27th Annual Western Aquatic Plant Management Society Meeting

March 3 – 5, 2008
Granlibakken Conference Center & Lodge ~ Lake Tahoe, California

WWW.WAPMS.ORG

2008 Corporate Sponsors

Thank you for your continued support!

Gold Sponsors

SePRO

CLEAN LAKES INC.
Aquatic Ecosystem Restoration & Maintenance
Cabela's TROPHY PROPERTIES™
www.CabelasTrophyProperties.com
LAKE MAPPING PARTNER

Silver Sponsors

Aquatic Environments, Inc.
Where land meets water...

Cygnet Enterprises West, Inc.

UPI
United Phosphorus, Inc.

syngenta

Bronze Sponsors

Professional Vegetation Management
BASF
The Chemical Company

The Purpose of the WAPMS is to:

- Promote the management of non-native and nuisance aquatic vegetation.
- Encourage scientific research.
- Promote student scholarships.
- Provide scientific advancement and knowledge to its members.
- Extend and develop public interest in aquatic plant management activities.

27th Annual
Western Aquatic Plant
Management Society Meeting

March 3 – 5, 2008
Granlibakken Conference Center & Lodge ~ Lake Tahoe, California

PROGRAM

Monday, March 3rd

2:00 – 9:00 Exhibitor Setup

6:00 – 7:00 Reception

7:00 – 8:00 Board Meeting/Dinner

Tuesday, March 4th

7:30 – 8:30 **Breakfast**

8:30 – 8:40 Conference Welcome – Scott Shuler, President, WAPMS

8:40 -8:45 General Session I: Lake Tahoe, Lars Anderson, Moderator

8:45 – 9:05 **LIMNOLOGICAL HISTORY OF LAKE TAHOE:** Charles Goldman, Professor of Limnology, Director, Tahoe Research Group

9:05 – 9:25 **STATUS OF THE LAKE TAHOE AQUATIC INVASIVE SPECIES WORKING GROUP (LTAISWG):** Francis, Jenny. Lake Tahoe Aquatic Invasive Species Working Group Chair, Tahoe Resource Conservation District

9:25 – 9:45 **LAKE TAHOE: PATHWAYS FOR INVASIONS BY AQUATIC INVASIVE SPECIES:** Wittmann, Marion E., Bren School of Environmental Science and Management, University of California Santa Barbara

9:45 – 10:05 **LIMITING THE UNKNOWNS: UTILIZING DIFFERENTIAL QUANTITATIVE MAPPING TECHNOLOGIES TO ASSIST INVASIVE SUBMERGED AQUATIC VEGETATION (SAV) MANAGEMENT IN LAKE TAHOE:** Scott A. Ruch, West Coast Project Manager, ReMetrix LLC

10:05 – 10:25 **SITE-SPECIFIC INTEGRATED ADAPTIVE MANAGEMENT OF INVASIVE AQUATIC WEEDS IN LAKE TAHOE:** Lars W. J. Anderson, USDA-Agricultural Research Service, Exotic and Invasive Weed Research

10:25 – 10:45 **AQUATIC WEED MANAGEMENT IN TAHOE KEYS:** Harry W. Dotson, Member, Board of Directors, Tahoe Keys Property Association (TKPOA).

10:45 – 11:05 Break

General Session II: Western States Aquatic Invasive Species Update Thomas J. McNabb, Moderator

11:05 – 11:15 **Washington State Aquatic Invasive Species Update** (Jenifer Parsons, Washington State Department of Ecology)

11:15 – 11:25 **Idaho Aquatic Invasive Species Update** (Tom Woolf, Idaho Department of Agriculture)

11:25 – 11:35 **Montana Aquatic Invasive Species Update** (Sue Ball, Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation)

11:35 – 11:45 **Oregon Aquatic Invasive Species Update** (Toni Pennington, CH2M Hill/Center for Lakes and Reservoirs, Portland State University)

11:45 – 12:55 **California Aquatic Invasive Species Update** (Susan Ellis, California Department of Fish & Game, California Aquatic Invasive Species Coordinator)

11:55 – 12:10 **Nevada Aquatic Invasive Species Update** (Jim Heinrich, Nevada Department of Wildlife)

12:10 – 12:20 **Washington State Noxious Weeds and Irrigation Plant Control Permit's Update (**Kelly McLain, Pesticide Specialist/Permit Writer, Water Quality Program, WA Dept. of Ecology

12:20 – 12:30 **Discussion**

1:30 – 1:30 **Lunch**

General Session III: Aquatic Plant Management Activities in The Western States, Scott Shuler, Moderator

1:30 – 1:50 **EURASIAN WATERMILFOIL MONITORING AND ERADICATION ASSESSMENT IN THE PEND OREILLE LAKE AND RIVER SYSTEM, IDAHO:** John D. Madsen[1], Ryan Wersal[1], and Thomas E. Woolf[2]; [1]Mississippi State University [2]Idaho State Department of Agriculture, Boise, ID

1:50 – 2:10 **ASSESSING PROGRESS IN BRAZILIAN WATERWEED MANAGEMENT IN THE SACRAMENTO-SAN JOAQUIN DELTA, CA: EFFICACY RESULTS FROM 2007 BROAD-SCALE HERBICIDE TREATMENT IN FRANK'S TRACT:** Scott A. Ruch, West Coast Project Manager, ReMetrix LLC & California Department of Boating and Waterways Aquatic Weed Unit

2:10 – 2:30 **AQUATIC WEED ASSESSMENT FOR THE MARIN MUNICIPAL WATER DISTRICT'S SEVEN RESERVOIRS:** Cressey, S[1]., L. Dohman[1], and G. Andrew[2]. [1]Aquatic Environments, Inc.Marin Municipal Water District

2:30 – 2:50 **DISTRIBUTION AND SPREAD OF EURASIAN WATERMILFOIL IN FALL RIVER, CALIFORNIA:** D. F. Spencer and G. G. Ksander, USDA ARS Exotic & Invasive Weeds Research Unit

2:50 – 3:10 **IDAHO'S EVOLVING AQUATICS PROGRAM:** Tom Woolf, Idaho State Department of Agriculture

3:10- 3:30 **Break**

General Session III Continued: Aquatic Plant Management Activities in The Western States, Tom Woolf, Moderator

3:30 – 3:50 **THE MILFOIL WEEVIL IN WASHINGTON STATE: AN UPDATE ON STATUS AND RESEARCH:** Parsons, J. K., G. E. Marx, M. Tamayo. Aquatic Plant Specialist, Washington Department of Ecology

3:50 - 4:10 **APPLIED ECOLOGY OF EURASIAN WATERMILFOIL (*MYRIOPHYLLUM SPICATUM* L.) IN FALL RIVER:** Thaddeus Hunt[1], Joseph M. DiTomaso[1], David F. Spencer[2]; [1]Department of Plant Sciences, University of California, Davis 95616; [2]USDA ARS Exotic & Invasive Weeds Research Unit, Department of Plant Sciences, University of California

4:10 – 4:30 **FLOWERING RUSH: An Invasive Aquatic Macrophyte Infesting the Headwaters of the Columbia River System:** Sue Ball, Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation, Rice, Peter M.[1] and Dupuis, Virgil[2] University of Montana[1]. Salish Kootenai College[2]

4:30 – 4:50 **SAN FRANCISCO BAY INVASIVE SPARTINA PROJECT UPDATE, San Francisco Bay Invasive Spartina Project:** Erik K. Grijalva, Field Operations Manager, San Francisco Estuary Invasive Spartina Project

4:50 – 5:10 **WASHINGTON'S FRESHWATER ALGAE (CYANOBACTERIA) PROGRAM:** Hamel, K.S. and J. Clark; Washington Department of Ecology.

