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Using Remote Sensing Mapping and Growth Response to Environmental Variability to Aide Aquatic Invasive Plant Management

Management of aquatic weeds in complex watersheds and river systems present many challenges to assessment, planning and implementation of management practices for floating and submerged aquatic invasive plants. The Delta Region Areawide Aquatic Weed Project (DRAAWP), a USDA sponsored area-wide project, is working to enhance planning, decision-making and operational efficiency in the California Sacramento-San Joaquin Delta. Satellite and airborne remote sensing are used map (area coverage and biomass density), direct operations, and assess management impacts on plant communities. Archived satellite records enable review of results following previous climate and management events and aide in developing long-term strategies. Examples of remote sensing aiding effectiveness of aquatic weed management will be discussed as well as areas for potential technological improvement. Modeling at local and watershed scales using the SWAT modeling tool provides insight into land-use effects on water quality (described by Zhang in same Symposium). Controlled environment growth studies have been conducted to quantify the growth response of invasive aquatic plants to water quality and other environmental factors. Environmental variability occurs across a range of time scales from long-term climate and seasonal trends to short-term water flow mediated variations. Response time for invasive species response are examined at time scales of weeks, day, and hours using a combination of study duration and growth assessment techniques to assess water quality, temperature (air and water), nitrogen, phosphorus, and light effects. These provide response parameters for plant growth models in response to the variation and interact with management and economic models associated with aquatic weed management. Plant growth models are to be informed by remote sensing and applied spatially across the Delta to balance location and type of aquatic plant, growth response to altered environments and phenology. Initial utilization of remote sensing tools developed for mapping of aquatic invasive plants improved operational efficiency in management practices. These assessment methods provide a comprehensive and quantitative view of aquatic invasive plants communities in the California Delta.

Key Words: Remote Sensing, Mapping, Growth, Environmental