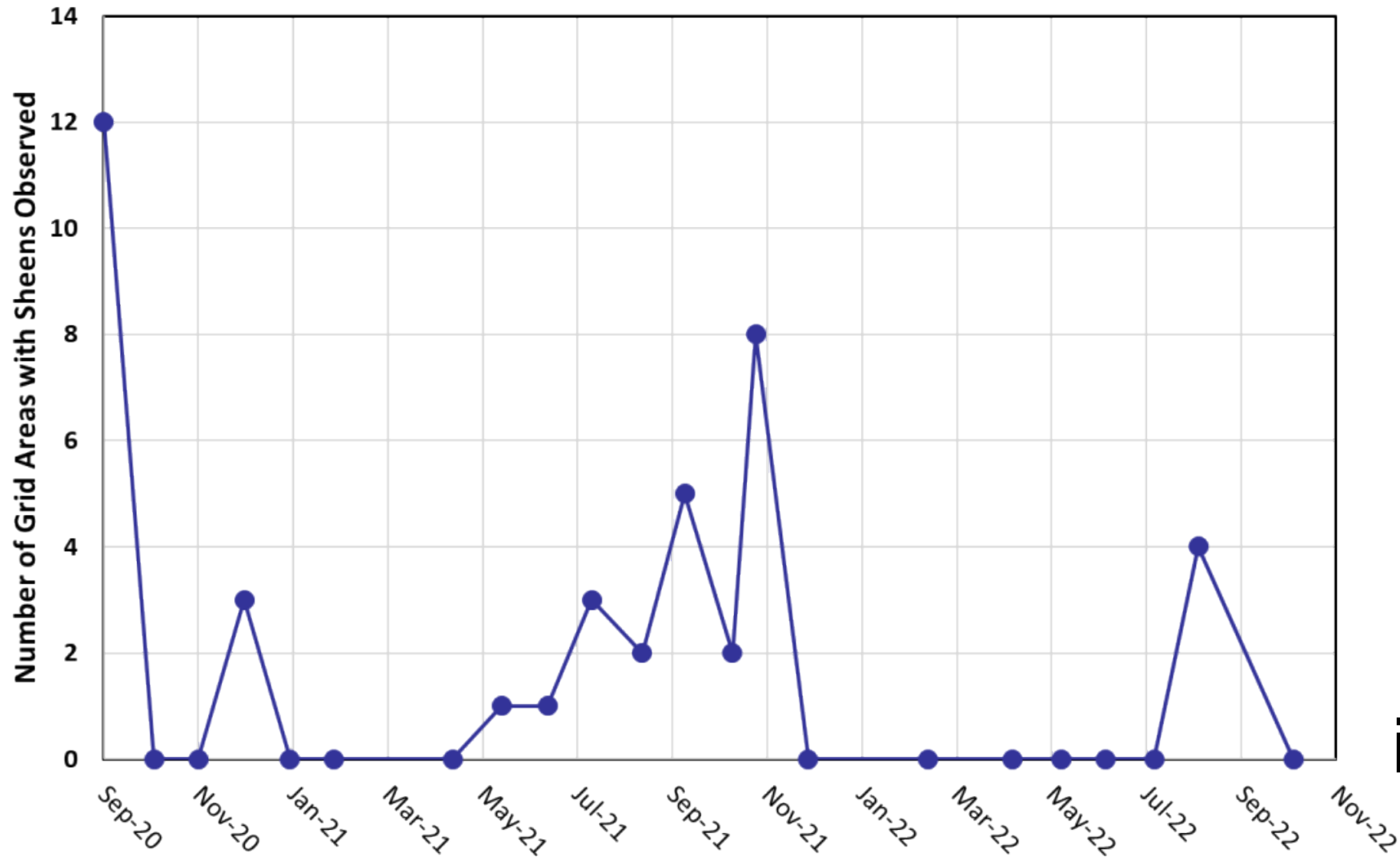
Case Study #1



NAPL is present in sediment adjacent to a former MGP up to 30 feet below the sediment surface.