5:10 – 5:15 Closing Remarks

6:00 – 8:30 **President's Reception/Banquet**

Wednesday, March 5th

7:15 – 8:30 Breakfasts

8:30-8:35 Welcome: Thomas J. McNabb, Vice President, WAPMS

General Session IV: Kelly McLain, Moderator

8:35 – 8:55 **AQUATIC INVASIVE SPECIES MANAGEMENT THROUGH PUBLIC AWARENESS:** Doug Freeland Aquatic Consulting and Evaluation aka A.C.E.Diving Mark Butler, Environmental Education Resource Teacher, Curriculum & Instructional Services, District School Board of Pasco County

8:55 – 9:15 **BONNER COUNTY INVASIVE SPECIES TASK FORCE, A PUBLIC PROCESS:** Brad Bluemer, Bonner County Public Works

9:15 – 9:35 **PUBLIC PERCEPTION OF A LARGE SCALE EURASIAN WATERMILFOIL CONTROL PROGRAM IN THE PEND OREILLE LAKE & RIVER SYSTEM, IDAHO:** Thomas G Moorhouse, Thomas J. McNabb, Clean Lakes, Inc.

9:35 – 9:55 **THE CONTROL OF WATER HYACINTH IN THE SACRAMENTO/SAN JOAQUIN DELTA: A work in progress.** Paul Ryan, Environmental Scientist, California Department of Boating and Waterways

9:55 – 10:15 **AQUATIC ECOSYSTEM RESTORATION FOUNDATION:** Carlton Layne, Director

10:15 – 10:30 Break

General Session V: Aquatic Vegetation Control, Brad Bluemer, Moderator

10:30 – 10:50 **THE STRUGGLE AGAINST HYDRILLA CONTINUES: California Update for 2007 Season.** Akers, Patrick. Hydrilla Eradication Program, Integrated Pest Control Branch, California Department of Food and Agriculture

10:50 – 11:10 **RESULTS OF LONG TERM MECHANICAL TULE CONTROL WITHIN FRESHWATER AQUIFERS:** George P. Forni II, Aquatic Environments

11:10 – 11:30 **EURASIAN WATERMILFOIL CONTROL IN THE PEND OREILLE LAKE AND RIVER SYSTEM:** Thomas J. McNabb, Thomas G. Moorhouse, Clean Lakes, Inc.

11:30 – 11:50 **CONTROLLING AQUATIC WEEDS IN IRRIGATION CANALS WITH ENDOTHALL:** Cody J. Gray[1] and K. Jayne Walz[2]. [1]United Phosphorus, Inc., Peyton, CO 80831; [2]United Phosphorus, Inc.,

11:50 – 12:10 **SELECTIVE CONTROL OF EURASIAN WATERMILFOIL USING DIQUAT: A Five Year Case Study in Long Term Selective Plant Management** Marc Bellaud[1], Gerald Smith[1],Michael Lennon[1], and **James Petta[2]**
[1]Aquatic Control Technology, Inc. and [2]Syngenta Professional Products

12:10 – 1:10 Lunch

General Session VI: Aquatic Herbicides, Robert Leavitt, Moderator

1:10 – 1:30 **REGULATORY REVIEW OF HERBICIDES FOR FISH AND WILDLIFE SAFETY:** Rich Bireley, California Department of Pesticide Regulation

1:30 – 1:50 **EFFICACY OF DRY GROUND APPLICATIONS OF PENOXSULAM AND FLURIDONE ON SAGO PONDWEED:** Koschnick, T.J.[1], S. Miller[2] & S. Shuler[3]; [1]Aquatic Research Manager, [2]Aquatic Research Biologist, and [3]Aquatic Specialist; SePRO Corporation

1:50 – 2:10 **COMBINATIONS OF ENDOTHALL WITH 2,4-D AND TRICLOPYR FOR CONTROL OF EURASIAN WATERMILFOIL:** John D. Madsen[1], Kurt D. Getsinger[2], and Ryan M. Wersal[1], [1]GeoResources Institute, Mississippi State University, Mississippi State, and [2]US Army Engineer Research and Development Center

2:10 – 2:30 **IMAZAMOX ABSORPTION AND METABOLISM BY EURASIAN WATERMILFOIL (*Myriophyllum spicatum*):** Vassios, J.D.[1], S. Nissen[2], G. Brunk[3]. Colorado State University, Department of Bioagricultural Sciences and Pest Management

2:30 – 2:45 Break

General Session VII: What's New, Patrick Akers, Moderator

2:45 – 3:05 **NEW TECHNOLOGY FOR ALGAE CONTROL:** Paul Westcott, Southwest Regional Manager, Applied Biochemists

3:05 – 3:25 **NEW TECHNOLOGIES USED TO REMOVE EURASIAN MILFOIL FROM BIG BEAR LAKE CALIFORNIA:** McNabb, Terence, Aquatechnex

3:25 – 3:45 **NEW GPS TOOLS FOR RECORDING FIELD DATA:** Akers, Patrick, Jonathan Heintz Hydrilla Eradication Program, Integrated Pest Control Branch, California Department of Food and Agriculture

3:45 – 4:15 Annual Business Meeting

4:15: MEETING ADJOURNED

5:30 – 6:30 Dinner

Thursday, March 6th

7:30 – 9:00 Breakfast

27th Annual
Western Aquatic Plant
Management Society Meeting

March 3 – 5, 2008
Granlibakken Conference Center & Lodge ~ Lake Tahoe, California

ABSTRACTS
Oral Presentations
(In Order of Presentation)

LIMNOLOGICAL HISTORY OF LAKE TAHOE, Charles Goldman, Professor of Limnology, Director, Tahoe Research Group will provide an overview of the limnological history of Lake Tahoe.

STATUS OF THE LAKE TAHOE AQUATIC INVASIVE SPECIES WORKING GROUP (LTAISWG), Francis, Jenny. Lake Tahoe Aquatic Invasive Species Working Group Chair, Tahoe Resource Conservation District, 870 Emerald Bay Rd., Suite #109 South Lake Tahoe, Ca 96150, ph. 530-543-1501 ext. 109, fax 530-543-1660, jenny.francis@carcd.org. The establishment and proliferation of aquatic invasive species in the Tahoe Basin presents difficult challenges to resource management agencies. The historical lack of coordination and unified management strategies has contributed to the difficulty of invasive species control. Recognizing the lack of coordination and unified approach, the Lake Tahoe Basin Weed Coordinating Group (LTBWCG) established an aquatic weed subcommittee. As the group evolved they recognized the need to address all aquatic invasive species threatening Lake Tahoe. Thus, the Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG) was established to better address the need for control and management of aquatic invasive species. By establishing numerous partnerships and agreements, the LTAISWG has contributed to the increased awareness of the threat presented by aquatic invasive species and the benefit of a coordinated approach to management and control. The coordinated efforts of the LTAISWG have begun by focusing on six main components for better addressing the threats presented by aquatic invasive species; 1) education, 2) exclusion, 3) prevention, 4) control, 5) information exchange, and 6) cooperation. By working in cooperation, on a standard approach, the LTAISWG has been able to leverage significant additional resources thru multi agency partnerships and funding opportunities. This has resulted in the initiation of a comprehensive coordinated prevention, monitoring, and control approach for aquatic invasive species this year. The coordinated approach used by the LTAISWG has resulted in a standardized process for management and cooperative funding that has greatly contributed to opportunities for more effective management and control of invasive species.

