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Making a Difference for California

Using Biosolids to Improve Post-fire Water Quality

David Crohn
University of California, Riverside

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Facing slopes in Temecula, CA

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K-rail

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Experimental Site

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Controlled burn – Summer 2009

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After the burn

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Randomized Complete Block Plot Design

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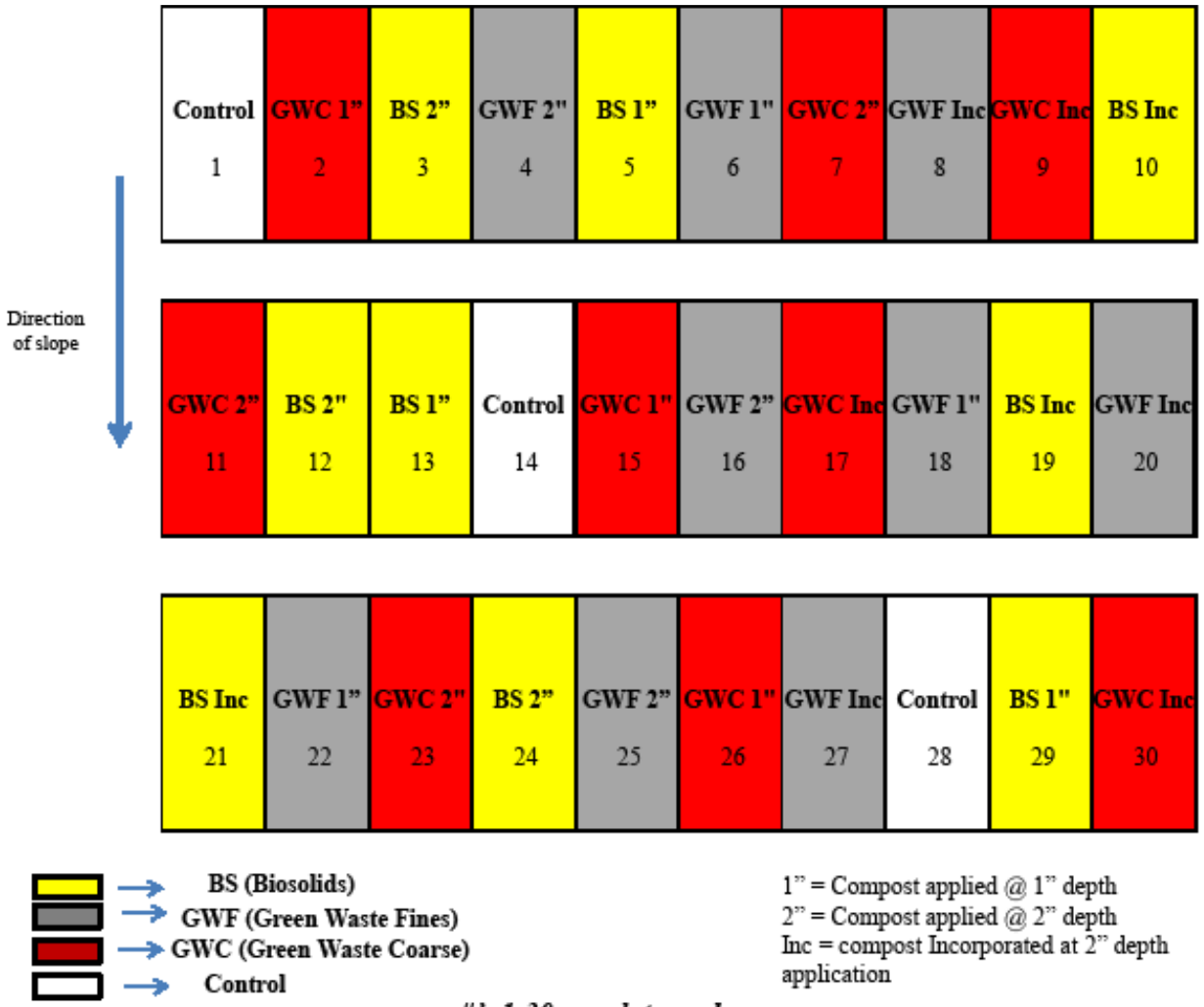

Materials

- Greenwaste compost fines
- Greenwaste compost overs
- Biosolids compost
- No compost

Rates

- 1 inch
- 2 inches
- 2 inches incorporated

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3:1 slope

Installed Slope

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Bins

Samples were collected after 4 separate rain events (most of that year's rain.)

