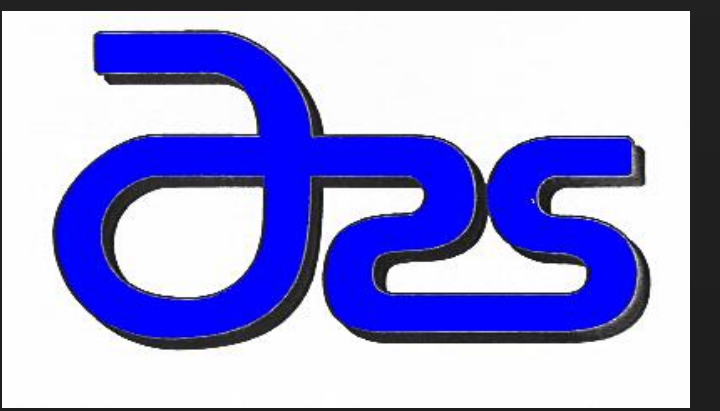


Nitrogen Utilizing Bacteria in Shallow Nitrogen-Contaminated Groundwater Originating from a Leaking Cattle Feedlot Holding Pond



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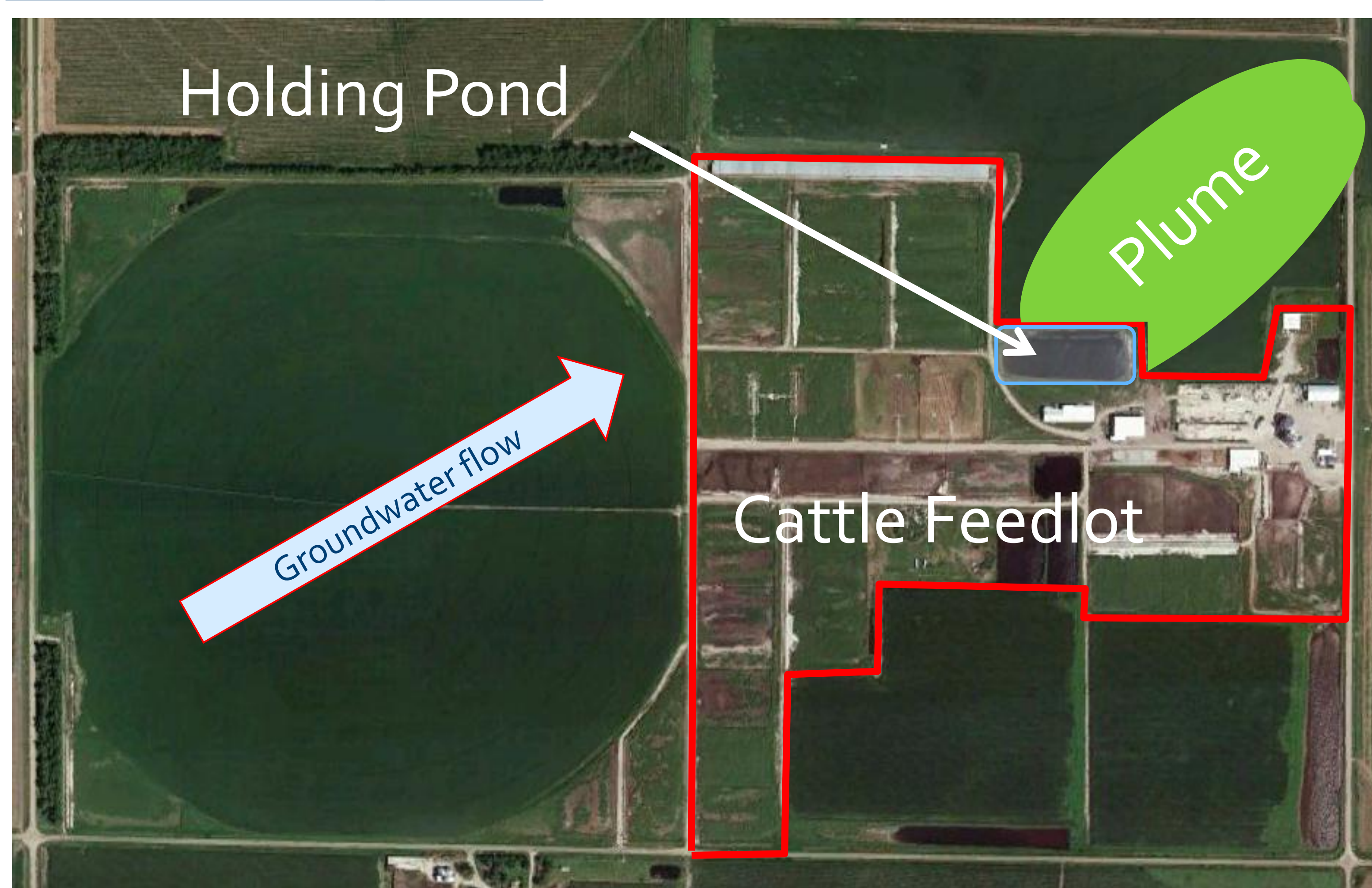
Problem:

- Wastewater holding ponds normally control nutrient movement to aquifers.
- Older holding ponds may be a point source for N (nitrate and ammonium) contamination.