LAKE TAHOE: PATHWAYS FOR INVASIONS BY AQUATIC INVASIVE SPECIES, Wittmann, Marion E.[1], Bren School of Environmental Science and Management, University of California Santa Barbara, Bren Hall, Santa Barbara, CA 93106-5131, office: 805 893 5890, mwittmann@bren.ucsb.edu, Web: http://www.bren.ucsb.edu/~mwittmann. The transport of aquatic invasive species on boats and boating equipment plays a key role in the dispersal and invasion of water bodies (Johnstone et al. 1985, Padilla et al. 1996, Johnson et al. 2001). Eurasian watermilfoil (*Myriophyllum spicatum* L.) is a submersed, invasive aquatic macrophyte that has naturalized in and around Lake Tahoe for over 30 years. It has spread extensively along the South shore of the lake and into the Truckee River. In 2003, the invasive curly-leafed pondweed (*Potamogeton crispus* L.), was also discovered along the south shore of Lake Tahoe, and has since been spreading. Lake Tahoe and surrounding water bodies are heavily utilized for recreational boating and fishing activities. Under current conditions, there are no vehicle inspection programs regarding the removal of potentially viable plant fragments or other aquatic species from boats and trailers exiting or entering the lake. Over the summers of 2006 and 2007, I conducted surveys at seven Lake Tahoe boat launches gathering information on boater movements both within the lake and to surrounding water bodies. I performed visual inspections of outboards, propellers and trailers and also collected information on boat cleaning habits and awareness of invasive aquatic plants. I found that boats removed from Lake Tahoe carry plant fragments, and either return to Lake Tahoe or travel to other water bodies within seven days, posing a potential threat to uninfested sites nearby. Recreational boaters also travel from water bodies with known populations of non-native aquatic species such as the New Zealand Mudsnail and the Quagga Mussel to Lake Tahoe and other non invaded water bodies.

LIMITING THE UNKNOWNS: UTILIZING DIFFERENTIAL QUANTITATIVE MAPPING TECHNOLOGIES TO ASSIST INVASIVE SUBMERGED AQUATIC VEGETATION (SAV) MANAGEMENT IN LAKE TAHOE, CA., Scott A. Ruch. West Coast Project Manager, ReMetrix LLC, 2041 Bancroft Way, Suite 206, Berkeley, CA 94704. scott@remetrix.com. Six field methods currently exist for measuring submerged vegetation beds: (1) hyrdoacoustic sampling, (2) diver sampling, (3) physical point sampling from the surface, (4) underwater photography/videography, (5) aerial image analysis, and (6) empirical surface observations. Of these, hydroacoustic sampling is the most rapid and robust method for quantitatively determining the coverage, volume, and overall extent of submersed vegetation beds. Vegetation coverage, volume, and overall extent are key metrics in understanding not only where to manage invasive species like Eurasian watermilfoil (*Myriophyllum spicatum*) and Curlyleaf pondweed (*Potamogeton crispus*), but also quantifying the efficacy of management regimes through time. Hydroacoustic sampling is deemed essential for Lake Tahoe because of the broad geographic extent of the study areas (many possible sites spread over a 191 square-mile lake area), the frequency of visits to these sites, the need for cost-effective repeatability, the need to quantify bed-scale characteristics of SAV beds, the need for detailed sampling of the entire water column within the beds, and the need for detailed sampling of scores of acres. No other sampling option meets all of the necessary functions listed above. Augmenting the hydroacoustic data with concurrent diver and underwater video statistical sampling for species completes the slate of necessary information for locating and understanding the efficacy and effects of management regime use on invasive SAV beds within Lake Tahoe. In summer 2007, a preliminary pilot study was coordinated with the Tahoe Resource Conservation District (TRCD) at Ski Run Marina. Results from this effort will be presented and discussed.

Site-Specific Integrated Adaptive Management of Invasive Aquatic Weeds in Lake Tahoe, Lars W. J. Anderson, USDA-Agricultural Research Service, Exotic and Invasive Weed Research One Shields Ave. Mail Stop #4, Davis, CA 95616 lwanderson@ucdavis.edu. Eurasian watermilfoil (*Myriophyllum spicatum*) has gradually expanded its distribution within Lake Tahoe for at least the last 12 years, and curlyleaf pondweed (*Potamogeton crispus*) has begun expanding its range at least for the past 5 years. There is no reason to assume that expansions won't continue, nor that Lake Tahoe will not be subject to invasions by other non-native aquatic species. The current invasive weeds occupy a well-delineated portion of Lake Tahoe's 73-mile shoreline. With the exception of the Tahoe Keys, and recent expansions at Ski Run, most of the infested sites are confined to small areas that are protected from high-energy waves. However, from a management-action perspective, these sites present a very diverse set of circumstances due to differences in:(1) physical barriers; (2) access; (3)public/private uses; (4)"ownership and authority" ;(4)"vectoring liability"; (5) ecosystem impacts; (6) economic impacts; and (7) societal mindsets. Therefore, a management program cannot be expected to achieve success with a "one-size fits all" approach, nor should any "tool" be excluded simply because it does not "fit" in all or most infestations. The most appropriate, effective and acceptable approaches must employ a suite of methods that are integrated to best match the seven "diversity" characteristics, and which include a robust, science-based adaptive (monitoring/experimental) feed-back component. This strategy will reduce both risk to the environment (non-target effects), and risk of failure (poor weed management) while maximizing the support of stakeholders. An adaptive model will be presented that incorporates these concepts at specific Lake Tahoe infestations.

AQUATIC WEED MANAGEMENT IN TAHOE KEYS. Dotson, H.W., PE, Member and past President, Board of Directors, Tahoe Keys Property Owners Association, 356 Ala Wai Blvd., South Lake Tahoe, CA 96150, 530-542-6444, HarryDotson@sbcglobal.net. The Tahoe Keys is a community development of over 1500 homes and townhouses located at the south end of Lake Tahoe. The development includes a labyrinth of man made channels and lagoons to provide water access to Lake Tahoe for property owners. There are approximately 140 acres of waterways, having an average depth of about 10 feet. Over the last 30 years, invasive aquatic weeds have caused serious adverse impacts on boating, swimming, water quality, and general aesthetics within the Keys and have contributed to the spread of aquatic weeds to other areas in Lake Tahoe. In 1984, the Tahoe Keys Property Owners Association (TKPOA) started using a large mechanical harvester to physically remove weeds from the lagoons. Twenty years ago, approximately 1800 yd^3 (1,380 m^3) were removed by mechanical harvesting. Today, approximately 4,400 yd^3 (3,360 m^3) are removed annually using 4 harvesters, at a total cost of about $260,000 per year. Harvesting techniques have been improved to reduce the spread of weed fragments and improved methods are continually being pursued. However, this method of control is less than adequate to keep up with weed growth, prevent adverse impacts and spreading. The TKPOA is currently cooperating with TERC and California Fish and Game by supporting instrument placement and the collection and sharing of data. The education of property owners on the use of fertilizer, runoff reduction, and maintaining weed-free boats is on-going and will continue. The TKPOA is signatory to the MOU of the Lake Tahoe Basin Aquatic Invasive Species Working Group (LTAISWG) and is dedicated to supporting its goals. We are optimistic that continued interagency cooperation will lead to the identification and implementation of effective methods to eradicate invasive aquatic weeds in the Tahoe Keys.