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…after the first rains…

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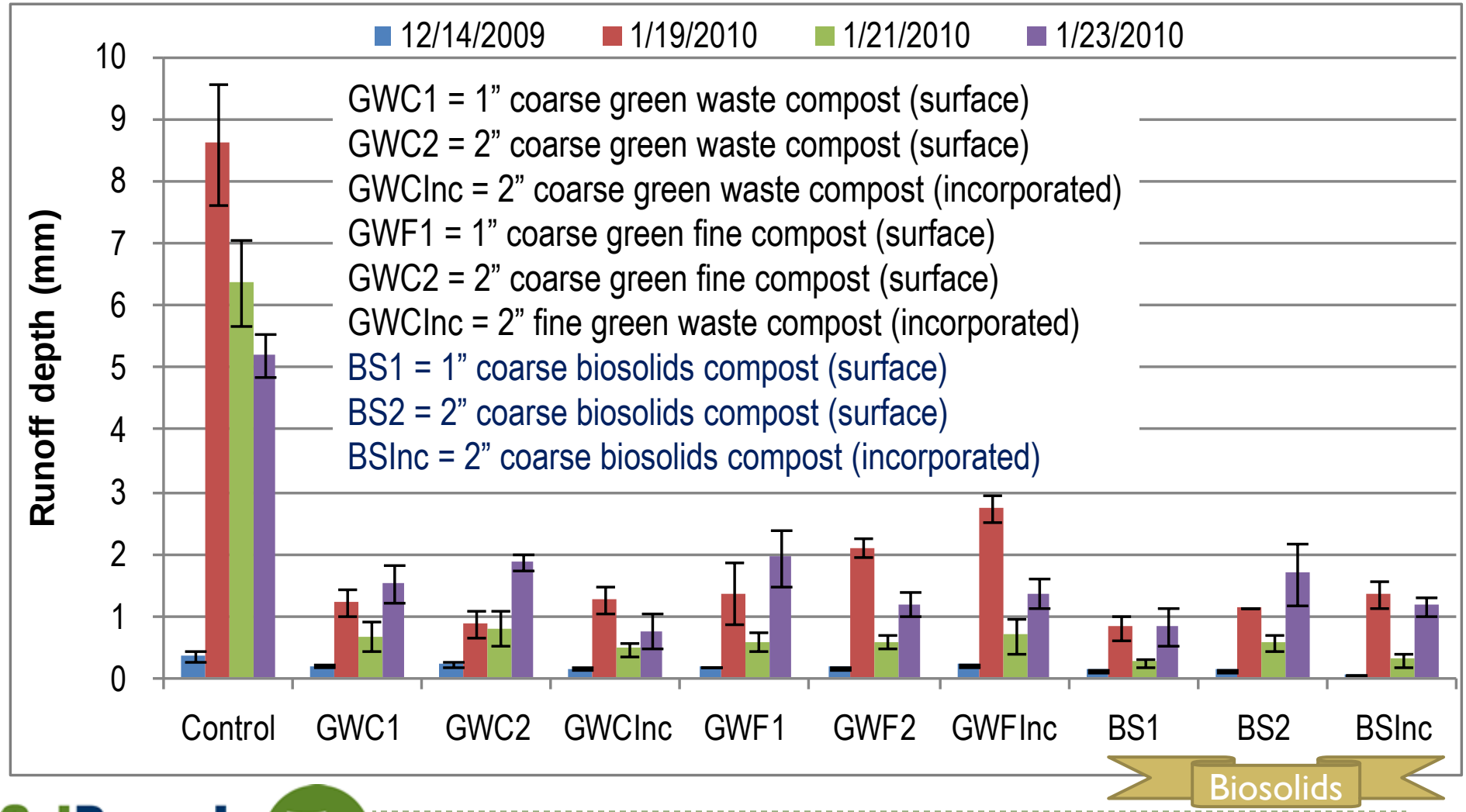
Total Runoff Depth



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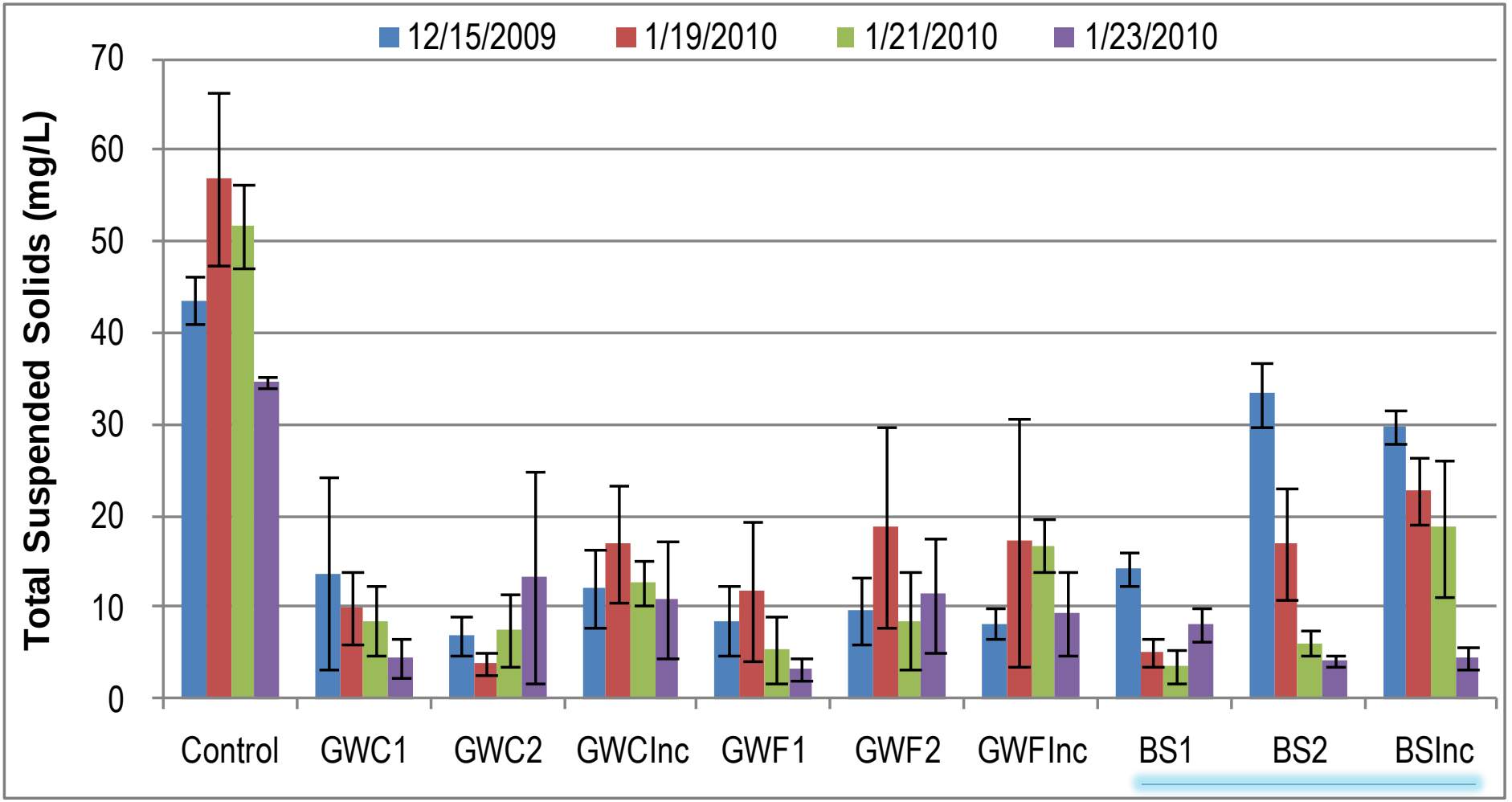
Total Suspended Solids



