The Western Aquatic Plant Management Society

ABSTRACTS
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Session I

Water Weeds of Montana. Allison Rowland, Marcy Mack and Peter Rice. National Bison Range, 132 Bison Range Road, Moiese, MT 59824. weedwarrior@excite.com

Aquatic invaders have the potential to impact aquatic habitats and recreation opportunities in Montana. The state is currently developing an aquatic nuisance species management plan. Lake County, of which ten percent is surface water, has particular concerns about invasive aquatic plants.

Yellow flag iris (*Iris pseudacorus*) forms monocultures in riparian and wetland areas, and seeds spread along irrigation canals and creeks, clogging ditches and displacing native wetland plants. It has infested locations along the Flathead River, and may be in the Clark Fork. Previous control was with glyphosate; we will test other herbicides and cultural treatments next year.

Flowering rush (*Butomus umbellatus*) is in Flathead Lake and the Flathead River, and impacts habitat and recreation along lake and river shorelines. Eurasian water-milfoil (*Myriophyllum spicatum*) and hydrilla (*Hydrilla verticillata*) cause problems in Idaho and Washington, and could be present in Montana waters. Searches will be conducted in Montana for these plants.

Session II

Development of an Integrated Aquatic Plant Mangement Plan for the Box Canyon Dam, Pend Oreille River. Devin Malkin, Duke Engineering, Seattle, WA.

As part of its relicensing efforts at the Box Canyon Hydroelectric Project, the Pend Oreille PUD No. 1 has committed to the development and implementation of an Integrated Aquatic Plant Management Plan for the Box Canyon Reservoir, Pend Oreille River, Washington. The plan takes into account diverse stakeholder interests, the identified beneficial uses of the reservoir, and the efficacy of current and experimental technologies. The plan will incorporate the results of two multi-year studies funded by the PUD: an evaluation of the local efficacy of water level drawdown for control of Myriophyllum spicatum, and experimental rearing and release of milfoil weevils. Successful implementation of the plan will require the continued cooperation of all stakeholders.

Aquatic Plants and Slime We Love to Hate. Harold Ornes, Professor of Biology and Dean College of Science, Southern Utah University, Cedar City, UT. ornes@suu.edu

Some quick and easy techniques for field identifications of common algae and macrophytes will be discussed. For example, suspended, planktonic species of algae vs floating or attached mats, green algae vs. blue green (cyanobacteria), could affect the selection of appropriate herbicide. Likewise, identification of macrophytes and knowing whether they are floating leaved, submersed, or rooting will affect the selection of appropriate herbicide and delivery method.

Session III

Purple Loosestrife Control in CA. Nate Dechoretz, CA Department of Food and Agriculture. NDechore@cdfa.ca.gov

Over the past two years, the California Department of Food and Agriculture (CDFA) has conducted a cooperative program to detect and control purple loosestrife in the San Joaquin/Sacramento Delta Watershed. The program is funded through a three-year grant from CalFed. Major components of the program include: (a) aggressive outreach effort; (b) survey, mapping and inventory; (c) integrated control emphasizing biological and chemical methods; and (d) monitoring/evaluation. Federal, state, local agencies, and private organizations provide additional funding and in-kind support for the program. Small incipient infestations are under eradication. The goal of the program is to prevent the widespread establishments of this noxious plant in the San Joaquin/Sacramento Delta and adjacent watersheds.

Managing Spartina With Glyphosate and Imazapyr. Kim Patten, Washington State University-Long Beach. 2907 Pioneer Rd. Long Beach, WA 98631. pattenk@cahe.wsu.edu

Spartina is a noxious weed in west coast estuaries. Chemical control programs have focused on glyphosate (Rodeo[7]) using 5% (v/v) applied at 90 gpa spray volume (18 lb ae/ac) by hand. Although providing reasonable control, this methodology doesn't work on Spartina meadows. An evaluation of low-volume applications methods for control of Spartina meadows using glyphosate and imazapyr was made. Overall, imazapyr consistently out-performed glyphosate under the range of conditions typically found in an estuary. On Spartina meadows where dry times after applications were >24 hours, excellent efficacy was achieved with glyphosate at 7.5 lbs ae/ac applied at 10 gal/a. For other sites, however, with reduced dry time, control was marginal. The efficacy of imazapyr (0.75 or 1.5 lbs ae/ac), was also influenced by dry time, but considerably less than glyphosate. Excellent control was achieved with 1.5 lbs ae/ac of imazapyr applied with spray volumes as low as 3 gal/ac with long dry times or 10 gal/ac with 6 hours dry time.

