The U.S. Army Corps of Engineers' (USACE) Aquatic Plant & Nuisance Species Research Program

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Invasive and nuisance species are increasing worldwide, likely due to a variety of factors such as global trade. In some instances, the impacts of existing invasive species are compounded by climate change. Climate change can create conditions that are suitable for more robust growth or increase the potential invasive range of a species. The estimated cost of invasive species to the U.S. economy varies widely; it is common for estimates to be in the hundreds of millions or billions of dollars annually. Agriculture likely bears the largest monetary impact of invasive species. However, impacts to aquatic resources are significant, although harder to quantify, and are frequently a source of public concern. The adverse impacts of aquatic plants on the economy, and the value of effective aquatic plant management operations, have been conservatively estimated to provide a 10:1 cost/benefit ratio (Rockwell and William 2003). That is, for every $10 spent on managing invasive aquatic vegetation, there is an estimated $100 in benefits.

Congress recognized the impact of aquatic invasive plants to our nation's waterways as far back as late 1880s and early 1890s. It was in this period that Congress authorized the USACE to remove water hyacinth from navigable waters. Over time the Aquatic Plant Control Research Program (APCRP) was officially established as the nation's only federally authorized research program directed to develop technology for the management of non-indigenous aquatic plant species. The research is centered around the development of effective, economical, and environmentally sustainable methods for assessing and managing problem aquatic plants. The goal of the program is to reduce invasive aquatic plant populations to non-problem levels, replace exotic species with native species, and restore healthy and productive aquatic habitats. Similarly, the Aquatic Nuisance Species Research Program (ANSRP) was established by Congress in 1990 to address invasive aquatic animals that are problematic to the nation's waterways and infrastructure. More recently the ANSRP has been amended to include harmful algae species. Both research programs are administered by the Engineer Research and Development Center (ERDC), Environmental Lab, https://www.erdc.usace.army.mil/Locations/EL/.

The Harmful Algal Bloom (HAB) research and demonstration project programs were added to the ANSRP by authorizations contained in the Water Resources Development Act of 2018 and 2020, respectively. HABs continue to be a significant and difficult issue affecting waterbodies across the U.S. Arguably, HABs are one of the most pressing issues in freshwater systems today. HABs result in economic and ecological damage in addition to their inherent health concerns. HAB research is focused on delivering scalable technologies to reduce the frequency and effects of HABs through research, technology development, and demonstration projects. Specific areas of research include prevention, detection, and management.

The research in both programs focuses on producing information on the growth and ecological requirements of problem aquatic species and develops new biological, chemical, and ecological technologies for their management. Specific information on the biology and ecology of problem aquatic species, obtained through research in the programs, has greatly improved the efficacy and diversity of management options, while minimizing adverse effects on the environment.

Research in the programs is primarily directed toward operational needs within the USACE. However, much of the research is broadly applicable. USACE researchers routinely partner with other federal agencies, tribes, state resource managers, academic institutions, private sector, and professional societies to conduct research activities and transfer technology to stakeholders.

Research efforts focus on the development of ecologically based, integrated pest management strategies for aquatic invasive species. Priority species for research include Eurasian watermilfoil, Flowering rush (Figure 1, next page), phragmites, giant salvinia, hydrilla (Figure 2 a and b, next page), Cuban bulrush, harmful algae, zebra and quagga mussels, invasive carp, and several other species that are currently part of the research portfolio.

Additional information on the programs can be found on the program webpages; APCRP – https://apcrp.el.erdc.dren.mil/; ANSRP – https://ansrp.el.erdc.dren.mil/hab.html; and HAB – https://ansrp.el.erdc.dren.mil/hab.html.

Reference

Rockwell, H. William, Jr. (2003). The Economic Impact of Aquatic Weeds.