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Concentration

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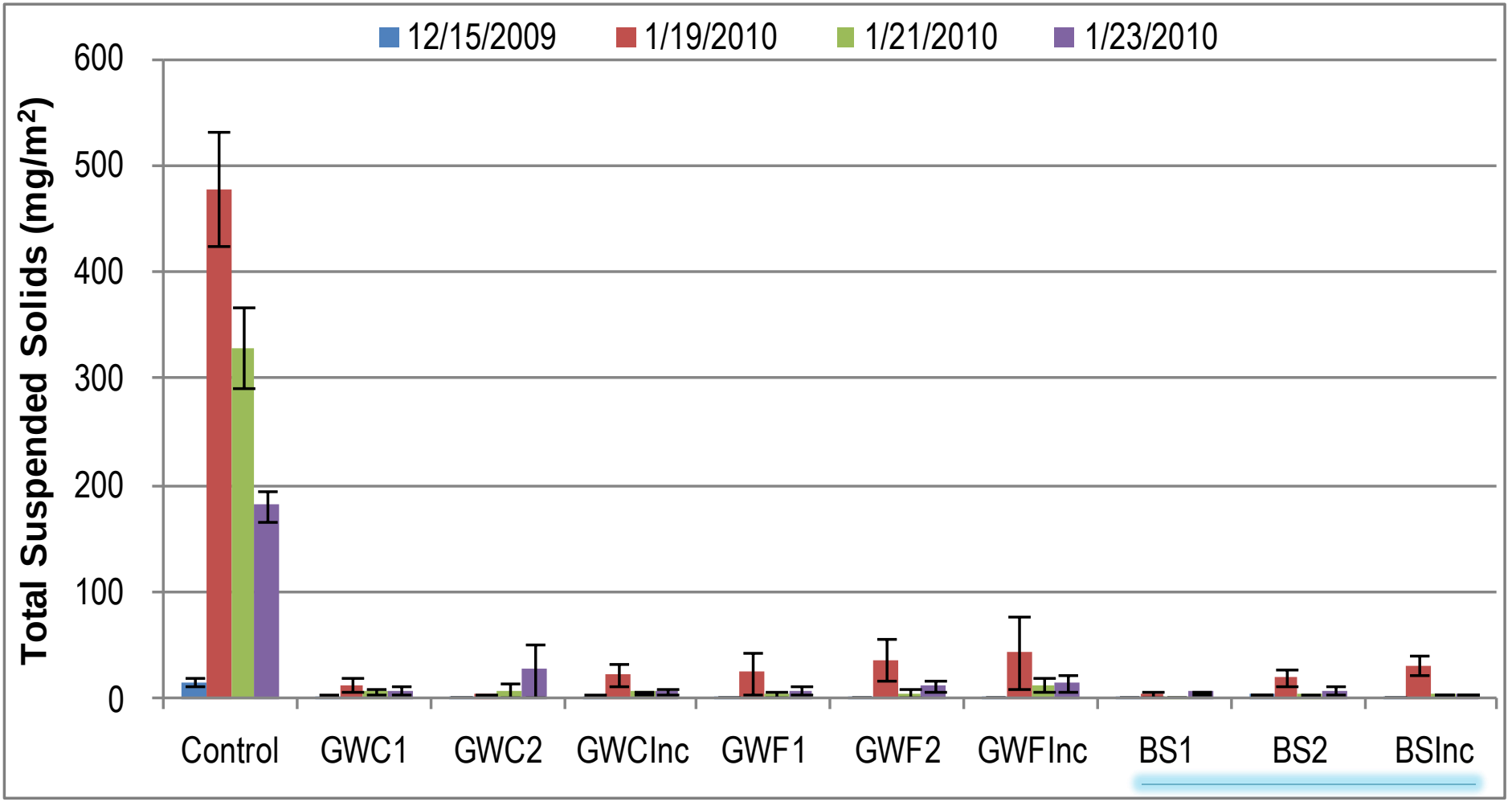
Total Suspended Solids



