

# 2013 DRAFT Vegetation Response to Nutrient Enrichment in the Willard Spur

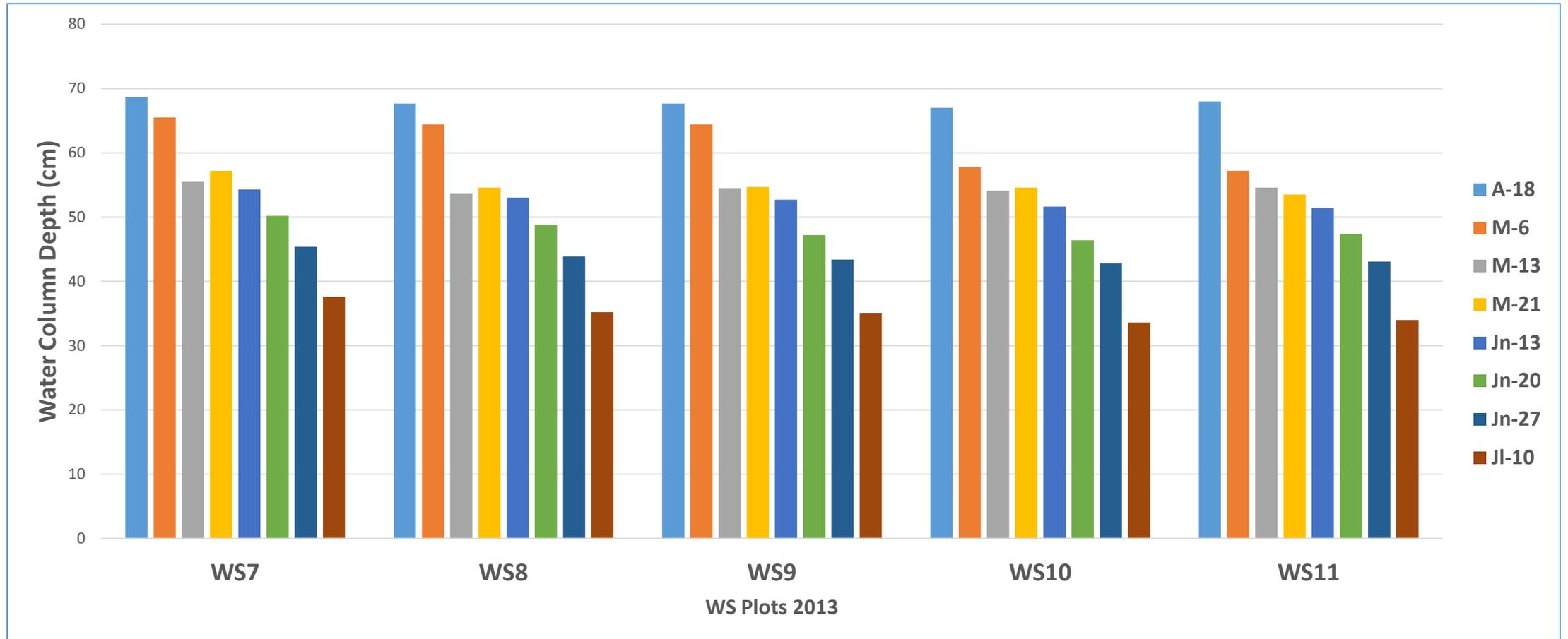