WESTERN STATES AQUATIC INVASIVE SPECIES UPDATES (No Abstracts)

EURASIAN WATERMILFOIL MONITORING AND ERADICATION ASSESSMENT IN THE PEND OREILLE LAKE AND RIVER SYSTEM, IDAHO. John D. Madsen[1], Ryan Wersal[1], and Thomas E. Woolf[2]; [1]Mississippi State University, Mississippi State, MS 39762-9652, ph. 662.325.2428, fax 662.325.7692, jmadsen@gri.msstate.edu and [2]Idaho State Department of Agriculture, Boise, ID. The Pend Oreille Lake and River system is the largest freshwater body in the State of Idaho, encompassing 37,200 hectares. Eurasian watermilfoil (*Myriophyllum spicatum* L.) has spread throughout much of the systems littoral zone, reducing native plant growth and diversity. We surveyed the entire littoral zone of the lake and river using a point intercept survey covering 1671 points in both June and August of 2007, in a uniform grid with points 250 m apart in waters of less than 15m deep. Approximately 1700 hectares of Eurasian watermilfoil were found in the entire system, or approximately 26% of points in the June survey and 23% in the August survey. We also surveyed almost 2000 points in June and August/September of 2007 in locations selected for management. The three treatments assessed were herbicide treatments using either a granular formulation of fluridone (2.3 to 7.9 kg ai ha^{-1}, treated in early July) or a granular formulation of the triethylamine salt of triclopyr (25 to 43 kg ae ha^{-1}, treated in late July), and diver-operated suction dredging. Fluridone was not effective at reducing Eurasian watermilfoil frequency (45% pretreatment, 40% posttreatment, McNemar's Test $p=0.35$). Fluridone efficacy may improve with additional exposure time. Triclopyr treatments were effective at reducing Eurasian watermilfoil frequency (pretreatment 61%, posttreatment 18%, McNemar's Test $p<0.0001$). Diver dredging was also not effective at reducing Eurasian watermilfoil frequency (pretreatment 36%, posttreatment 46%, McNemar's test $p=0.65$). Additional herbicides, application times, and management strategies should be evaluated in the future.

ASSESSING PROGRESS IN BRAZILIAN WATERWEED MANAGEMENT IN THE SACRAMENTO-SAN JOAQUIN DELTA, CA: EFFICACY RESULTS FROM 2007 BROAD-SCALE HERBICIDE TREAMENT IN FRANK'S TRACT. Scott A. Ruch and California Department of Boating and Waterways Aquatic Weed Unit, ReMetrix LLC, 2041 Bancroft Way, Suite 206, Berkeley, CA 94704, California Department of Boating and Waterways, 2000 Evergreen St., Suite 100, Sacramento, CA 95815. scott@remetrix.com. Control of invasive Brazilian waterweed (*Egeria densa*) in the complex waterways of the Sacramento-San Joaquin Delta (SSJD) presents many challenges. Rapid tidal fluxes, varying and often strong current patterns, sediment composition, changing water temperature and turbidity, and a host of other factors can all influence the efficacy of aquatic herbicide treatment regimes. Understanding how and why submerged macrophyte cultures of *Egeria densa* react to management efforts throughout growing seasons in the SSJD is key to realizing the best methodology to use in regulating invasive growth. The semidiurnal tidal flux and significant turbidity of SSJD waters has historically rendered empirical measurements of Egeria coverage and biovolume unreliable. Hydroacoustic plant mapping technology, applied in Delta waters since 2003, has provided a breakthrough in solving this assessment problem. Combining hydroacoustic transects with underwater photographic surveillance and traditional point sampling techniques provides the most complete picture to date of submerged aquatic vegetation conditions in the unique shallow water habitats of the SSJD. Sites in the central Delta have been monitored since 2003 for submerged vegetation species, health, biocover, and biovolume. The goal of this ongoing monitoring approach is to measure actual efficacy and the factors that influence efficacy on Brazilian waterweed. Yearly summaries strongly contribute to adaptive management decision-making. Within the operational context of the goals of the California Department of Boating & Waterways *Egeria densa* Control Program, analysis results from Frank's Tract, a ~3,000-acre treatment site located in the central SSJD, will be utilized as an example of progress in managing volume and coverage of *Egeria*.

AQUATIC WEED ASSESSMENT FOR THE MARIN MUNICIPAL WATER DISTRICT'S SEVEN RESERVOIRS. Cressey, S[1]., L. Dohman[1], and G. Andrew[2]. [1]Aquatic Environments, Inc. PO Box 1406, Alamo, CA 94507, ph 925-521-0400, fax 925-521-0403, email scres@aol.com and ldohman@aquamog.com; [2]Marin Municipal Water District, Corte Madera, Ca. gandrew@marinwater.org. The Marin Municipal Water District (MMWD) owns and manages seven water storage reservoirs as a source of water supply for much of Marin County, California, located just north of San Francisco. One of the seven reservoirs, Bon Tempe, is known to contain the highly invasive aquatic plant, Eurasian milfoil (*Myriophyllum spicatum*). This aquatic weed puts at risk many of the beneficial uses of Bon Tempe Reservoir and has a high potential for being accidentally introduced to the other reservoirs in the watershed. For this reason, MMWD contracted with Aquatic Environments, Inc. (AEI) of Concord, California to determine the extent of the aquatic weeds in each reservoir. AEI's scope of work was to: 1) Identify and characterize aquatic weeds in the seven reservoirs; 2) Identify treatment options and the pros and cons of each option; and 3) Create protocols for periodic assessment of the aquatic weeds in these reservoirs. AEI's staff mapped the aquatic weeds of the seven reservoirs using a hydroacoustic system. The system consists of a digital scientific echosounder (Model DT-X) with integrated GPS (accuracy of 1 meter) and interpretive software (EcoSAV) that identifies aquatic weeds and provides estimations of canopy height and percent bottom coverage. This presentation describes the study methods, results, and a review of the approaches explored for controlling Eurasian milfoil in the reservoirs. The four management options considered included reservoir water level operations, chemical treatment, mechanical harvesting, and biological controls (utilizing a weevil that feeds on milfoil).

DISTRIBUTION AND SPREAD OF EURASIAN WATERMILFOIL IN FALL RIVER, CALIFORNIA. D. F. Spencer and G. G. Ksander, USDA ARS Exotic & Invasive Weeds Research Unit, Davis, CA, ph. 530-752-1096, fax 530-754-4604, dfspencer@ucdavis.edu. We determined whether submersed aquatic plants were present or absent at randomly determined points in Fall River between a launch point located upstream of Spring Creek Bridge and a point below the Circle 7 property, On July 24 and 25, 2006 and October 4 and 5, 2007. This is approximately 4.6 river miles (7.4 km). We used a GPS digital camera and an underwater viewing device to collect images of the submersed plants and river sediments at these points. The underwater viewing device was held in place as a small boat with an outboard motor slowly traversed a rounded zigzag course downstream. The presence or absence of submersed rooted aquatic plants (Elodea, *Elodea canadensis;* Eurasian watermilfoil, *Myriophyllum spicatum*; waterstar grass, *Callitriche hermaphroditica;* and horned pondweed or zgrass, *Zannichellia palustris*) and filamentous algae were recorded. The number of occurrences of each species was divided by the total number of samples collected to yield the frequency (%) which is a measure of relative abundance. From these data the mean frequency and 95% confidence limits were calculated. There were clearly detectable changes in species' abundances. It is of note that the abundance of Eurasian watermilfoil increased within this section of Fall River between the two years.

Idaho's Evolving Aquatics Program, Tom Woolf, Idaho State Department of Agriculture PO Box 790 Boise, ID 83701. Aquatic plant management is relatively new to the state of Idaho. In 2006 the issue began to receive considerable attention when the Idaho State Legislature and the Governor enacted a program to take aggressive action against expanding Eurasian watermilfoil populations in the state. The program's focus is on "eradication" and to date over $6-million have been spent on treatment, education, and prevention. Over 8,000 acres of Eurasian watermilfoil have been treated and over 150 waterbodies have been surveyed through the program. Success has been seen throughout the state and standardized surveying protocols have improved treatment assessment and early detection. Surveys have also revealed a number of other invasive aquatic plants that are new to the state. As new aquatic plant management challenges arise the program continues to seek out expertise from around the nation to help build an effective program that gets results.