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Exported Mass

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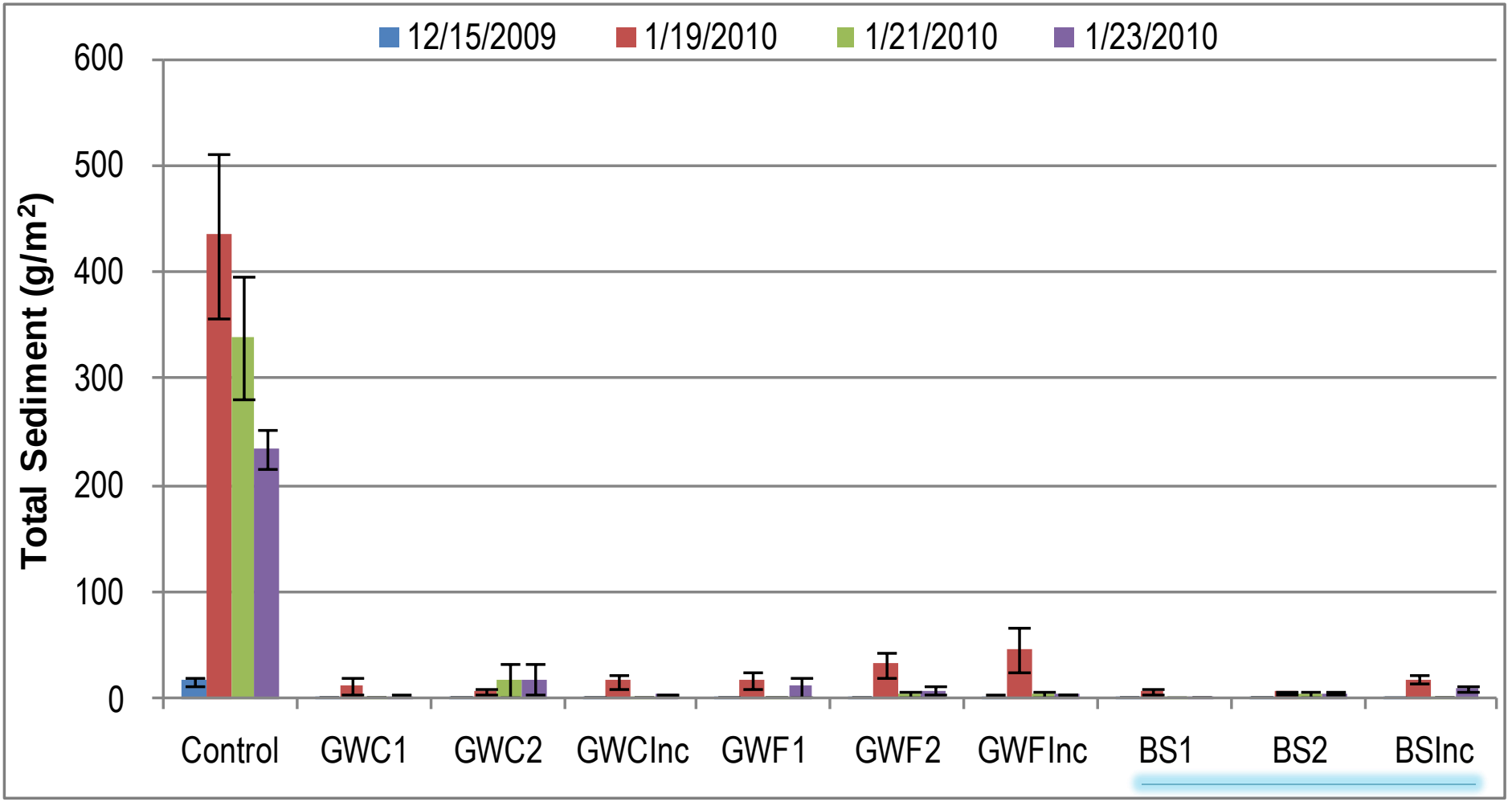
Total Solids



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Exported Mass

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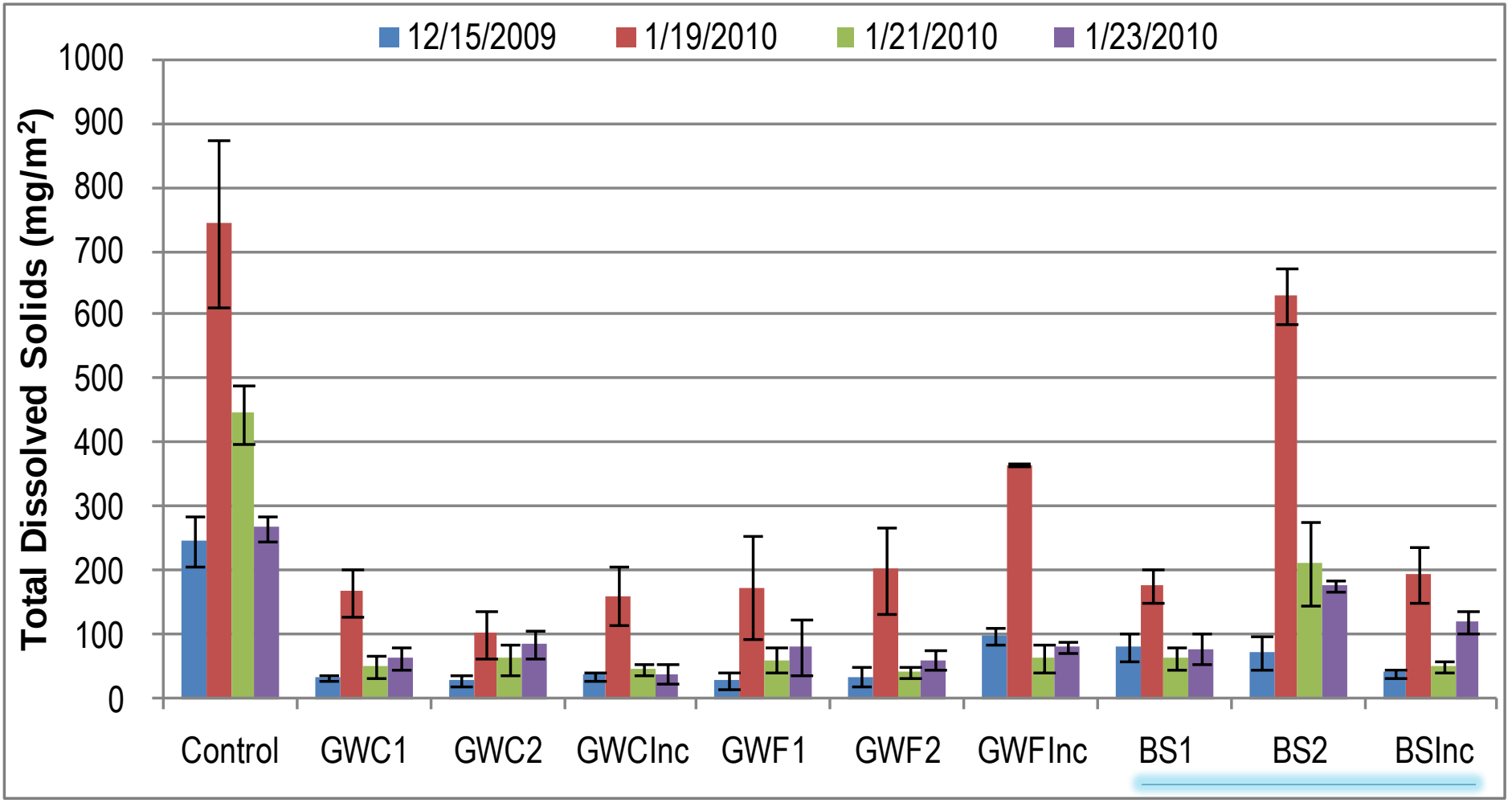
Total Dissolved Solids