Univ of Utah Research Team Update

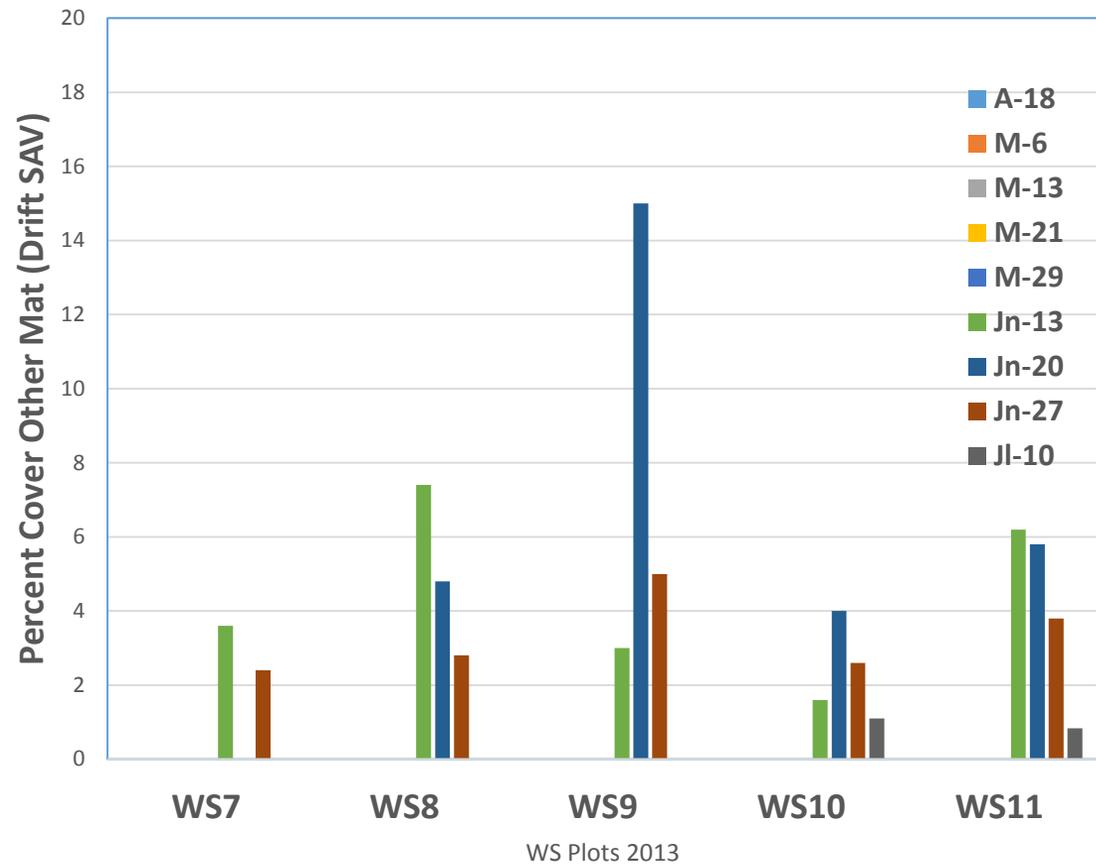
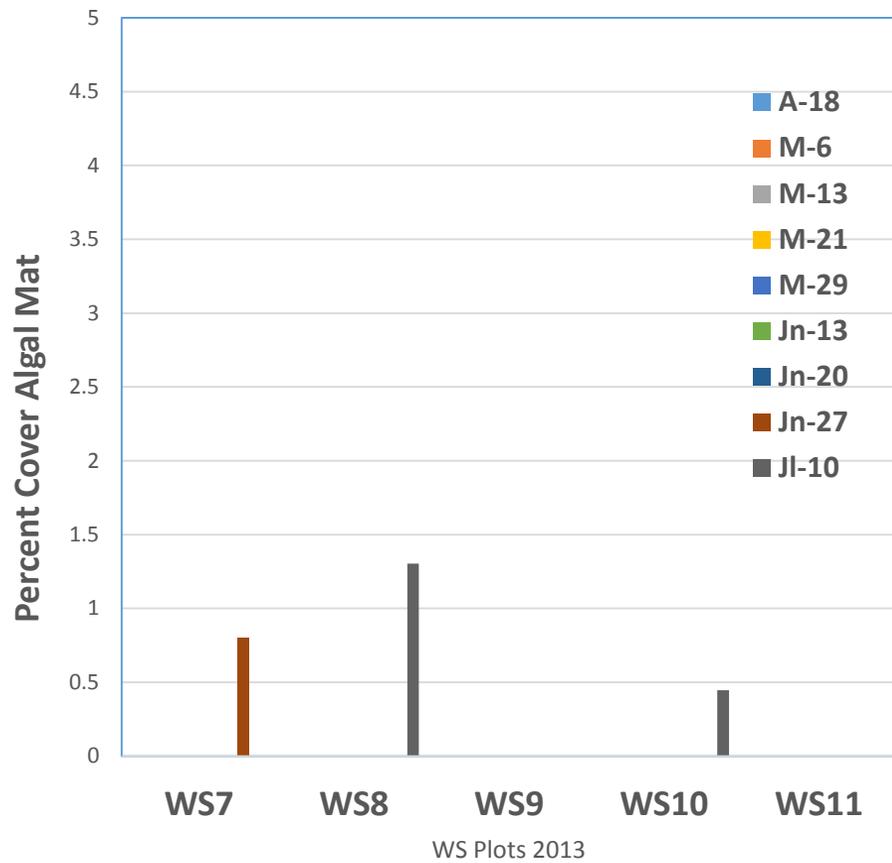
Science Panel Meeting