THE MILFOIL WEEVIL IN WASHINGTON STATE: AN UPDATE ON STATUS AND RESEARCH. Parsons, J. K., G. E. Marx, M. Tamayo. Aquatic Plant Specialist, Washington Department of Ecology, 15 W. Yakima Ave, Suite 200, Yakima, WA 98902 ph 509-457-7136, jenp461@ecy.wa.gov. The milfoil weevil (*Euhrychiopsis lecontei*) is a potential biological control agent for the invasive non-native aquatic weed Eurasian watermilfoil (*Myriophyllum spicatum* L.). Inventories for the milfoil weevil have revealed naturally occurring populations of this native beetle in 21 lakes. We have tracked populations of the weevil and Eurasian watermilfoil in one lake where weevil populations are naturally high enough to suppress Eurasian watermilfoil abundance. We also conducted a milfoil weevil rearing and augmentation trial in a small lake for two years. The milfoil weevils were slow to establish, but after 5 years are now abundant in the lake. Fish community data collected as part of the project showed a change in the fish community away from dominance by small sunfish during this period. This may have been either a cause of or result from the milfoil weevil population growth.

APPLIED ECOLOGY OF EURASIAN WATERMILFOIL (*MYRIOPHYLLUM SPICATUM* L.) IN FALL RIVER. Thaddeus Hunt[1], Joseph M. DiTomaso[1], David F. Spencer[2]; [1]Department of Plant Sciences, Mail Stop 4, One Shields Avenue, University of California, Davis 95616; [2]USDA ARS Exotic & Invasive Weeds Research Unit, Department of Plant Sciences, Mail Stop 4, One Shields Avenue, University of California, Davis 95616 email: Qhunt@ucdavis.edu. The Fall River in Shasta County, CA is a host to the exotic weed Eurasian watermilfoil (*Myriophyllum spicatum*). In 2003, the aquatic weed infestation resulted in decreased flow rates leading to a broken levee and the flooding of 3000 acres of grazing land. Over $200,000 was spent on plant harvesting downstream to restore flow to the river. In addition, the species is a hindrance for the local trout fishery and downstream power generation. As part of this study, we are mapping its distribution in the river and comparing sediment and plant characteristics between invaded and uninvaded locations. Our goal is to determine potential limitations for its spread. We are also monitoring non-structural carbohydrates stored in root crown tissue to identify time periods when reserves are lowest so that control operations may be optimally timed. Nutrient addition experiments measuring biomass return as well as tissue nitrogen (N) and phosphorous (P) content indicate below critical levels of content of P for two sites sampled in 2005 and evidence of limitation of growth at one site sampled in 2005. Data for 2006 indicates below critical levels of P at 4 sites sampled and some limitation in biomass production. Data from 2007 has yet to be analyzed. Root crown stored non-structural carbohydrate lows coincided with spring regrowth and flower development in June, July, and August in 2005, 2006 and 2007 for most sites and in fall for one site in 2005 and 2007. The data from 2005 and 2006 suggests that *Myriophyllum spicatum* is not yet at the upstream extent of its potential distribution and that control efforts which involve canopy removal should be timed in

July and August to take advantage of reduced carbohydrates stored in root crowns and reduced capacity for post-treatment regrowth.

Flowering Rush: An Invasive Aquatic Macrophyte Infesting the Headwaters of the Columbia River System Rice, Peter M.[1] and Dupuis, Virgil[2] University of Montana[1]. Salish Kootenai College[2]. peter.rice@umontana.edu. Flowering rush (*Butomus umbellatus*), an exotic Eurasian obligatory wetland species, is an invasive aquatic macrophyte with emerged and fully submerged forms that can dominate irrigation systems, wetlands, the littoral zone of freshwater lakes, and river edges. It will be added to the Montana Noxious Weed List when rule making is completed in 2008. Flowering rush was first reported in Flathead Lake in 1964. GPS/GIS mapping of the south half of the Lake was initiated in 2007 and so far has delineated at least 780 acres of flowering rush. Numerous infestations have also been reported for the north half of the Lake. It has passed through Kerr Dam on Flathead Lake and infested the Flathead River over at least a 60 mile reach. The Kerr Dam hydroelectric facility is operated to reach low pool in early spring, whereas an unregulated natural lake would reach low pool in late summer. This unnatural spring drawdown appears to create seasonal conditions that are favorable for the establishment of flowering rush infestations and disadvantages to native macrophytes evolved to a hydrologic cycle with a late summer low pool. Spread is by lateral rhizome fragments which are easily dislodged from the main rhizome by any natural or anthropogenic disturbance. Flowering rush establishes in fine sediments. It can colonize the previously unvegetated portions of variable drawdown zones. It forms monotypic colonies in the literal zone and is invading native shoreline and wetland communities. The karyotype in the Flathead Basin is a robust triploid. This large infestation at the headwaters of the Columbia River system is likely to spread downstream and infest most of the main stem of the system. Higher tropic level impacts have not been studied.

SAN FRANCISCO BAY INVASIVE SPARTINA PROJECT UPDATE, San Francisco Bay Invasive Spartina Project, Erik K. Grijalva, Field Operations Manager, San Francisco Estuary Invasive Spartina Project, California Coastal Conservancy, 2560 9th Street, Suite 216, Berkeley, CA 94710, Phone: (510) 548-2359 www.spartina.org. In 2007 the California Coastal Conservancy's Invasive Spartina Project (ISP) completed the third year in a 3-year non-native Spartina (cordgrass) eradication effort in the San Francisco Estuary. This 3-year effort was the second of three main phases of a larger control effort in the Estuary, and saw the treatment of over 1,750 acres of non-native Spartina during that time. The ISP coordinates the permitting, planning, budgeting, and implementation of non-native Spartina control on 156 sites spread around the nine counties of the San Francisco Estuary. Current estimates put the reduction of non-native Spartina cover within the Estuary at near 65%, with final efficacy estimates pending spring 2008 inventory monitoring. The final 3-year phase of the ISP Spartina control effort will be initiated in 2008, and will incorporate site-specific plan updates and renewed permitting. This effort relies on the dedicated involvement of a host of local, county, state and federal agencies and private groups. Control methods currently rely predominantly on herbicide application via both aerial and ground-based application techniques. A synopsis of the Invasive Spartina Control Program, including the history of the problem, treatment efforts, endangered species issues, SF Estuary tidal marsh ecology, and planned activities of the program will be presented.

WASHINGTON'S FRESHWATER ALGAE (CYANOBACTERIA) PROGRAM. Hamel, K.S. and J. Clark; Washington Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600, Ph. 360-407-6562, kham461@ecy.wa.gov. Cyanobacterial blooms (also known as blue-green algae) are becoming more common in Washington water bodies. Cyanobacterial blooms are of particular concern, because some species produce potent toxins that can kill pets and have the potential to affect humans. In 2005, the Washington State Legislature established funding for a Freshwater Algae Control Program and tasked the Washington Department of Ecology with program development. Elements of this program include:

- Toxicity testing for cyanobacterial blooms,
- A mail-in service for identification of algae blooms,
- A web-based database to post algal identification and toxicity testing results,
- Alerts when a local health jurisdiction decides to close a lake to recreation,
- A partnership with Washington Department of Health (DOH) for the development of statewide guidelines for algal toxins (microcystins and anatoxin-a). This includes guidance to local health jurisdictions about how to react to toxic blooms.
- Ecology and DOH websites with information about freshwater algae, management methods, and human and pet health risks of toxic cyanobacteria.
- A small grants program to fund freshwater algae management projects.

The authors will present an overview of the program and results from the 2007 sampling season.