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Exported Mass

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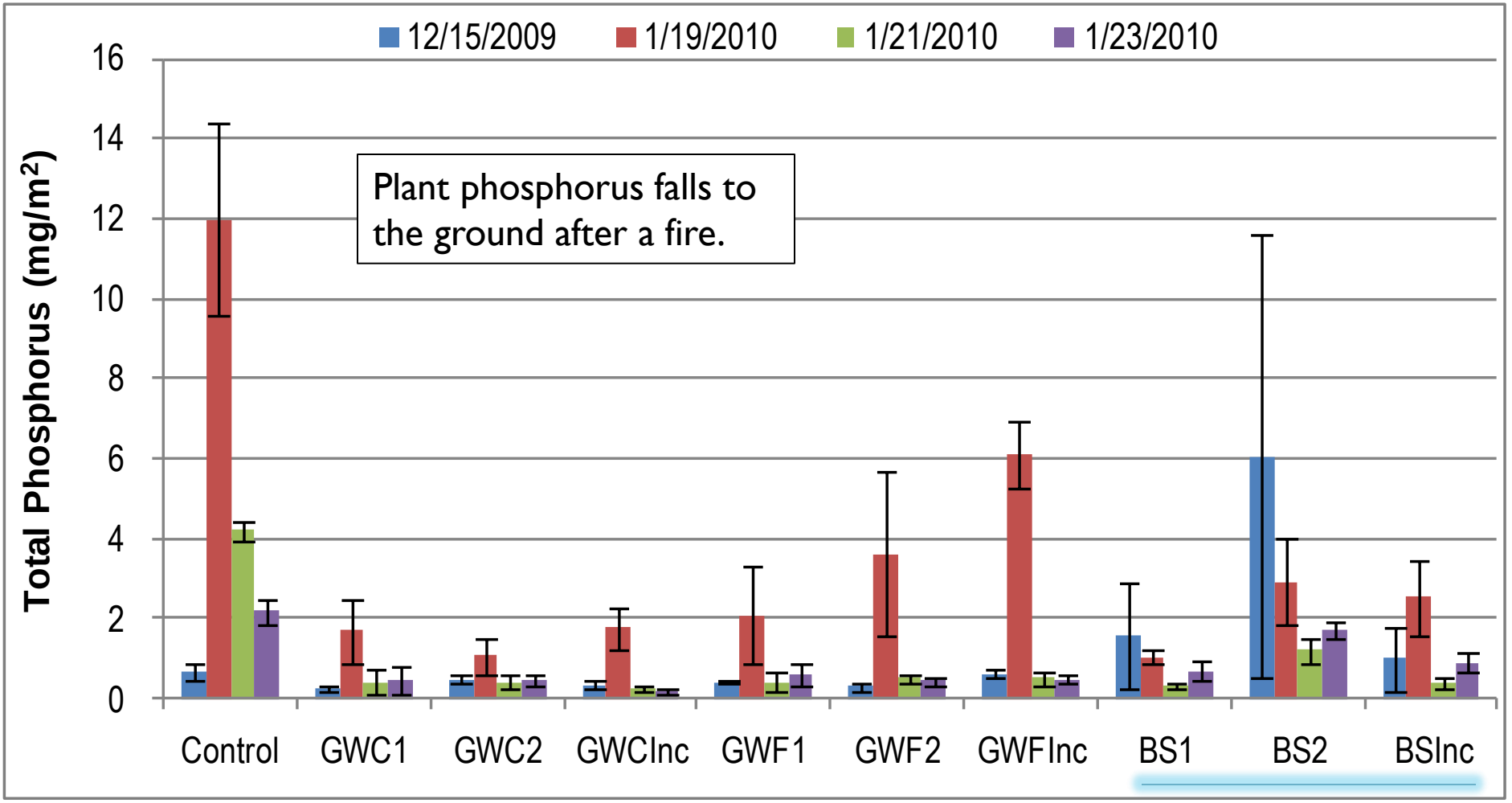
Total Dissolved Phosphorus