October 30, 2013

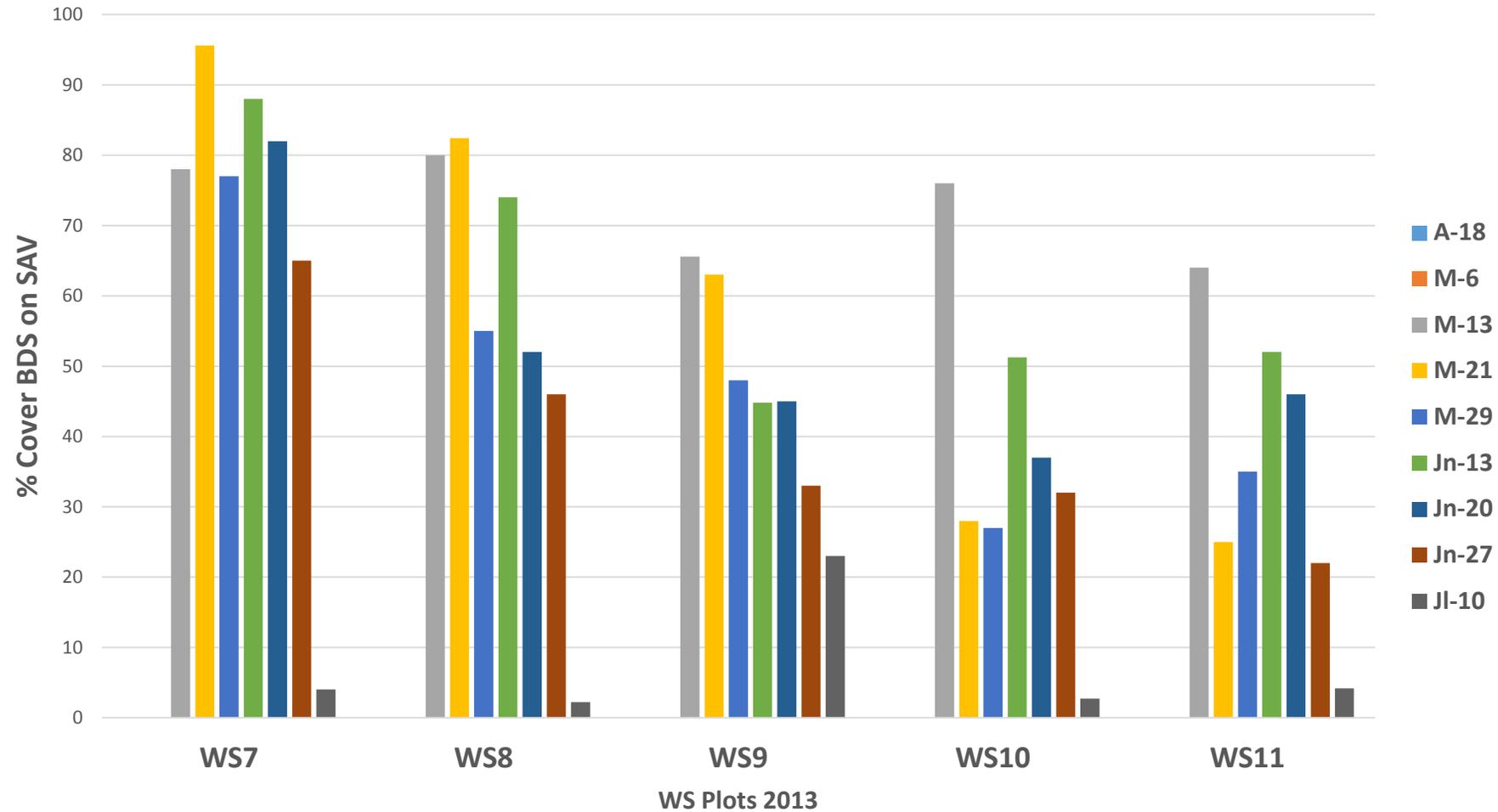
Dr. William Johnson, Dr. Heidi Hoven, Dr. Ramesh Goel, Dr. David Richards, Dr. Sam Rushforth, Sarah Jane Rushforth  
Joel Pierson, & Mitch Hogsett