AQUATIC INVASIVE SPECIES MANAGEMENT THROUGH PUBLIC AWARENESS. Doug Freeland, owner Aquatic Consulting and Evaluation aka A.C.E.Diving, P.O. Box 840 Spirit Lake, Idaho 83869, ph. 208 755 0800 acediving@hotmail.com. Mark Butler, Environmental Education Resource Teacher, Curriculum & Instructional Services, District School Board of Pasco County, 7227 Land O' Lakes Blvd, Land O' Lakes, Fl. 34638, Ph. 727 774 0587 mwbutler@pasco.k12.fl.us. Invasive plants and animals have inundated local lands and waterways. Millions of dollars are spent every year trying to find and control new and established infestations. Invasive plants and animals have been an ongoing problem for many years and they are increasing their territory and expense to control. A.C.E. Diving, a company with over 10 years experience managing and controlling invasive species throughout the Pacific Northwest, has recently taken on the task of creating a public awareness education program to aid the battle. Surveying and identification techniques will be taught using presentations directed at dive clubs, fishing clubs, and local lake property owners associations. A classroom curriculum utilizing teacher support materials, lesson plans, and activities will be directed towards youth organizations and school classrooms. This program is designed to provide support for managers as well as inform both the general public and students of the importance of knowing how they can help find and reduce the spread of invasive species.

BONNER COUNTY INVASIVE SPECIES TASK FORCE, A PUBLIC PROCESS, Brad Bluemer, County Weed Superintendent Bonner County Public Works, 4100 McGhee Road, Suite C, Sandpoint, Idaho 83864. Phone: 208-2636-3175, bbluemer@co.bonner.id.us. In 2006, the Bonner County Board of Commissioners established the Bonner County Invasive Species Task Force to support the County's efforts at developing a large scale Eurasian Watermilfoil Control Program for the Pend Oreille Lake and River system. The public process was at times intense, and included the evaluation of all of the available control technologies in cooperation with various stakeholders, that included the Idaho State Department of Agriculture (ISDA), the U.S. Army Corps of Engineers, Idaho Department of Lands, Idaho Fish & Game, private property owners, cities and communities, tourists and the general public. The initial process lead to the development of a grant proposal that was submitted, and approved for grant funding through ISDA for the 2006 and 2007 control seasons. The process has continued, with proposals

evaluated from the US Army Corps of Engineers to perform milfoil weevil and native plant stocking, Eurasian Watermilfoil Mapping by ISDA and Mississippi State University personnel, and currently the Task Force is overseeing the Development of a Long Term Invasive Species Management Plan for the system, and the County has submitted a grant application to support 2008 Eurasian Watermilfoil Control efforts. The presentation will cover this public process, some of the highlights and obstacles like water user issues that included various public hearings, the 2007 ISDA ask the experts panel public meeting, program tours, and other interesting events.

PUBLIC PERCEPTION OF A LARGE SCALE EURASIAN WATERMILFOIL CONTROL PROGRAM IN THE PEND OREILLE RIVER SYSTEM, BONNER COUNTY, IDAHO. Thomas G Moorhouse, Thomas J. McNabb, Clean Lakes, Inc., P. O. Box 3548, Coeur d'Alene Idaho 83814. As part of the 2007 Lake Pend Oreille Eurasian Watermilfoil Control Program, Clean Lakes, Inc. working under the direction of the Bonner County, Idaho, Department of Public Works, established an Information Office to keep the public appraised on the 2007 EWM Control Program. Public information packets were produced and distributed, and public concerns and complaints logged and compiled to evaluate the major issues. A review of this data will be presented.

The Control of Water hyacinth in the Sacramento/San Joaquin Delta: A work in progress. Paul Ryan, Environmental Scientist, California Department of Boating and Waterways, 2000 Evergreen St. Suite 100, Sacramento Ca. 95815. E-mail: pryan@dbw.ca.gov
This presentation will be about Cal boating's (formerly Department of Boating and Waterways) continuous challenges in controlling water hyacinth in the California Delta system. It will include information about the purpose of the program, issues in starting the program, changes made along the way, methodology of crews and field personnel, technology utilized, and what Cal boating would like the program to look like in the future. The water hyacinth program was officially given to Cal boating in 1982, via SB 1344. Not really sure how to start, or even conduct this type of program, Cal boating has been on a 25 year odyssey which has seen many changes. The methods in which field and office personnel worked changed when the program began working under the parameters of the National Pollutant Discharge Elimination System (NPDES). With this came the introduction of Environmental scientists to Cal boating. New requirements set forth by the NPDES permitting brought new conditions under which Cal boating had to operate under. New technology was integrated into Cal boating's pest management program to ease some of the issues in reporting and collecting samples in the field. This presentation, through the use of PowerPoint, will discuss the various programs we have used.

The Struggle against Hydrilla Continues: California Update for 2007 Season. Akers, Patrick. Hydrilla Eradication Program, Integrated Pest Control Branch, California Department of Food and Agriculture, 1220 N Street, Room 341, Sacramento, CA 95814. phone 916 651-0574. pakers@cdfa.ca.gov. Hydrilla returned to Clear Lake in July, 2007, for the first time since June 23, 2003. The 2006 season was the first without treatments, and some re-appearance of the weed was not surprising. Crews found 70 "spots" with hydrilla during the 2007 season. Most were single plants, but clumps ranged up to a few feet across. The finds fell into 33 treatment areas ranging from 3.5 to 56 acres in size, for a total of 245 acres to be treated. The crews treated nearly all plants within a day or two of finding them. In the Chowchilla River / Eastman Lake infestation, crews could not find any hydrilla for the fifth straight year. In the Oregon House infestation, staff made use of continued flare-ups in several small ponds to test a new copper formulation, imazamox, and triploid grass carp. A contract is also proceeding to put a concrete lining in the heavily infested portion of the canal. The canal is the headwaters of the infestation.

The remaining six active projects in California either produced no hydrilla or populations were greatly reduced.

AQUATIC ECOSYSTEM RESTORATION FOUNDATION UPDATE, Carlton Layne, Director, Aquatic Ecosystem Restoration Foundation (AERF), 3272 Sherman Ridge Dr. Marietta, GA., 30064 clayne@aquatics.org. An update on current and planned AERF activities in support of aquatic vegetation control programs will be presented.

Results of Long Term Mechanical Tule Control within Freshwater Aquifers. George P. Forni II; President, Aquatic Environments, 4000 Industrial Way, Concord, CA 94507, ph: (925) 521-0400; fax: (925) 521-0403; e-mail: gforni@aquamog.com. The City of Santa Cruz, in conjunction with Aquatic Environments, has engaged in a 10 year effort to mechanically control emergent Bulrush (*Scirpus californicus*) growth within its 44 acre freshwater aquifer site. The Neary Lagoon site provides necessary flood protection, storm detention and turbidity reduction for a 850 acre watershed, inclusive of 1.1 million square feet (s.f.) of asphaltic concrete road surfaces and approximately 4.2 million s.f., public access hard surface run off. The program began as an effort to return the site to its original 1992 Lagoon Management Plan of 7.01 acres of open water to marsh/wetland and riparian habitat balance. The work has been permitted under the guidelines of the US Army Corps of Engineers, CEQA, Ca Coastal Commission, Regional Water Quality and the California Department of Fish and Game. Several threatened & endangered species exist within both the aquifer and surrounding watershed, requiring extensive oversight and coordination for all interested stakeholders with no negative effects experienced. The result has been that mechanical control has been achieved after a long period of inactivity and general deferred maintenance, through the section by section method of plant removal. The benefit of increased water exchange (circulation) and the reestablishment of original flow channels has improved water quality and reduced sedimentation build up within the open water areas. The data presented includes comparison tables, mapping and aerial photographs showing the contrasting between existing and design percentages of open water to land and plant habitat. This presentation will document the results from this work and monitoring through the 2007 season.