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Exported Mass

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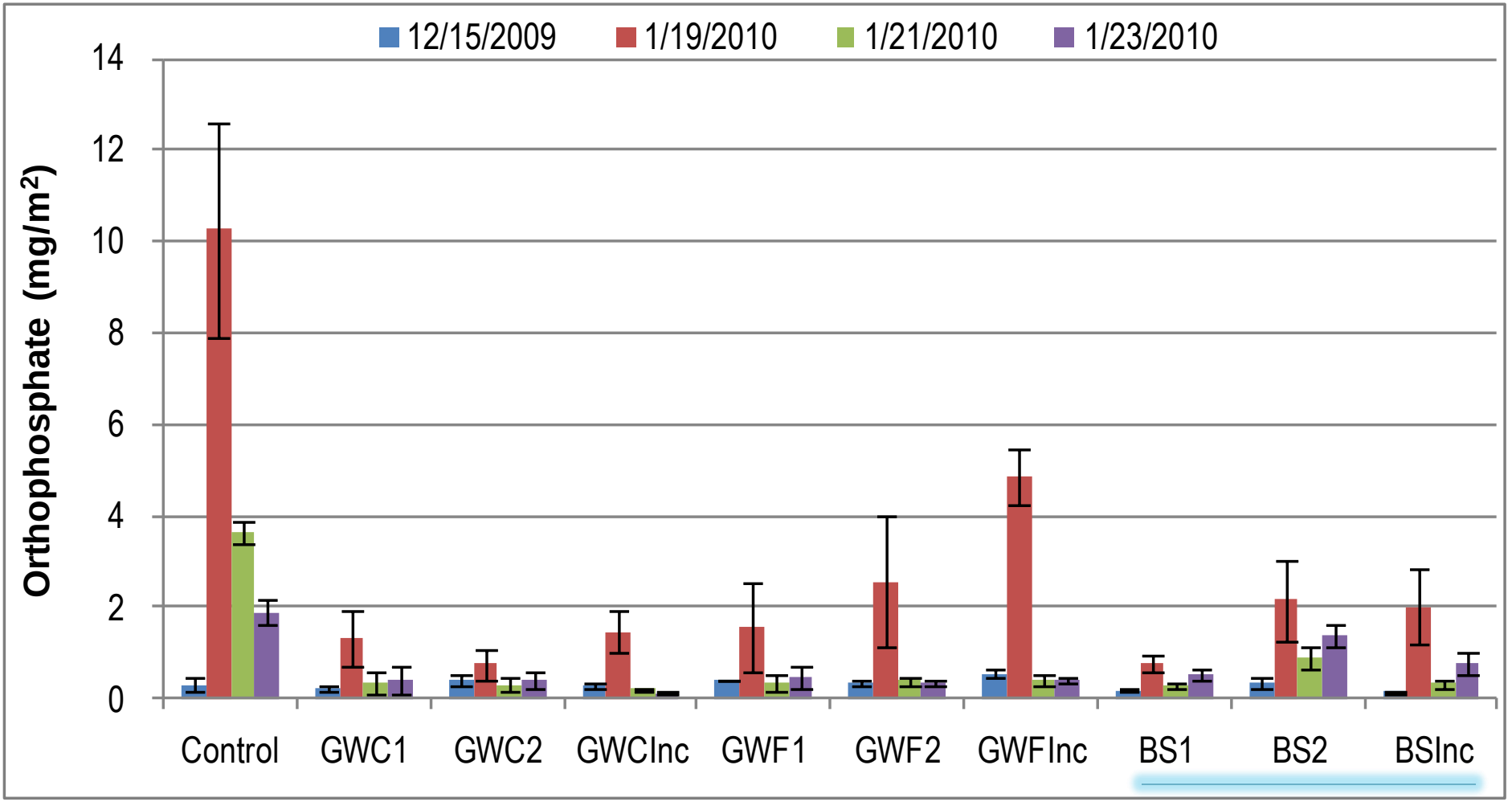
Orthophosphate



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Exported Mass

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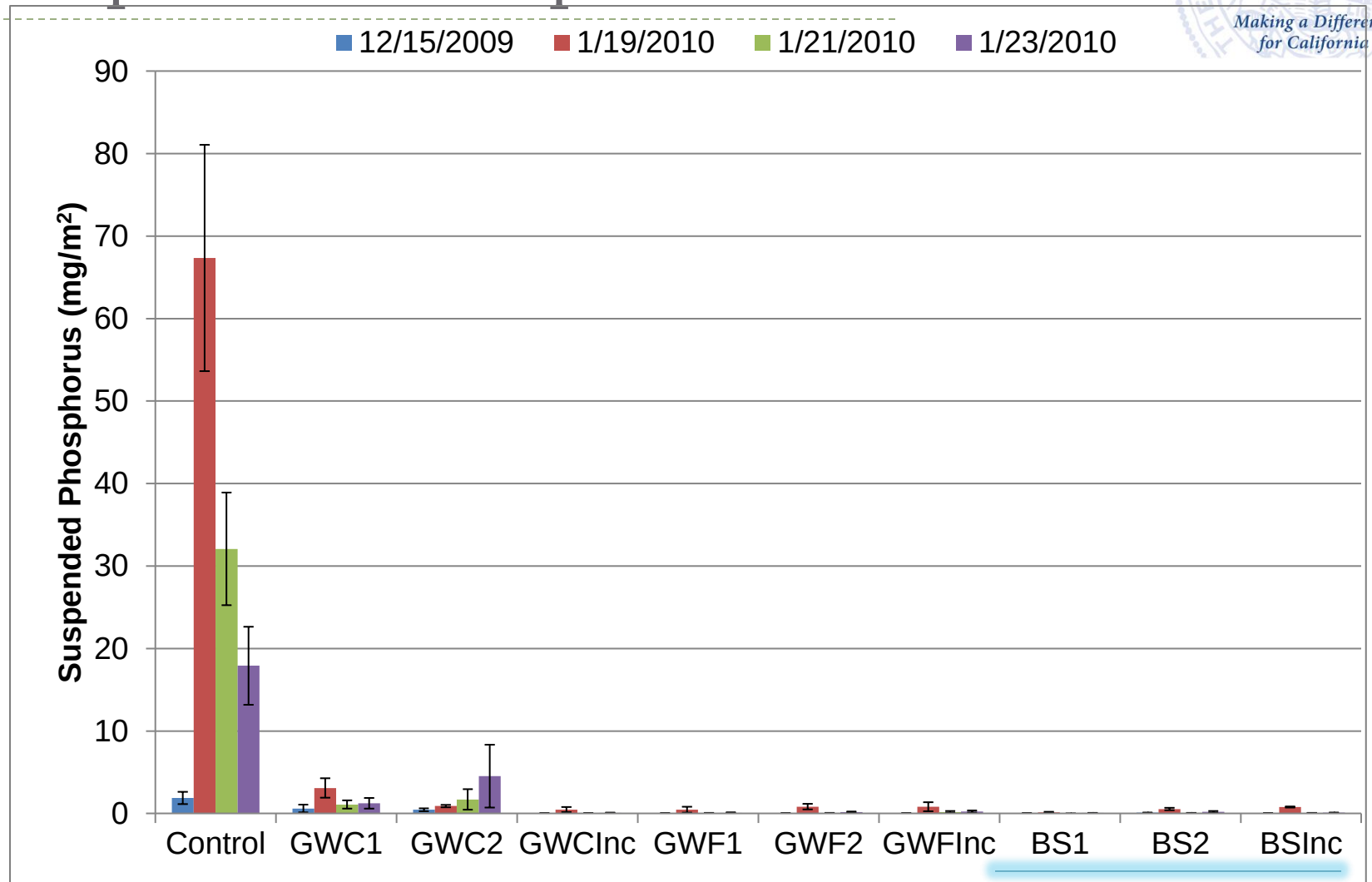
Suspended Phosphorus