Mark Schwarzländer[1] and Patrick Häfliger[2], **Shoot Flies, Gall Midges, and Shoot and Rhizome Mining Moths Associated with Common Reed (*Phragmites australis*) in Europe and their Potential for Biological Control** [1]Biological Weed Control Program, College of Agricultural and Life Sciences, University of Idaho, Moscow, ID 83844-2339 USA, [2]CABI Biosciencs Switzerland Centre, CH-2800 Delemont, Switzerland

ABSTRACT Common reed, *Phragmites australis* (Cav.) Trin. ex Steudel is a cosmopolitan grass, that has recently become an invasive in freshwater and brackish wetlands in North America . Particularly along the Atlantic coast and Washington, *P. australis* is forming large monospecific stands that replace native wetland vegetation and provide poor habitat for native biota. The reasons for the rapid spread of *P. australis* are unclear. Although fossil rhizomes of the plant were recently discovered in North America, the current population explosion is often attributed to accidental introductions of more competitive genotypes. Regardless of its status as introduced or indigenous, invasions of *P. australis* are a threat to biodiversity in natural wetlands and have resulted in aggressive control attempts. Chemical, mechanical, and physical control or combinations of these methods can provide short term success in suppressing *P. australis,* however treatments need to be repeated every 3-5 years and may by themselves have undesirable effects on non-target species. Twenty eight herbivore species feed on *P. australis* in North America. However, only 5 of these insects are native to North America whereas 13 species have recently been introduced accidentally. In contrast to the scarcity of native herbivores

feeding on *P. australis* in North America, more than 140 insect species feed on *P. australis* in Europe and Asia Minor and for at least 55 of these species *P. australis* is the only known host plant. During field surveys in 4 European countries for host specific endophagous herbivores between 1998-1999 we found more than 20 insect species mining in rhizomes and/or shoots of *P. australis.* Nearly all species were shoot flies, gall midges, or moths. Since these insect groups are considered of lesser potential for biological control, data on the distribution, abundance, feeding niche and damage to the host plant were collected in order to evaluate the potential of each herbivore species. It is concluded that some of the herbivore species show good potential to become important control agents for *P. australis* in North America. However, any management strategy needs to weigh and balance the current negative ecological and economical impacts of *P. australis*-invasions and control attempts against benefits and potential risks of a biological control program, a process which will require a dialogue of all stakeholder groups involved.

KEY WORDS *Phragmites australis*, *Archanara geminipuncta*, *Platycephala planifrons*, *Lipara,* biological control, common reed

Arundo donax* Mitigation and Control in Coyote Creek,* George Forni*,* President, Aquatic Environments, Inc., gforni@covad.net; P.O. Box 1406, Alamo, CA. 94507, (925) 314-0831, Fax: (925) 229-2346

Arundo donax, a tall bamboo type plant was imported from its native India and planted in areas throughout the Southwestern US in an effort to control erosion in harsh climates devoid of rainfall or adequate ground water. The plant is highly adaptable and has since then reached epidemic proportions, specifically throughout riverine and riparian areas within California. Of particular concern is the plants ability to grow in thick, dense stands, which can alter stream flow and threaten habitat as well as fixed structures. The plant is spread by rhizome as well as fragmentation. Arundo has no natural predators and has been documented in other regions to be in the development phase of a seed base, although currently not viable. This is a strong indication that the plant is continuing its adaptation to the host region, making it all the more difficult to control and or contain. In this particular case, the affected section of Coyote Creek was contained within the Santa Clara County's Park Jurisdiction, but had caused significant rerouting of the creek in a Cal Trans right of way, destabilizing an large concrete overcrossing abutment. The riparian zone is primary habitat for several endangered and threatened species, and impact was to be kept to the absolute minimum. The project involved the removal of ~4 acres of Arundo, both by hand and mechanical methods, followed by an aggressive maintenance program to ensure eradication. The results of both the mitigation and maintenance programs will be used as a template for future Arundo donax removal programs within the State.