EFT had not been documented prior to the formal NAPL study.



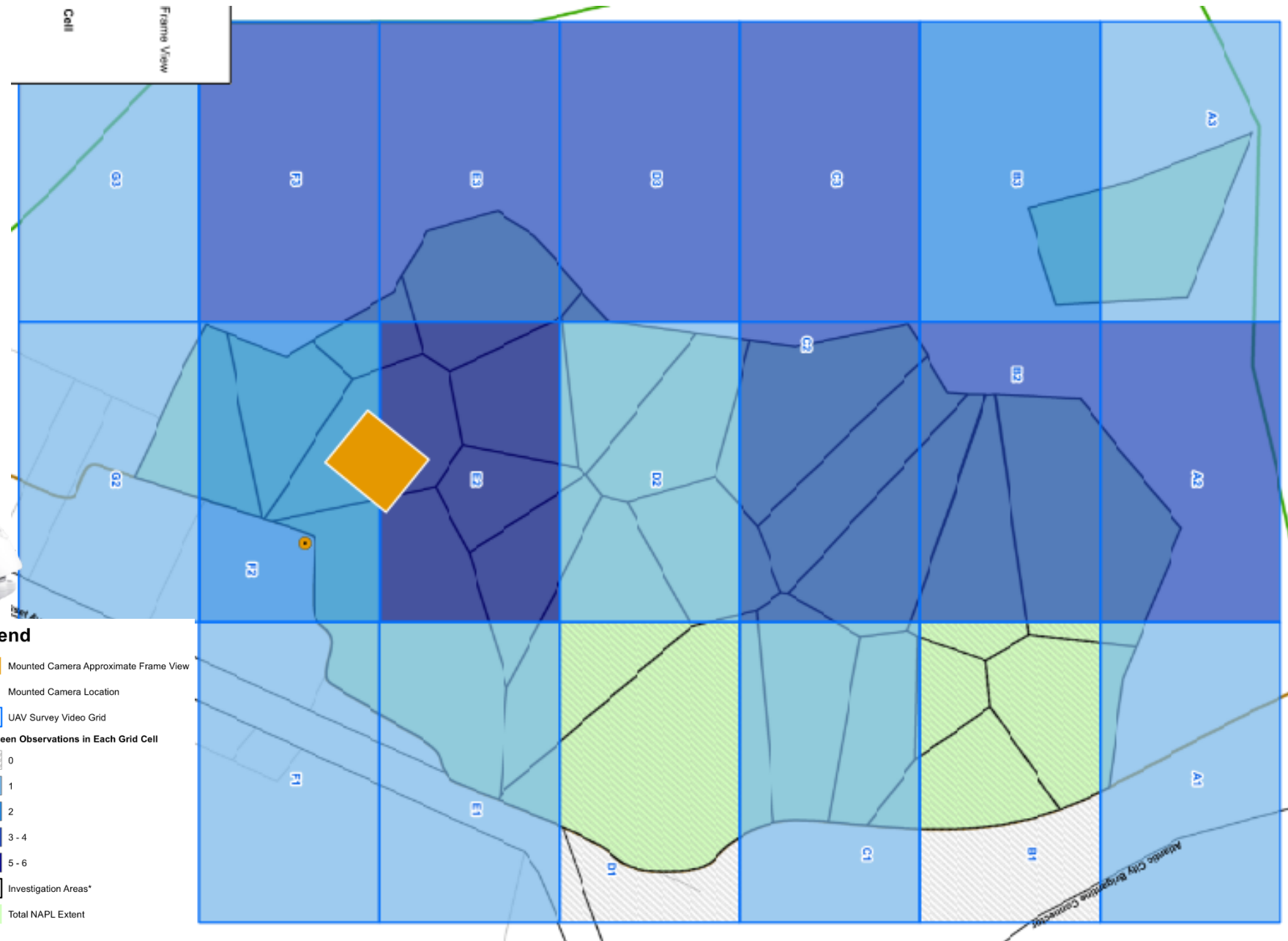
Sheens
observed year
round,
predominantly
in late summer /
early fall.