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Exported Mass

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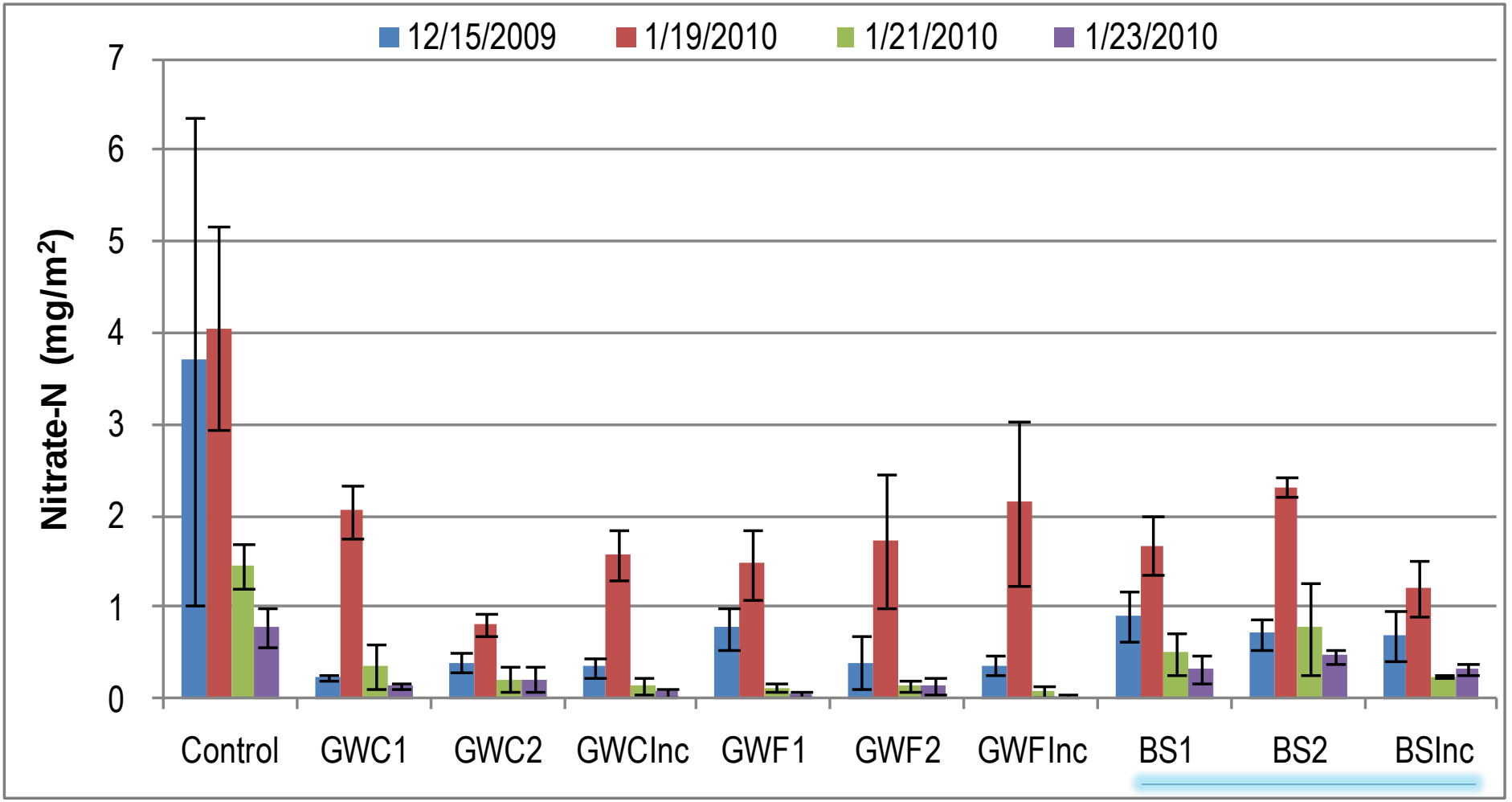
Nitrate-nitrogen