Influence of off-season dilute acetic acid treatments on American pondweed winter buds in a northern California irrigation canal, David Spencer, USDA-ARS Exotic & Invasive Weeds Research Unit. dfspencer@ucdavis.edu

American pondweed (*Potamogeton nodosus*) is a common weed problem in northern California irrigation systems. Previous research has indicated that winter buds are killed by dilute solutions of acetic acid. Here we report the results of a field experiment performed to evaluate acetic acid's impact on winter buds in a canal setting. During March, 2001, when flowing water was absent from the canal, we treated 50-m sections of a Nevada Irrigation District canal infested with American pondweed with either 2.5% or 5% solutions of acetic acid. We compared winter bud survival and growth in samples from the treated sections with similar samples from untreated portions of the canal. Cores placed in an outdoor tank and allowed to grow for 11 weeks showed

that no plants emerged and grew from cores collected in the treated areas while, biomass from untreated samples was about 40 g / core. Untreated plants also produced new winter buds (20 / core). Relative to untreated areas American pondweed biomass (five weeks post-treatment) was reduced by 75% in treated sections of the canal. Sediment pH in treated sections had returned to pre-treatment values within five weeks. A 2.5% acetic acid solution was as effective as a 5% solution. American pondweed from untreated sections of the canal bank invaded the treated area by the end of the growing season indicating that placement of the material is important.

Session IV

Lake Lytle Milfoil Control Project: YEAR 2. Rupa Shrestha (*Student*), Mark Sytsma, Center for Lakes and Reservoirs, Portland State University, rupas@pdx.edu

Eurasian watermilfoil (*Myriophyllum spicatum*), a B-listed, noxious aquatic weed in Oregon, invaded Lake Lytle about forty years ago and degraded the overall quality of the lake, displaced native plants, and impaired recreational activities. Sonar AS aquatic herbicide was applied to the lake and its adjoining waterbodies in the summer of 2000 as part of a three-year integrated aquatic vegetation management plan. The target Sonar concentration in the lake was 7 to 10 ppb with a contact time of 60 days. The treatment controlled 95 percent of milfoil in 2000.
An intensive vegetation survey conducted in spring 2001, revealed that milfoil survived the Sonar treatment, and occurred in 17 percent of samples collected from the lake. We were limited to use a non-chemical control method in 2001 because of the requirement of a NPDES permit by the Ninth Circuit Court of Appeals, which was not available in Oregon . Diver-operated dredging was used to manage milfoil in the lake in 2001 and was not successful at the level of infestation present in the lake. Following diver-operated dredging in 2001 milfoil occurred in 50 percent of the vegetation samples. Frequency of native species, *Chara vulgaris* and *Utricularia vulgaris* decreased in 2001. *Najas flexilis*, a native species that disappeared from the lake after the Sonar treatment in 2000, re-established in the lake with the frequency of 40.5 percent in 2001. *Potamogeton richardsonii*, a new native plant to Lake Lytle , collected in post-treatment vegetation sampling in 2000, also expanded coverage in 2001. The deviation from the management plan, which called for a second herbicide treatment in 2001 hampered the success of the project. Non-chemical control methods were not effective at the level of infestation present. It is likely that another two to three-year herbicide treatment program will be required to control milfoil in Lake Lytle .

Eurasian Watermilfoil bio-control Weevils and Eurasian Watermilfoil in Washington.
Mariana Tamayo[1], Christian E. Grue[1], and Kathy Hamel[2], [1]WA Cooperative Fish and Wildlife Research Unit, School of Aquatic and Fishery Sciences, Fishery Sciences Building , Box 355020 , University of Washington , Seattle , WA 98195 . [2]Water Quality Program, WA Department of Ecology, P.O. Box 47600 , Olympia , WA 98504 . **mtamayo@u.washington.edu**

The milfoil weevil (*Euhrychiopsis lecontei*) has shown potential as a biological control of Eurasian watermilfoil (*Myriophyllum spicatum*). This native weevil has been associated with declines of Eurasian watermilfoil in several states including Vermont , Minnesota , and Wisconsin . Researchers in Vermont and Minnesota have found that the weevil is a watermilfoil specialist and it can significantly impact Eurasian watermilfoil. The milfoil weevil is present in Washington State and has currently been detected in 24 waterbodies. During the summers of 2000 and 2001, we conducted a series of laboratory experiments to determine if the weevil could be reared successfully on Eurasian and northern watermilfoil (*M. sibiricum*) from various lakes in Washington . In addition, we characterized the aquatic and terrestrial habitats of 30 lakes to determine if differences exist between the lakes with weevils and those where they have not been detected. Results from both studies will be presented.