EURASIAN WATERMILFOIL CONTROL IN THE PEND OREILLE LAKE AND RIVER SYSTEM, Thomas J. McNabb, Thomas G. Moorhouse, Clean Lakes, Inc.. Lake Pend Oreille, located in Northern Idaho is a 85,960 surface acre reservoir that is the headwaters to the Pend Oreille River system. Eurasian Milfoil (*Myriophyllum spicatum*) has been impacting the beneficial uses of the Lake and River system. The Bonner County Department of Public Works, through Grant Funding from the Idaho State Department of Agriculture (ISDA), implemented large scale treatments in an effort to eradicate Eurasian Milfoil from the system in 2006. During the 2007 treatment season, approximately 2,084 acres of Eurasian Milfoil were treated with a combination of Renovate OTF and Sonar Q and PR. This presentation will review the 2007 herbicide application requirements and processes, as well as the new application technologies that were developed to increase efficiencies on the project.

CONTROLLING AQUATIC WEEDS IN IRRIGATION CANALS WITH ENDOTHALL. Cody J. Gray[1] and K. Jayne Walz[2]. [1]United Phosphorus, Inc., Peyton, CO 80831; [2]United Phosphorus, Inc., King Of Prussia, PA 19406. cody.gray@uniphos.com. Controlling aquatic vegetation in irrigation canals is an extremely important venture in the United States. The waters supplied by these canals are typically the primary source of water for irrigating agronomic crops. Therefore, the control of aquatic weeds in these canals is critical. Unfortunately, the tools available for aquatic weed control are limited. Grass carp (*Ctenopharyngodon idella*) are used in some locations, but their use is limited, as they create another set of unique issues. Mechanical

means, such as dredging and chaining canals, can be employed for weed removal; however, these methods are labor intensive, expensive, and offer only a temporary solution to the problem. The final option is the use of herbicides for weed control. Herbicides currently labeled for use in irrigation canals are acrolein, xylene, and copper formulations. Endothall has been used since the 1960's for controlling aquatic vegetation in ponds, lakes and reservoirs. In recent months, residue trials have been conducted for endothall as required for an EPA approved FIFRA Section 3 label to allow treated water to be used on irrigated crops during herbicide applications. This would eliminate any holding period for treated water that is to be used to irrigate agronomic crops. Sago pondweed [*Stuckenia pectinatus* (L.) Börner] is a native aquatic perennial that forms dense troublesome infestations in irrigation canals and drainage ditches. In 2007, irrigation experimental trials were conducted to evaluate endothall efficacy for sago pondweed control. Treatments resulted in greater than 95% sago pondweed control for up to 8 weeks after treatment. Results from these trials indicate endothall will provide an alternative that is more effective for aquatic weed control in irrigation canals.

Selective Control of Eurasian Watermilfoil Using Diquat – A Five Year Case Study in Long Term Selective Plant Management . Marc Bellaud[1], Gerald Smith[1],Michael Lennon[1], and **James Petta[2]** [1]Aquatic Control Technology, Inc. and [2]Syngenta Professional Products (presenting) 5221 River Oaks Drive, Corpus Christi, TX 78413 361-215-0551 jim.petta@syngenta.com. Eurasian watermilfoil (*Myriophyllum spicatum* L.) is a serious invasive weed problem in the United States. EWM is a serious problem to native plant species and habitats, water quality, and recreational water use including boating, swimming and fishing. While studies have been conducted to observe short-term effects of management tools such as diquat and other aquatic herbicides, few have continued to monitor the potential long term impacts of repeated control measures. In this situation, EWM infested the majority of the littoral zone of the 800-acre Twin Lakes system located in Salisbury, Connecticut. These lakes are in an ecologically sensitive region and support several state protected aquatic plant species in addition to a prized warm water and cold water fishery. Annual mechanical harvesting efforts were no longer providing acceptable levels of EWM control during the summer recreation season. Through close collaboration with state regulatory agencies, a partial-lake diquat (REWARD) herbicide treatment program was developed and commenced during the 2003 season. Treatment of 75 acres along developed shorelines and high-use areas in two of the three major lake basins was permitted. No-treatment buffers were established between documented beds of state listed species, and the middle basin was left as an untreated refuge area. EWM was successfully controlled and no adverse impacts were documented. The treatment program continued during 2004, 2005, 2006, and the 2007 seasons. Results of the annual comprehensive monitoring program have been favorable. No significant changes to water quality, phytoplankton, zooplankton, or state protected plant populations have occurred. The diquat treatments have shown a high selectivity for EWM. Native aquatic plants have recolonized areas previously dominated by EWM, as shown by the consistency and increase in measured indices such as plant cover, plant biomass, species richness, while EWM cover has declined and it does not interfere with recreational use of the lake in managed areas. It is the intention of this paper to contend that seasonal management programs using EPA-approved aquatic herbicides can be very effective in plant management, habitat protection, and recreational water use.

REGULATORY REVIEW OF HERBICIDES FOR FISH AND WILDLIFE SAFETY

Rich Bireley, Associate Environmental Research Scientist Department of Pesticide Regulation Pesticide Regulation Branch, 1001 I Street, P.O. Box 4015, Sacramento, CA 95812 916.324.3930 phone, 916.324.5872 fax. Before a company can sell a pesticide in California, the product must first be registered by the Department of Pesticide Regulation (DPR). As part of the registration process, the company must submit certain supporting data to DPR. Scientists in a variety of disciplines review these data to determine the accuracy of the data, the results of the studies, the potential impacts to humans and the environment, and whether the pesticide (herbicide) works according to the label claims. A significant portion of these required data represent the pesticide's potential impact on fish, wildlife and the natural environment. The submitted data include acute, subacute, and chronic studies on the impacts of the active ingredient on various species of freshwater and estuarine fish and invertebrates, birds, mammals, sediment dwelling aquatic invertebrates and honeybees. The species tested are intended to represent other similar species. For example, the results of the bluegill sunfish toxicity study are extrapolated to represent the effects of the pesticide on all warm water fish species. In addition, scientists review environmental fate data to determine what the pesticide does in the environment. These data tell us how long a pesticide lasts in the environment under a variety of conditions, what the metabolites are, how long the metabolites last in the environment, the solubility of the pesticide in water, and whether the pesticide will move in soil. The results of all the data reviews are then used to build a picture of what the pesticide will do in the environment when used according to label directions. This picture is the basis for the recommendation of whether the pesticide should be registered as submitted by the registrant.

EFFICACY OF DRY GROUND APPLICATIONS OF PENOXSULAM AND FLURIDONE ON SAGO PONDWEED. Koschnick, T.J.[1], S. Miller[2] & S. Shuler[3]; [1]Aquatic Research Manager, [2]Aquatic Research Biologist, and [3]Aquatic Specialist; SePRO Corporation, 11550 N. Meridian St., Ste 600, Carmel, IN 46032. 440-665-2748, tylerk@sepro.com. Many western irrigation canals are dewatered for much of the fall and winter. This period allows a potential opportunity to apply herbicides for pre-emergence submersed weed control. Herbicide application to dry ground during the dewatered phase must sustain residues for a period after flooding to achieve control of immature seedlings. Sago pondweed (*Stuckenia pectinatus* (L.) Boerner) is one of the predominant submersed weeds in irrigation canals, and reproduces both through seed and tuber formation. A study was designed to evaluate the efficacy of fluridone (1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl]-4(1H)-pyridinone) and penoxsulam (2-(2,2-difluoroethoxy)--6-(trifluoromethyl-N-(5,8-dimethoxy[1,2,4] triazolo[1,5-c]pyrimidin-2-yl))benzenesulfonamide) on sago pondweed in two different sediment types (sand and potting soil) after application to dry ground. Sediment type and water-in phase did not impact efficacy. Fluridone generally inhibited sago biomass, but distinguishing significant differences was compromised by high variance and poor sago growth in sand. Most treated plants were still exhibiting chlorosis at harvest. Penoxsulam did not inhibit tuber sprouting, but 0.1, 0.5, and 1.0 #/acre (0.112, 0.56 and 1.12 kg/ha) generally reduced biomass and stem length by > 90%. Data from additional trials will be reviewed. Penoxsulam (trade name: Galleon ®) is pending an Experimental Use Permit (EUP) and fluridone (trade name: Sonar ®) received EPA approval in 2007 for application to dewatered canals.