# Water Column Depth

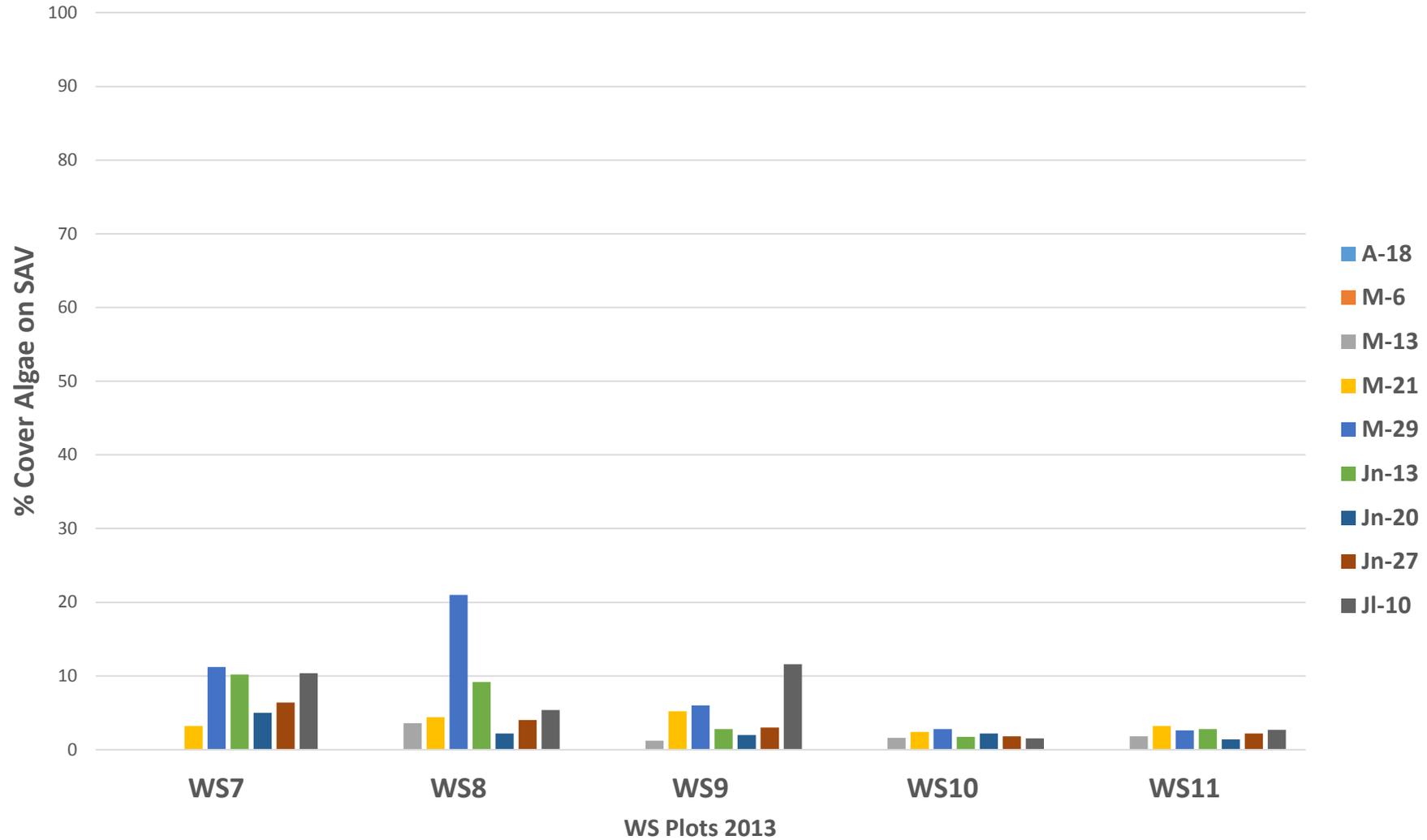