Aims:

- Investigate shallow N contamination near a cattle feedlot runoff holding pond.
- Determine potential for N-utilizing microbes to remediate N in the subsurface.

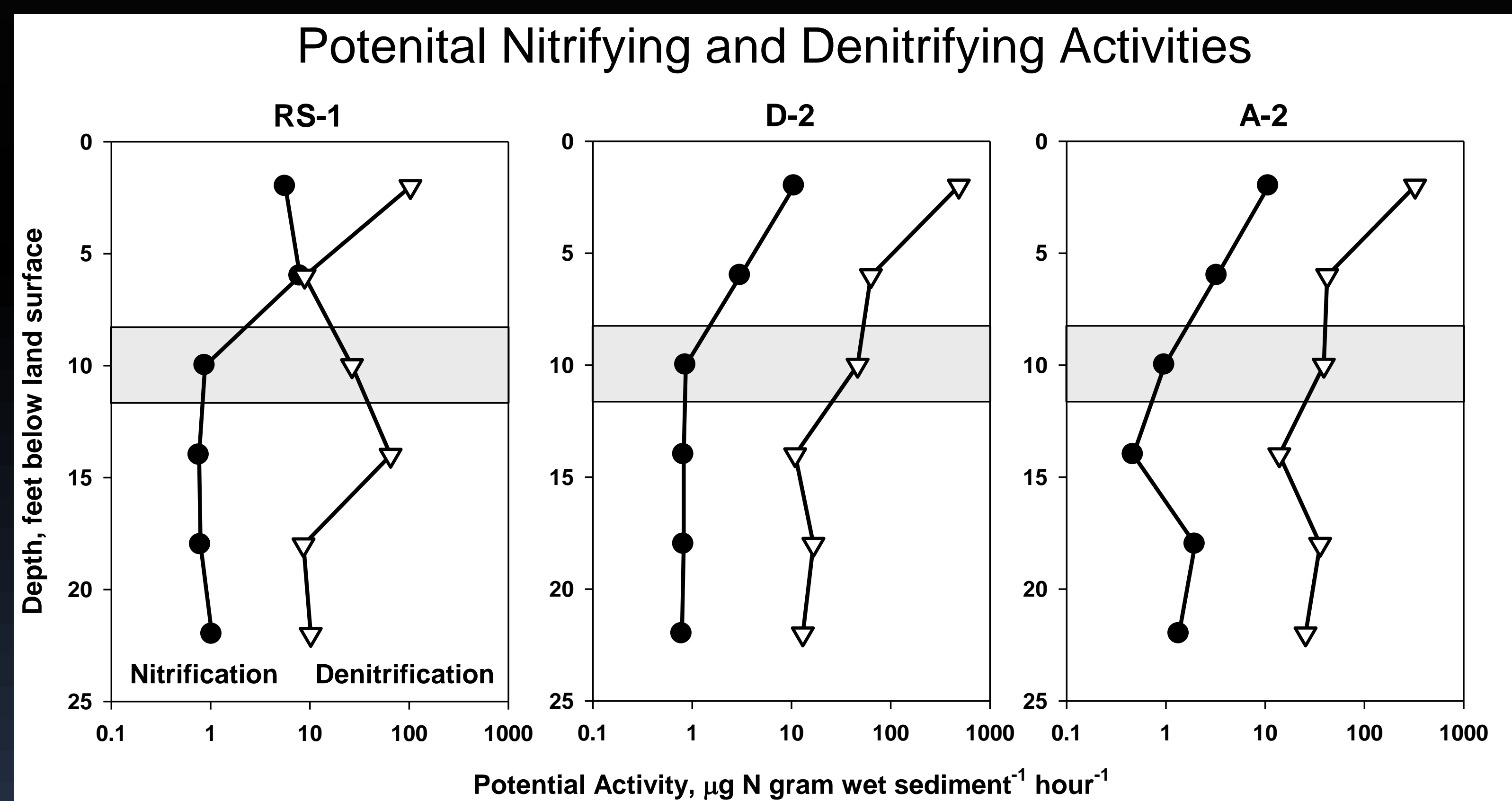
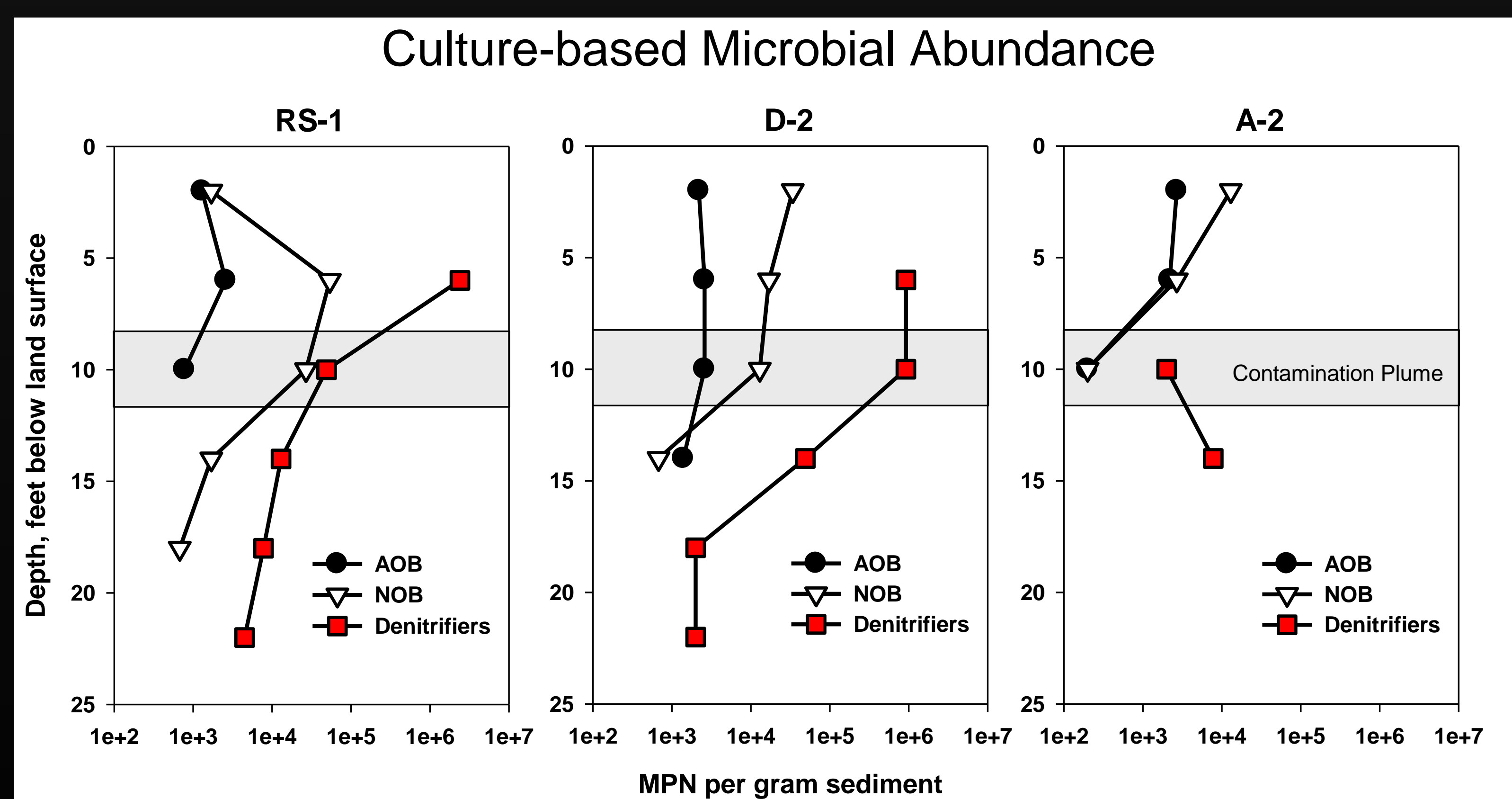
Site Description:



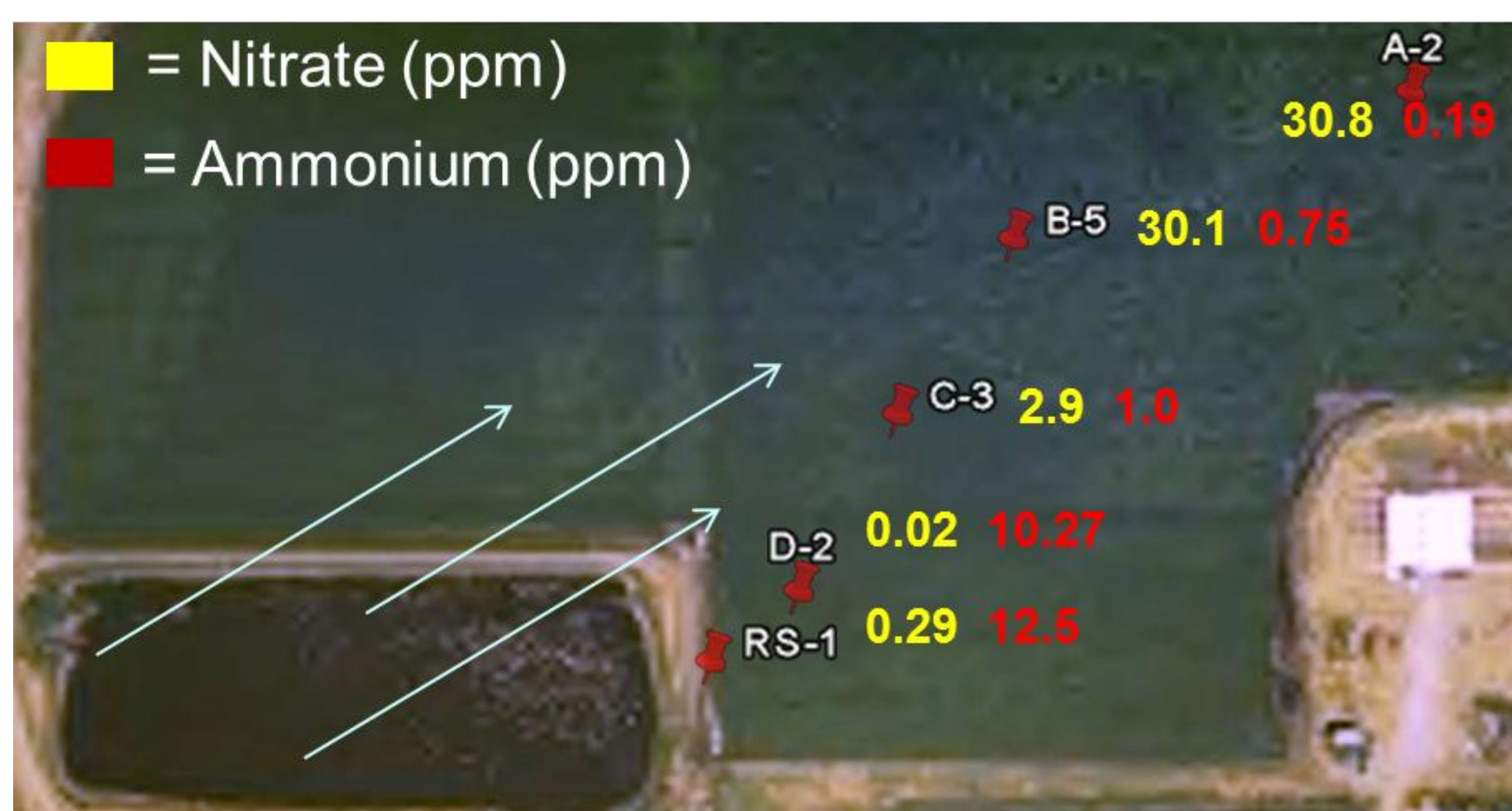
- Older feedlot located in Platte River valley—surface soils overlay fluvial sands.
- Water table is 6 feet below land surface (BLS)—background NO_3 (35 to 65 ppm) and NH_4 (0.1 ppm).
- Holding pond monitoring well tested high for NH_4 and Cl^- triggering study.

Microbial Analyses:

- Four-foot cores from land surface to 24 feet BLS.
- RS-1, D-2, and A-2 used for MPN determinations and potential activity assays.



Plume Geochemistry (8-12 ft BLS):



- NO_3 consumed in/near holding pond (C source).
- NH_4 plume near pond, NO_3 accumulation further down-gradient (NH_4 oxidation?).
- Cl^- concentrations high (>60 ppm) within plume (background <15 ppm).

Conclusions:

- High concentrations of NH_4 and Cl^- indicate the holding pond is the source of a contamination plume.
- Geochemistry indicates denitrification at the holding pond (NO_3 loss) and possible nitrification further down-gradient converting NH_4 to NO_3 .
- Presence of nitrifying and denitrifying microbes supports conclusion of an active N-utilizing community.
- Ongoing isotope and molecular work is clarifying the roles of specific microbial groups.