Sheens
observed
throughout
NAPL extent.



Legend

-  Mounted Camera Approximate Frame View
-  Mounted Camera Location
-  UAV Survey Video Grid
- Total Sheen Observations in Each Grid Cell**
-  0
-  1
-  2
-  3 - 4
-  5 - 6
-  Investigation Areas*
-  Total NAPL Extent



Presumptive
Remedy:
Limited
Shoreline
Dredge

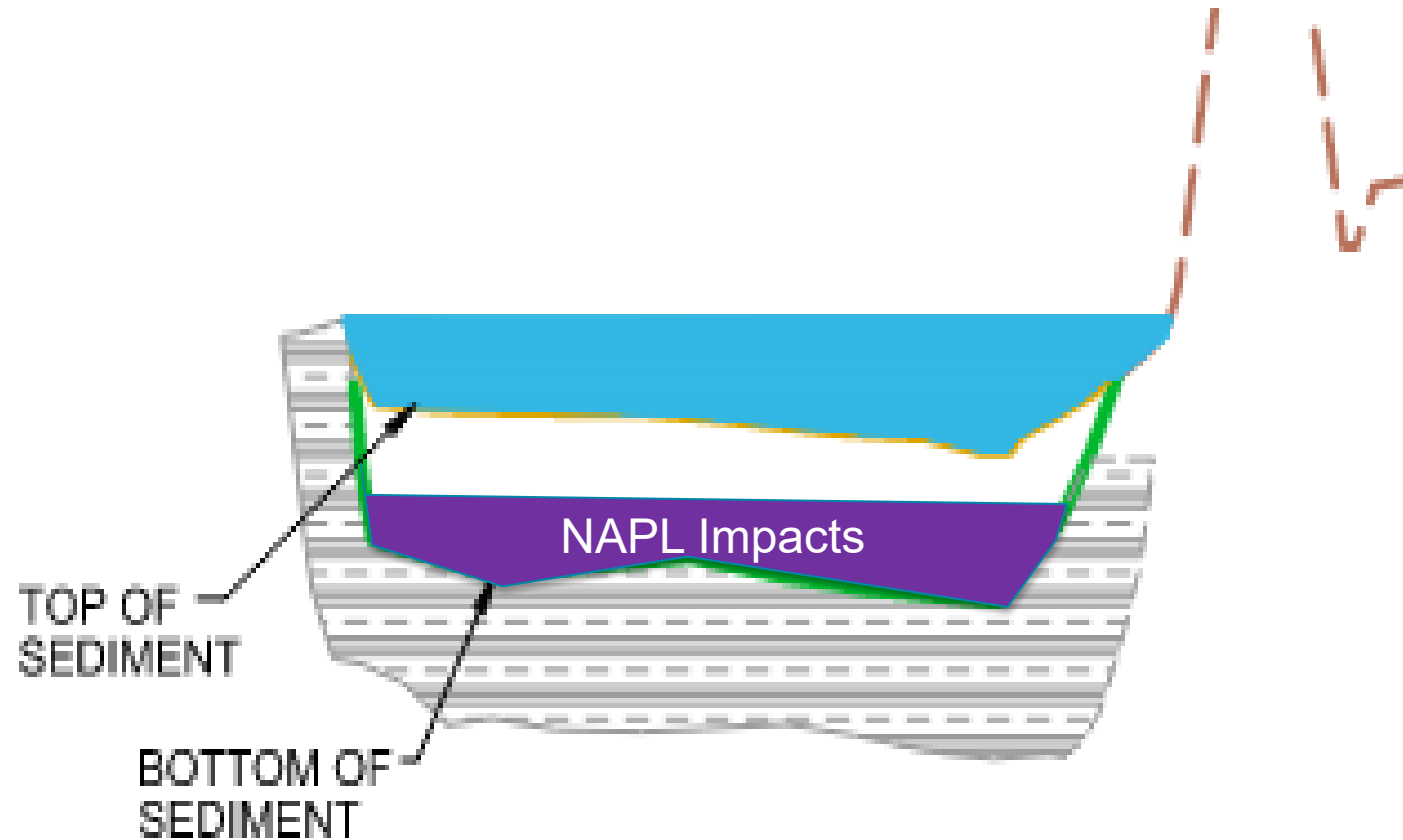
Current
Remedy: TBD



Photo Credit: <https://www.epa.gov/hudsonriverpcbs/photos-gallery>



Case Study #2



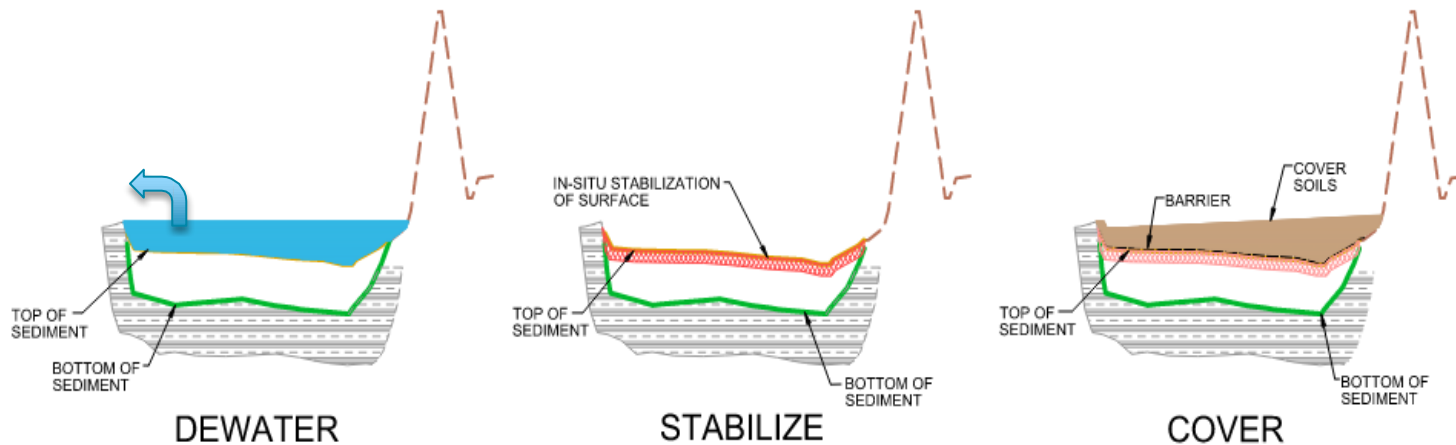
NAPL is present in sediment under a layer of clean sediment.



EFT had not been documented during prior sediment investigations.

Presumptive Remedy: Submerged GAC Cap

Current Remedy: Dewater, Stabilize, and Cover



Erosion/Topsoil Layer

Infiltration Layer

Geomembrane

Stabilized Sediments

Avian Species and Habitat



Carolina wren



pileated
woodpecker



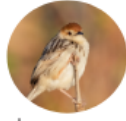
wood duck



yellow billed
cockoo



great crested
flycatcher



lesser swamp
warbler



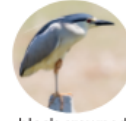
prothonotary
warbler



American
goldfinch



red shouldered
night hawk



black-crowned
night heron



eastern
kingbird



great egret



common
yellowthroat



tree swallow



Plant Species Diversity



sawtooth sunflower



rice cut grass



boneset



wild bergamont



golden Alexanders



mountain mint



blue vervain



Case Study #3



Ebullition had been documented as a potential concern in the mudflat areas.



All observed sheens
were natural/biological
not EFT of MGP
impacts.



Presumptive
Remedy:
Comprehensive
Dredge

Current
Remedy:
Limited Dredge



The takeaway:
A simple visual
survey for EFT is
a critical step
during site
investigation.

Lisa Reyenga
Senior Engineer & NAPL Technical
Director
303-264-1001
lreyenga@geiconsultants.com