Phrenology and Impacts of *Egeria Densa* in a Drinking Water Reservpoir. Toni G. Pennington and Mark D. Sytsma, Portland State University, Center for Lakes and Reservoirs, ESR/PO BOX 751, Portland, OR 97207-0751. toni@pdx.edu

An examination of the seasonal phenological changes in *Egeria densa* (Brazilian elodea) and its potential impact to a drinking water reservoir in Oregon began in 2001. To determine seasonal phenological changes in *E. densa*, plants were sampled monthly, separated into various plant parts and analyzed for carbon, nitrogen, and total nonstructural carbohydrates. Preliminary data indicate relatively high percent N (up to 5 percent) in apical meristems of *E. densa* compared to other plant parts considered in this study and other aquatic angiosperms. Seasonal variation in N content of apical meristems was similar to that in Southeastern US plants, however Oregon plants did not senesce during the winter of 2001. Nitrogen content in double node regions and root crowns varied little by seasonal (2.3 to 4.0 percent and 2.4 to 3.2 percent, respectively). To investigate the potential impacts of *E. densa* infestation in a drinking water reservoir, monthly water samples were collected and analyzed for dissolved organic carbon and for total trihalomethanes (TTHMs) after 0 and 7d incubation. Due to increased contact time between chlorine and water, TTHM levels generally increased two-fold over the 7d incubation period, suggesting significant THM formation potential in the sourcewater. Greenhouse investigations are planned to elucidate the role of *E. densa* in forming carcinogenic THM precursors in drinking water reservoirs.

Precision Release*, Advancements In Product Formulation Technology for Sonar*Herbicide. Mark Mongin, Mike Netherland, SePRO Corporation, Carmel , IN ; Shaun Hyde, SePRO Corporation, Folsom, CA, shaunh@sepro.com

Since the commercial introduction of Sonar aquatic herbicide in 1986, Lake Managers have strived to utilize the new tool in a variety of aquatic site situations. Water bodies with heavy flow or high rates of dilution are especially challenging for the utilization of conventional Sonar SRP (Slow Release Pellet). Measuring the concentration of Sonar coming off of the SRP pellet was also very difficult, as detectable concentrations were seldom present in values useful for decision making. Sonar* Precision Release* was developed to provide a faster, more predictable release of fluridone in convenient and economical to apply pellet formulation. This results in improved consistency of weed control in aquatic systems with measurable water flow rates that may cause herbicide dilution. Improved efficacy can also be expected where target plant populations require a higher threshold dose of fluridone. Sonar Precision Release possesses a unique release profile. With a faster release than current SRP formulations and longer-lasting residuals than Sonar A.S., Sonar Precision Release delivers enhanced performance in difficult treatment sites.
**Trademark of SePRO Corporation*

Aqua-Kleen 2.4,D Aquatic Herbicide Update, Chris Davis and David Cragin, Ph.D, Cerexagri, Inc.

Understanding the potential heath and safety aspects of aquatic pesticides is critical for using them safely and legally. Labels and Material Safety Data Sheets (MSDS) are a key source of this type of information. They can help applicators properly handle and apply products, as well pinpoint potential hazards in the event of spills or accidental exposures. The label contains a set of instructions in the effective use of the product, including appropriate use rates and timings for target weed species and water conditions, and also requirements for protective equipment, first aid, and how to dispose of empty containers and unwanted residual product. The MSDS provides a more detailed description of the possible hazards for a chemical in order to help you protect your health and the environment. Since there are relatively few aquatic herbicides, learning about the potential hazards they pose is an achievable task and the best way to minimize potential risks.

Diquat Dibromide: Toxic Pesticide or Medicine? A Real Case for Safety Margins and Perceptions using an Aquatic Herbicide. Petta, J. F. and D. Tierney, Syngenta Crop Protection, Greensboro , NC , *jim.petta@syngenta.com*.