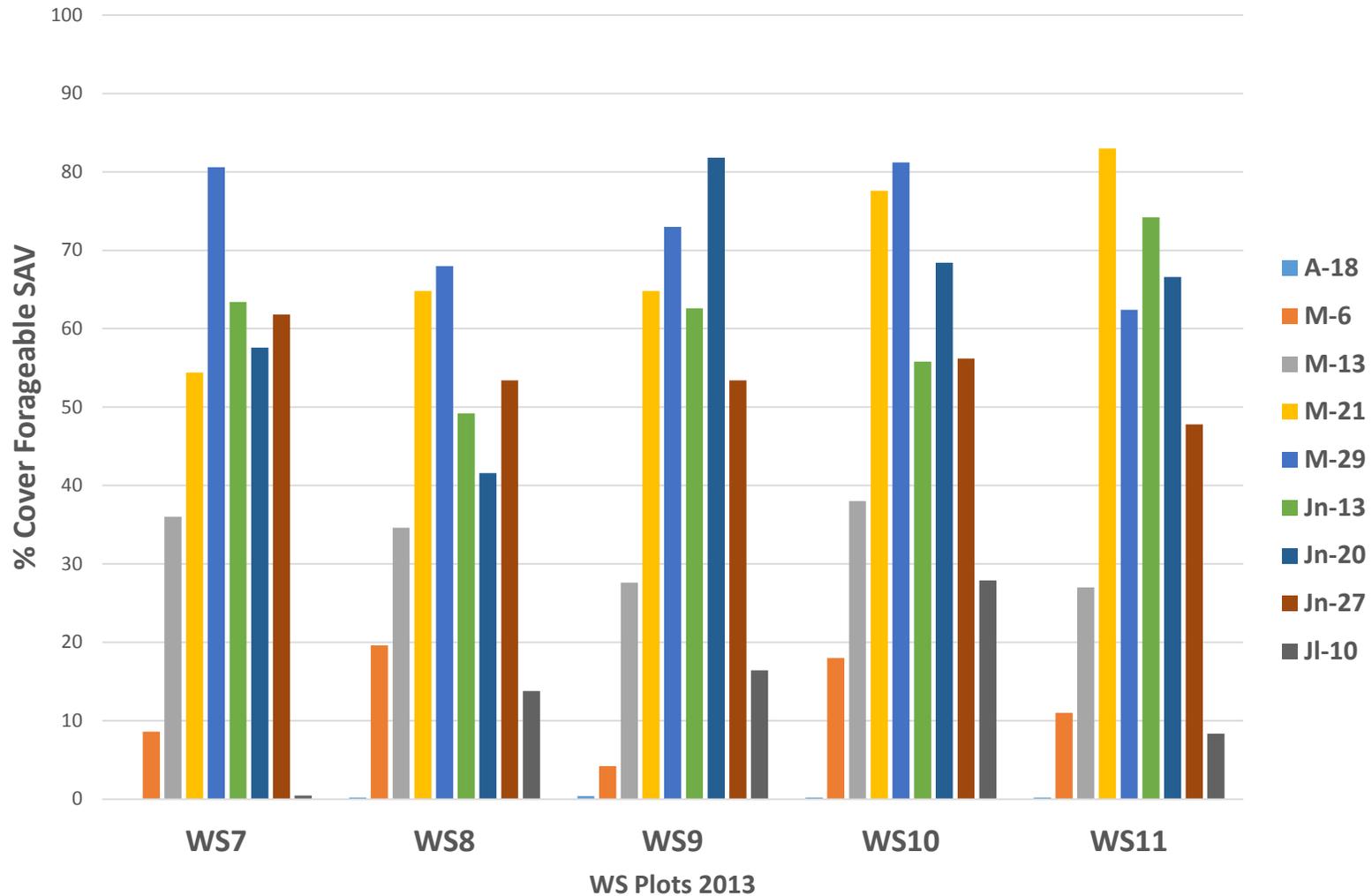
# BDS (Biofilm / Diatoms / Sediment) on SAV