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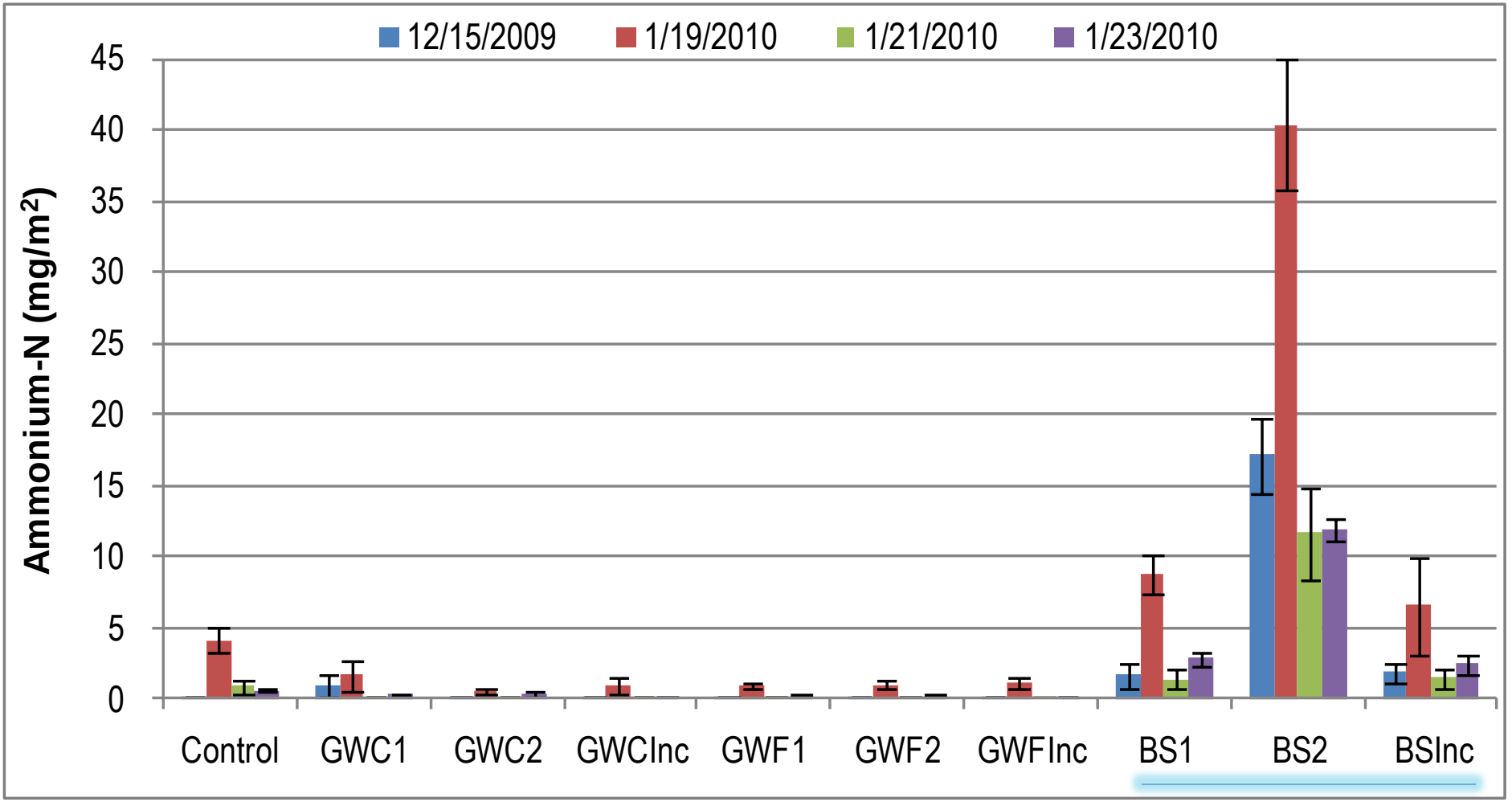
Ammonium-nitrogen



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Exported Mass

Conclusions

Compost mulches effectively reduce runoff pollution

- Runoff is reduced
  - Absorb water
  - Protect the soil
  - Promote infiltration
- Normalized pollutant export declined after two storms
  - Studies limited to one or two storm events will exaggerate pollutant losses from mulched plots.
- I" was as effective as 2" and retained more pollutants
  - Biosolids compost applied to 2" depth (B5) exported more TDS and NH_4^+-N than did the 1" application, as well as more Cd, Cr, Cu, and Mo.
- Incorporation is unnecessary

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Conclusions

- Compost blankets reduced
  - Runoff by 86%
  - Total dissolved solids (TDS) by 88%
  - Total suspended solids (TSS) by 96%
  - Total solids (TS) by 97%
  - Total dissolve phosphorus (TDP) by 72%
  - Orthophosphate (OP) 77%
  - Suspended phosphorus (SP) 98%
  - Nitrate (73%)
  - Metals ≤ Control
- Surface mulching and incorporation performed similarly
- Applying 2" offered no benefits over 1", and increased some pollutant losses
- Results similar for greenwaste compost "overs" (>3/8") and "fines" (<3/8")

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Woolsey Fire

Nov. 8 – 21, 2018

Burned 97,000 acres

Including the Rancho Las Virgenes Composting Facility

By NASA MODIS (TERRA Satellite) - NASA Worldview, Public Domain, https://commons.wikimedia.org/w/index.php?curid=74299785

Three Treatment

Treatment Types

- Class A Biosolids Composts
- Class B Anaerobic Cake
- Class A Pellets
- Control

Fall 2019 Set up

- Block design
- 30 ft^2 plots
- 2-3" application depths
- Sampled in Dec, Jan, Mar

Sampled

Sampled for

- Solids
- Nutrients
- Metals
- ~~VOC's~~
- ~~Semi-Volatiles~~
- ~~PCBs~~
- ~~Pesticides~~

(~~non-detects~~)

Pellets slowed revegetation

- Samples analyzed by LA City Sanitation laboratories at Hyperion Wastewater Plant

Preliminary Results

Export Masses

- Total Suspended Solids
  - Compost > Cake > Control
- Nitrate
  - Compost and Cake > Control
- Ammonium
  - Compost ≈ Control
- Total Phosphate
  - Compost > Cake or Control

Pellets slowed revegetation

- Samples analyzed by LA City Sanitation laboratories at Hyperion Wastewater Plant

Acknowledgements

CalRecycle
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