Diquat dibromide has been used for aquatic weed management for over 35 years in the United States . As part of the registration and re-registration process under FIFRA, numerous studies have been submitted to the Environmental Protection Agency to substantiate the safety margins as required under the law. Additionally, the registrant (Syngenta Crop Protection) is required by law to submit any negative claims made against the product concerning any potential problems such as fish kills or other off-target effects. To date, no negative effects have been reported to either Syngenta or to the EPA from Syngenta as no reports have been received.

However, in spite of this information, questions persist as to the potential toxicity to aquatic vertebrates such as salmonids. At the same time as these questions are raised on herbicidal use, fish hatcheries have been using diquat dibromide under an Experimental Permit system since 1992 as a fish protectant/medicine at rates up to 20x of the herbicidal use rates. Diquat dibromide is applied in fish hatcheries for the control of three very serious diseases of fish. These diseases include Columnaris disease (*Flavbobacterium columnare*), coldwater disease (*Flavobacterium psychrophila*), and bacterial gill disease (*Flavobacterium branchiophila*). Currently, the treated fish include musky, northern pike, large and smallmouth bass, bluegill, walleye, and catfish at the fingerling growth stage. New species to be tested include salmonids where coldwater disease and bacterial gill disease are serious diseases of coho salmon. There have been no reported adverse physical or behavioral reactions after treatment for any test species or life stage. The use of diquat dibromide has resulted in fish very high survival rates versus the untreated. This paper attempts to bridge the apparent gap in perceived toxicity as an aquatic herbicide and the use in fish hatcheries for disease control.

Session IV

Assessment of treatments to eradicate the marine algal invader *Caulerpa taxifolia* in California : Using Sediment Cores as indicators. Lars Anderson, USDA- Univ. of California – Davis, lwanderson@ucdavis.edu

The non-native marine alga *Caulerpa taxifolia* was discovered in a small San Diego Lagoon in June, 2000, the first such known introduction in the northern hemisphere. This plant has spread in the Mediterranean waters from a few square meters in the mid-1980's to over 5,000 ha presently. It displaces native sea grasses, covers a variety of bottom habitats and has recently spread to Australia as well. An eradication program was initiated within weeks of the San Diego discovery through the auspices of Southern California Caulpera Control Team (SCCAT) and has relied upon liquid and pelleted chlorine applied beneath PVC tarps used to seal off colonies of the alga. To assess effectiveness, beginning Dec. 2001, 4in.dia by 20cm sediment cores were removed from several tarped and treated sites as well as "control" cores from areas within the lagoon that neither had *C. taxifolia* nor were treated in any way. Within 24 h of removal, cores were placed in "instant Ocean" in grow-out conditions (20C; 240 umols/m2/sec coolwhite fluroesent light; LD: 14:10) and any re-growth was noted. To affirm adequate growing conditions, "control" cores were inoculated with live explants of *C. taxifolia*. No *C. taxifolia* emerged in cores from treated sites 45 days later. Inoculated *C. taxifolia* elongated, produced new thalli prodigiously in "control" cores. Seedling native eelgrass also emerged from several cores from treated sites. This method appears promising for assessing control and eradication methods for submersed aquatic plant target species.

Giant Salvinia Control With Clearigate Aquatic Herbicide On The Lower Colorado River .
PAUL WESTCOTT, Applied Biochemists-Surface Water Division, Advantis Technologies, Inc., Phoenix , AZ paulwestcott@appliedbiochemists.com,

Giant Salvinia (*Salvinia molesta*) is a free-floating aquatic fern native to South America . It is an aggressive, invasive species capable of forming dense mats on the waters' surface, rapidly spreading by vegetative fragments. Giant Salvinia was found in the Imperial Wildlife Refuge on the Lower Colorado River in August 1999. The source of the infestation was determined to be the outfall drain from the Palo Verde Irrigation District (PVID) near Blythe , CA . The PVID outfall drain collects agricultural runoff and tailwater from the irrigated farmland and returns it to the Colorado River . A number of aquatic herbicides were evaluated for efficacy and suitability based upon site characteristics, water use, and growth conditions. The water quality and dense, overhanging growth of emergent vegetation within the drain presented some major challenges to control efforts. An operational control program for Giant Salvinia under these conditions was initiated in September 2001 utilizing Clearigate, based upon the evaluation results and its unique formulation characteristics.