

State and Federal issues workgroup

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Research needs / Topics of interest:

1. Questions regarding chemical control
 - a. Flouridone resistance
 - i. Having a serious impact in FL, with treatment levels that once had to be 3-5ppb now going up to 20-30ppb. Costs, damage to non-targets.
 - ii. How can this be avoided elsewhere?
 - iii. Are there strategies to recover usefulness?
 - b. Induction of microorganisms that preferentially degrade an herbicide: problem of a *Pseudomonas* reducing residual effectiveness of flouridone in FL. Very long lasting: over two years. Happened suddenly. Same happens with endothall.
 - i. How did it arise?
 - ii. Can it be avoided elsewhere?
 - iii. Are there ways to suppress it? Cu tried; problematic.
 - c. Efficacy of ALS inhibitor herbicides being registered on various target species of major concern, and on important non-targets, especially crops. Strategies to maximize efficiency, minimize impacts.
 - d. Resistance management: need for all parties to support efforts by pesticide companies and regulatory agencies to develop strategies for resistance management among the suite of available herbicide options. Vetting of mgt schemes by scientific community. Make new aquatic herbicides restricted materials limited to use by regulatory/government agencies.
 - e. Flowing water situations: strategies for control and eradication, methods to maintain contact of AI with target. Possibilities for metering of herbicides? Incorporation into hydrosol?...bed resorting, limits to diffusion.
2. Grass carp
 - a. Sterility issue: definitive quantification of probability of releasing a fertile fish; definitive ruling out of any possibility of reversion.

- b. How long do triploids live relative to diploids?
 - c. Breeding or genetic manipulation to control growth rate, longevity: grow fast and die (rock and roll carp).
 - d. Many old questions outstanding:
 - i. Benefits/risks of different stocking rates
 - ii. Levels of selective feeding on different species; use to manage for native plants
 - iii. Methods to remove fish when they're no longer wanted
 - e. Better sampling methods to quantify carp in a waterbody; now very difficult.
 - f. Mortality (life table) curves for carp through the years; based on temperature-time.
 - g. Sources and control of predation
 - h. Behavior of carp in brackish habitats: do they eat seagrass?
3. Biological control
- a. Generally: can we predict when an agent will be effective in one location and not another? Eg, Neochetina weevils on water hyacinth. Can we predict where they will be (in)effective?
 - b. Hydrilla
 - i. Some areas (eg, FL) getting desperate for wide scale control strategy: time for a hard push on an extensive search for new BC agents?
 - ii. Scaling up of production of fungus that attacks hydrilla? Ability of fungus to increase susceptibility of hydrilla to flouridone?
 - c. Calls for classical BC programs on parrotfeather, Egeria densa, Brazilian Elodea, Eurasian milfoil.
4. Impact studies, of all sorts
- a. Effects of invasives on game fish, non-game fish, native plants, other taxa
 - b. Impacts of indirect effects of invasives (changes in DO, nutrients, shading, cover for predators) on game fish, non-game fish, native plants, other taxa
 - c. Case studies of economic impacts of invasives, losses in water transport, flows in natural systems, power generation, pumping, irrigation, any other values
 - d. Prediction of economic losses (economic sectors at risk) should an invasion occur
 - e. Regulatory agencies often ask for studies of effects on non-targets that operate through an outward-spiraling series of indirect mechanisms (effects on feeding behaviors, predation avoidance, influences on predators and competitors, subtle metabolic shifts, community shifts). Is there any possibility of developing protocols that would bracket worst-case scenarios and limit "study creep"?
 - f. Studies of comparative risks: invasion to fullest possible extent vs control efforts at various stages in invasion.
5. Mechanical control
- a. Economics of harvesters
 - b. Impacts of harvesters on non-target species, water chemistry

- c. Movement of invasives on equipment
 - d. Creation and control of fragments using harvesters
 - e. Interesting new suction harvester from Australia?
6. Hydrilla biology
- a. Depths to which tubers can be produced.
 - b. Depths from which tubers can successfully resprout.
 - c. In a flowing system, effects of bed resorting on tuber survival, sprouting.
 - d. Detection methods for rare plants.
 - e. Control of fragments from chemical, mechanical treatments
 - f. New methods to search for or locate tubers
 - g. Control methods for flowing water systems
7. Education (beyond public awareness during treatments)
- a. What works? What doesn't? What's most cost-effective? How can we find out?
 - b. How much do we need to invest in it?
 - c. Possible approaches or venues to consider: fishing organizations, schools and curricula, signage at public facilities (ramps, fishing spots), citation (tickets, fines) of offenders, watercraft inspections for invasives with immediate education
8. Problems with filamentous algae
- a. In TX and SE, Lyngbya sometimes taking over when hydrilla is controlled. Creates toxins and clogs watersystems. Very difficult to control alga.
 - b. Some success by planting native macrophytes...needs more work. Some work with harvesting but seems very inefficient.
 - c. Other, similar algae appearing in other parts of SE
9. Reference materials
- a. Need for a central national information center on invasive species that compiles and makes available information on locations, biology, control. The TNC Website on invasive plants is a good starting point.