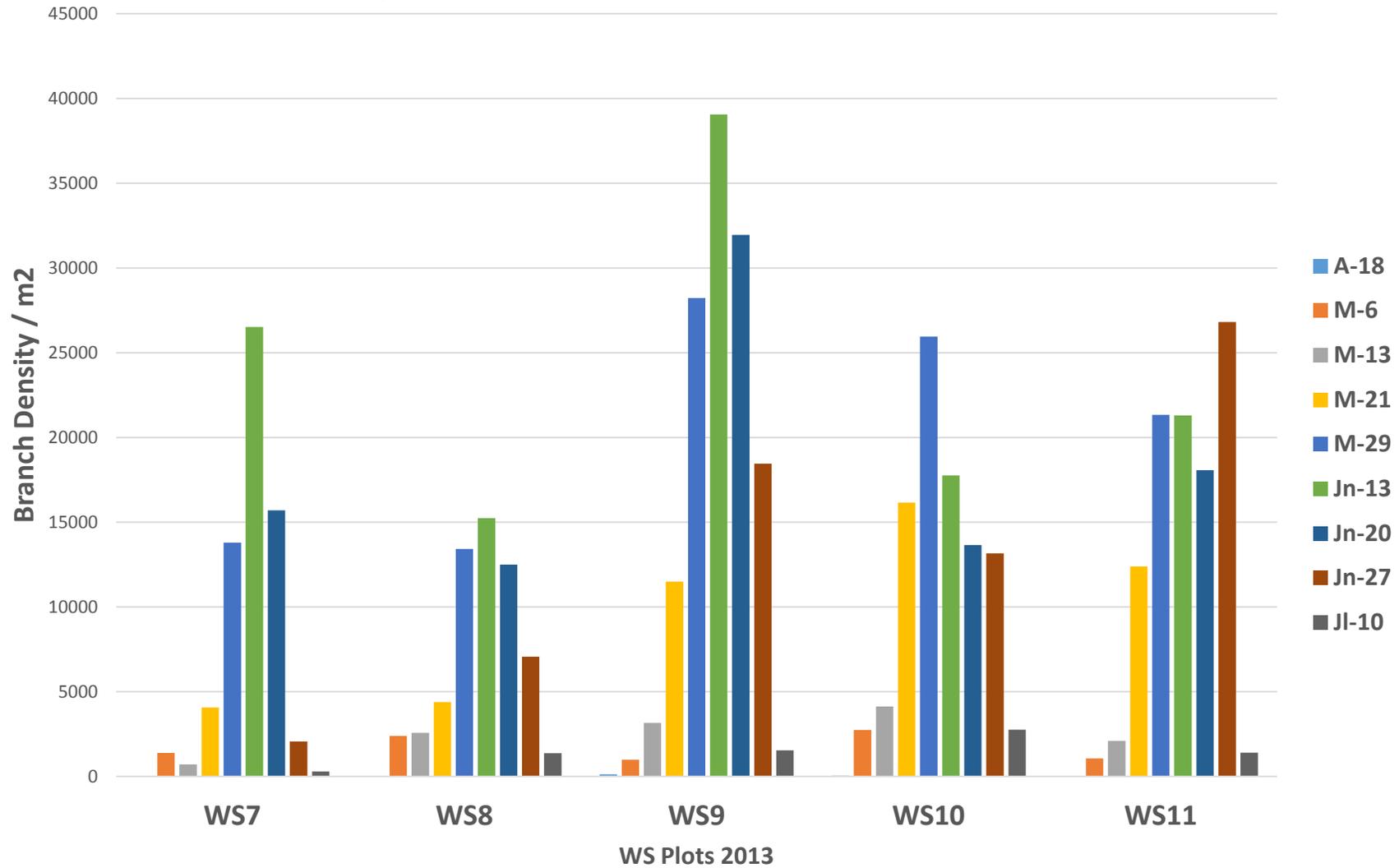
# Algae on SAV



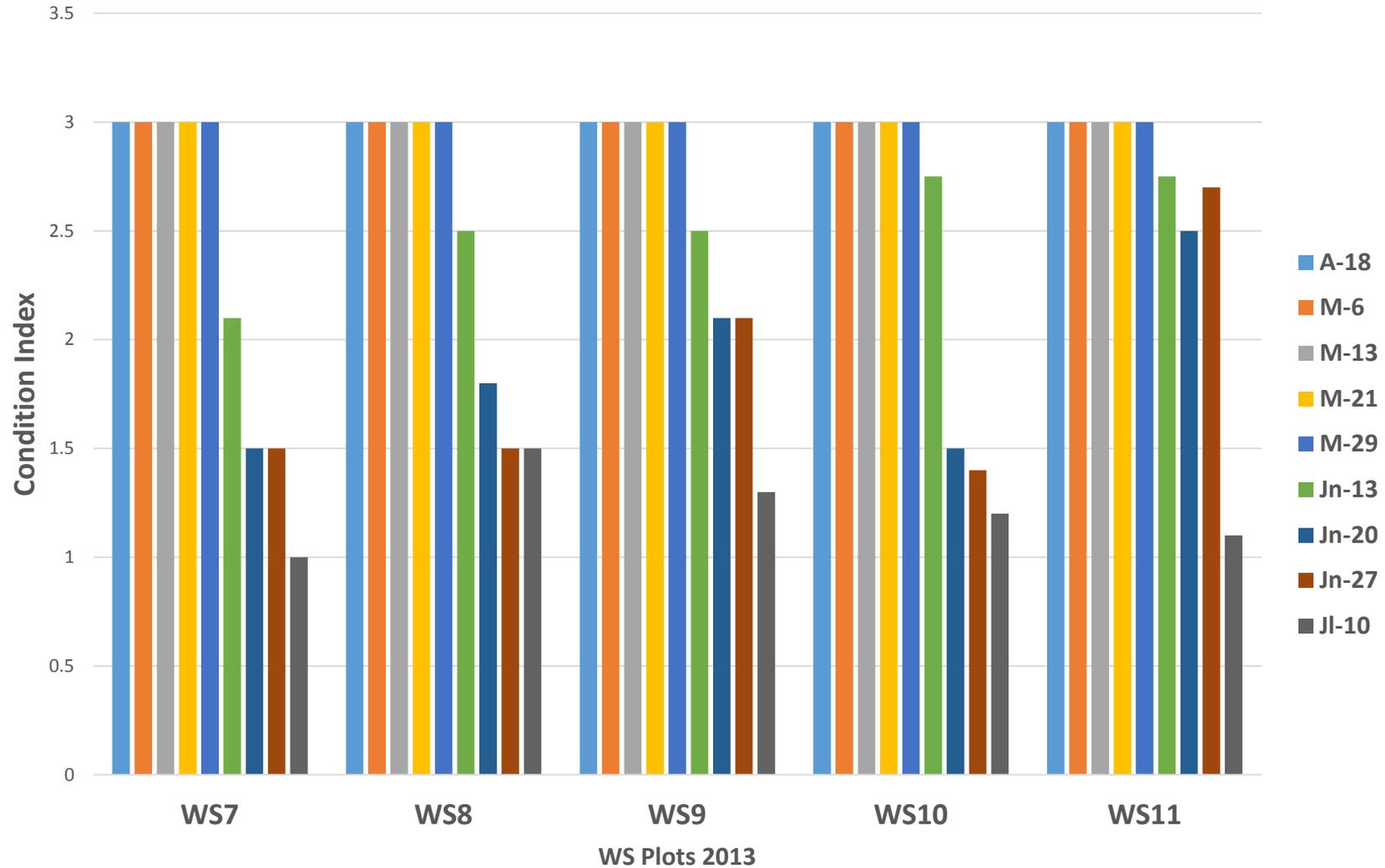
# Forageable SAV



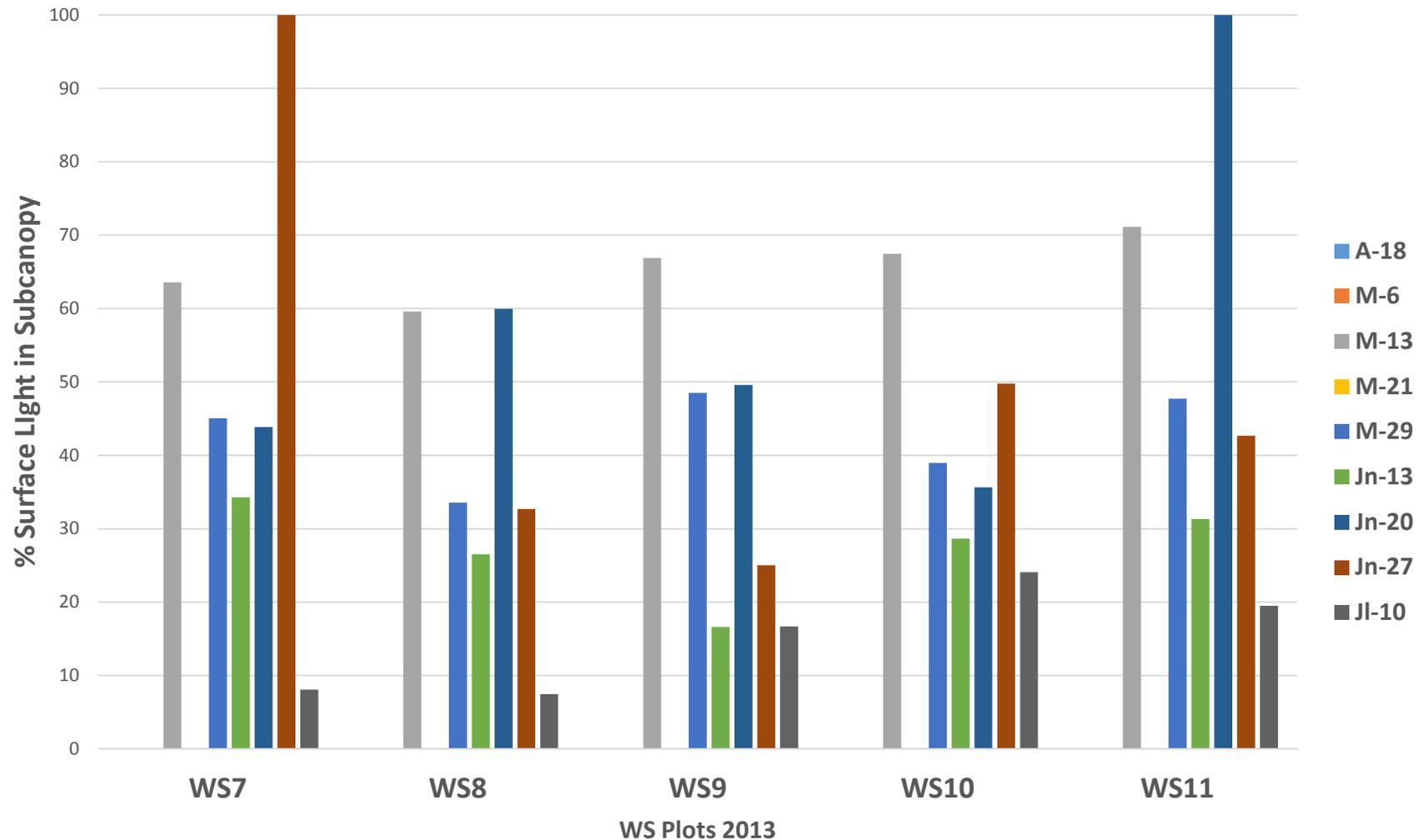
# Branch Density



# SAV Condition Index



# Percent Surface Light in the SAV Subcanopy



# SAV Summary

- The 2012 data identified a critical window of biological response during a low precipitation (dry) year.

**Between late April and mid- to late June.**

- Late vegetative response was documented lake-wide in 2013 (Hoven, in prep), as was the case in Willard Spur.
- SAV Die-off occurred 1 month prior to ambient (as in 2012) and 1 week prior to treatment control.
- BDS may have imposed a disadvantage to SAV during 2013 in nutrient treatment plots; Algae on SAV did not