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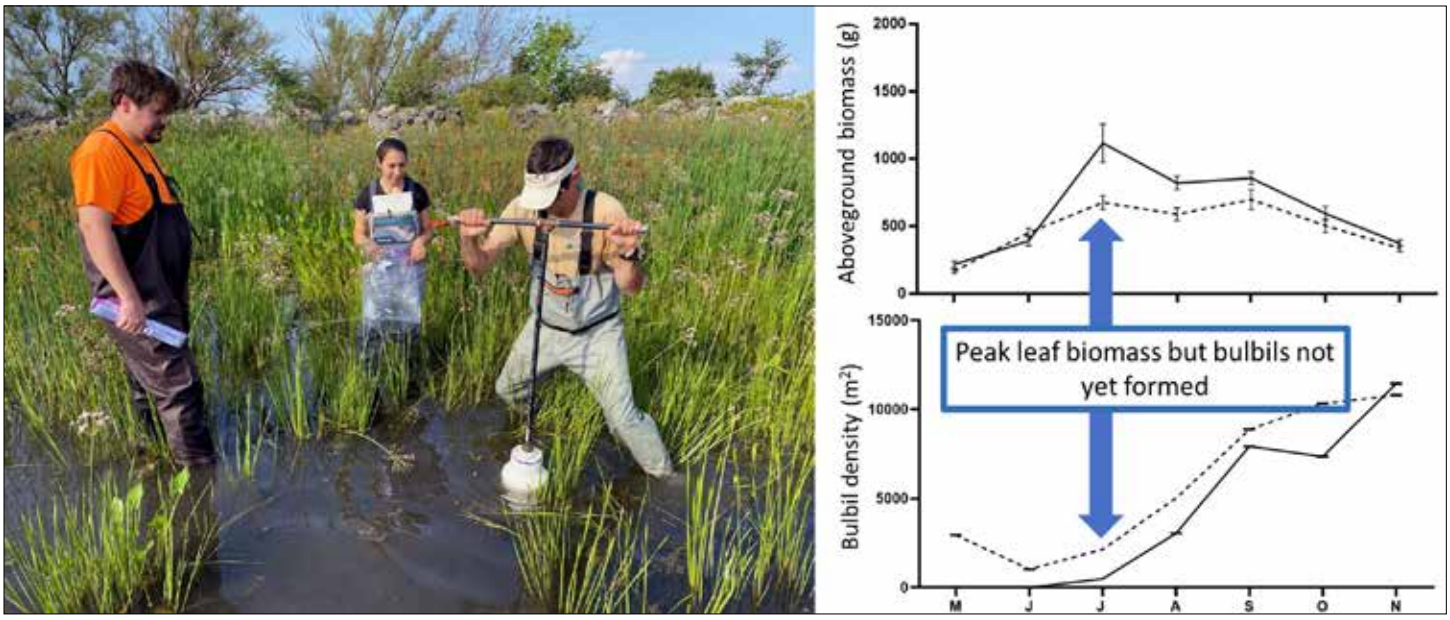

Figure 1. Phenology studies are being conducted on flowering rush in the Great Lakes and Pacific Northwest to optimize the timing of management. Whole plants were sampled monthly, analyzed for biomass, biomass allocation (roots, shoots, bulbils), starch and starch allocation. Results to date indicate that June/July are the best time for management in the Great Lakes to maximize herbicide contact with leaves and prevent bulbil formation. Flowering rush principal investigators: Nathan Harms, PhD and Bradley Sartain, PhD.

Figure 2. Research continues to focus on hydrilla management in the U.S. Major areas of investigation include further understanding of reproductive biology patterns (turions and tubers), field verification of novel chemical control tools and techniques, genetic lineage of populations found in the U.S., strategies for control in high water exchange environments, and deleterious effects of hydrilla on aquatic ecosystems. In addition to these efforts, which focus on existing monecious and dioecious hydrilla genotypes, a new effort has been initiated to explore the biology and management of a novel hydrilla genotype (Clade C) recently found in the Connecticut River. (a) dye study being conducted in a flowing system at Merritt's Mill Pond near Lake Seminole; (b): Connecticut River hydrilla. Hydrilla principal investigator Benjamin P. Sperry, PhD.