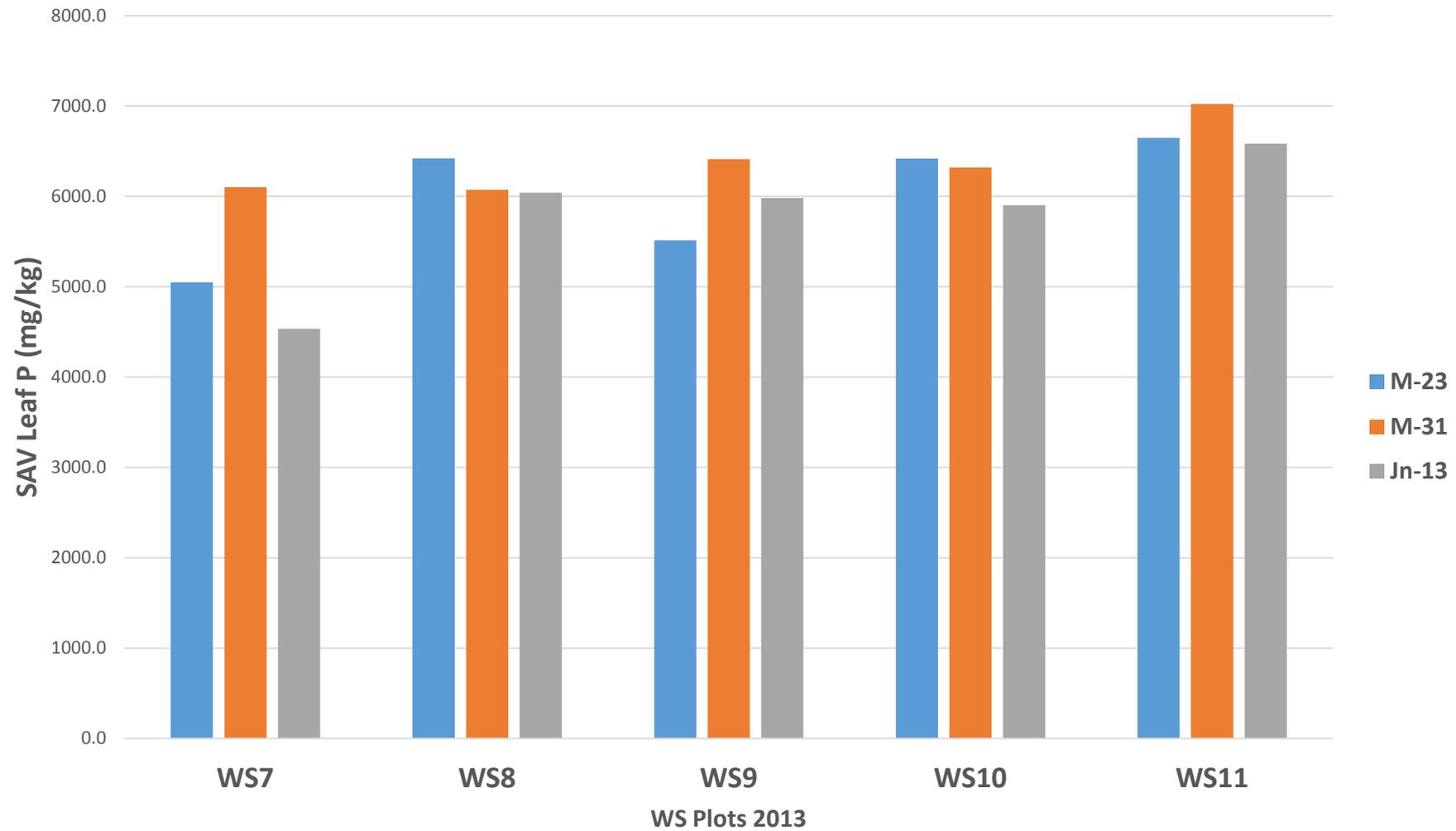
# SAV Summary cont'd

- % cover Forageable SAV not a sensitive indicator.
- BDS and Algae on SAV probably informative but not consistent indicators.
- Branch Density is a sensitive indicator.
- CI (Condition Index) may be a sensitive indicator if observer is trained for signs of SAV degradation: index paired well with Branch Density

# DQO: Key Program Questions

- What are the natural, temporal changes that occur in Willard Spur submergent wetlands?
  - Although the timing of die-off between nutrient enriched and ambient differed, die-off of SAV occurred both years (2012 + 2013).
  - Algae (macroalgae on surface and phytoplankton as chl a) developed after the decline and subsequent die-off of SAV, perhaps in response to internal cycling of decomposing SAV.
- How do differences in nutrient conditions in the water column drive changes?
  - Waiting for 2013 N and C isotope data (SAV and epiphytes)

# SAV Leaf P



# SAV Nutrient Response

- Degradation of SAV due to nutrient limitation?
  - Loss of turgor, “laying down” not upright, dropped leaves / bare stems – forageable and CEDE
  - If  $P < R$  - plants unable to pump  $O_2$  into lacunae, mechanism that floats the stems upright
  - P – limited? Plants can’t make high energy molecules necessary for PS (ATP, NADPH)
    - Not enough C fixed
  - N – limited? Plants can’t form biomolecules for metabolic function (nucleic acids, amino acids, lipids, proteins, enzymes...)