COMBINATIONS OF ENDOTHALL WITH 2,4-D AND TRICLOPYR FOR CONTROL OF EURASIAN WATERMILFOIL John D. Madsen[1], Kurt D. Getsinger[2], and Ryan M. Wersal[1], [1]GeoResources Institute, Mississippi State University, Mississippi State, MS 39762-9652, ph. 662.325.2428, fax 662.325.7692, e-mail jmadsen@gri.msstate.edu, and [2]US Army Engineer Research and Development Center, Vicksburg, MS 36180-6199. Eurasian watermilfoil (*Myriophyllum spicatum* L.) is a widespread nuisance-forming submersed aquatic plant. While both contact and systemic herbicides can control Eurasian watermilfoil, each class of herbicide has its drawbacks. Contact herbicides are fast acting, but may allow regrowth. Systemic herbicides will often kill the entire plant, but are slower acting and limited by short contact times. We examined whether combinations of contact (endothall) and systemic (2,4-D and triclopyr) herbicides might exploit the strengths of each herbicide class, and minimize their weaknesses. Eurasian watermilfoil was treated with combinations of endothall (Aquathol-K) with either 2,4-D (DMA-4 IVM) or triclopyr (Renovate 3). The liquid formulation of endothall was evaluated alone (at either 1.5 or 1 ppm, 24-hour exposure) and in combination with 2,4-D or triclopyr (1 ppm endothall with 0.5 ppm of 2,4-D or triclopyr at both 12 and 24 hours of exposure). Each week, tanks were rated for percent control on a 0-100% scale. Four weeks after treatment, plants were harvested, sorted, dried at 70C and weighed for shoot biomass. After four weeks, all treatments controlled plant biomass, based on a one-way analysis of variance. Analysis of visual ratings indicated that endothall alone provided control the first week after treatment (60%). Triclopyr and 2,4-D alone provided 100% control after two to three weeks, but initial control was less than 20%. All treatments with endothall and a systemic herbicide provided at least 50% control in the first week of treatment, and 100% control after four weeks.

Imazamox Absorption and Metabolism by Eurasian Watermilfoil (*Myriophyllum spicatum*). Vassios, J.D.[1], S. Nissen[2], G. Brunk[3]. Colorado State University – Department of Bioagricultural Sciences and Pest Management, 110 Weed Research Lab, Fort Collins, CO 80523, ph. 719.740.9291, jvassios@simla.colostate.edu. The submersed macrophyte Eurasian watermilfoil (EWM) (*Myriophyllum spicatum*) is an invasive species currently infesting 45 states, including Colorado. EWM negatively effects recreation, wildlife habitat, and the efficiently of water delivery. Several laboratory experiments were conducted to determine the response of EWM to imazamox. These experiments included; 1) imazamox absorption using ^{14}C-imazamox, 2) the influence of external imazamox concentration on internal imazamox concentration, 3) imazamox desorption when plants were transferred to clean water, and 4) imazamox metabolism over a six day time course. The time course showed that approximately 75% of total absorption occurs within the first 48 hours following treatment and reached a maximum of 1%. The external concentration did influence internal imazamox concentrations. At 200 ppb imazamox the internal concentration was approximately 0.5 µg/plant, while at 800 ppb the internal concentration was 3.0 µg/plant. The percent of imazamox absorbed was the same regardless of the external concentration, which indicates the absorption results from simple diffusion driven by a concentration gradient. Desorption occurred rapidly and reached equilibrium 24 h after plants were transferred to clean water with approximately 43% of absorbed imazamox desorbed. In the metabolism experiment soluble metabolites were seen starting 48 hours after treatment and by six days 28% was bound metabolite, 40% was soluble metabolite and only 31% of the radioactivity was still intact imazamox. Even though the amount of imazamox absorbed is less than 1% of the applied amount, this herbicide has provided excellent EWM control in whole lake studies.

New Technology for Algae Control Paul Westcott, Southwest Regional Manager Applied Biochemists, 15420 N 29th Ave, Phoenix, AZ 85053, (602) 896-8288, paulwestcott@appliedbiochemists.com. Applied Biochemists in conjunction with Clemson University and other researchers have cooperated with public and private stakeholders over the past 6 years in advancing the science of algae control and management. Our focus and objective has been to optimize the use of U.S. EPA Registered Algaecides to manage algal problems within acceptable margins of safety to both man and environment. This Targeted Algal Management has involved development of effective algaecide screening protocols; corresponding toxin measurements; determination of impacts on non-target organisms; post-treatment residue levels; field trials to verify laboratory results and establishment of successful operational treatment programs. New studies are underway to determine impacts from commonly used algaecide products at the cellular level with respect to production and potential release of toxins / T & O compounds. A database and matrix is being compiled in conjunction with this work comparing control information on different genera, formulations, rates and water qualities. Applied Biochemists continues to develop and produce specific algaecide and aquatic herbicide formulations to optimize the control of problematic aquatic species.

New Technologies used to remove Eurasian Milfoil from Big Bear Lake, California. McNabb, Terence. Aquatechnex, LLC, PO Box 30824, Bellingham, Washington 98228, ph:360-527-1271, fax 360-671-5349, email: tmcnabb@aquatechnex.com. Big Bear Lake is a 2,900 acre reservoir located in the San Bernardino Mountains in Southern California. This lake is an important recreational resource for those living in this region, it is one of a very few lakes that provide access for boating and swimming. Throughout the 1980's and 90's, the Lake Management District operated an extensive aquatic plant harvesting program. Also in this time frame, the invasive aquatic weed Eurasian Milfoil (*Myriophyllum spicatum*) began to dominate the macrophyte community in the lake. The problem became so severe that it contributed to the lake being listed on the States 303D list of impaired waters. Faced with the 303D listing, the Big Bear Lake Municipal Water District turned to Aquatechnex to design and implement a management program. Aquatechnex has successfully eradicated Eurasian Milfoil from a number of much smaller lakes using Sonar Aquatic Herbicide and managing contact exposure times. It was not economically feasible to deploy these technologies on a lake this size however. In this same time frame, a number of new technologies entered the aquatic marketplace. Our team used advanced bathymetric and GPS/GIS mapping technologies to determine plant coverage and exact water volumes in the lake. We documented over 800 acres of milfoil in the reservoir. SePRO introduced the PlanTEST plant assay and milfoil plants from the lake were shipped to their laboratories to determine the exact dosage that would be necessary to target this growth. In 2002, Sonar Precision Release (PR) pellets were applied to approximately 500 of these acres using a system to maintain contact time. The remaining acreage was treated in 2003 using the same technique. Surveys using DGPS/GIS technologies and aerial shoreline analysis photography determined that less than 10 acres of Eurasian Milfoil remained in the system at the end of the 2003 treatment season.

New GPS Tools for Recording Field Data. Akers, Patrick, Jonathan Heintz Hydrilla Eradication Program, Integrated Pest Control Branch, California Department of Food and Agriculture, 1220 N Street, Room 341, Sacramento, CA 95814. phone 916 651-0574. pakers@cdfa.ca.gov, jheintz@cdfa.ca.gov. We have begun preliminary investigations of two new GPS systems that might interest field biologists. Both are relatively inexpensive. The first system is a stand-alone datalogger that can monitor external sensors, such as a spray trigger, event counter, or any simple switch. The unit is called a SmartPak, and it can be easily customized for many different purposes by the manufacturer, Darr Precision Solutions. We have been using it to collect presence-absence information on multiple weed species in Clear Lake for

the County Public Works Department. It permits us to note the presence and location for up to eight weed species simultaneously while tossing hooks for hydrilla, while taking less than five seconds to make each observation. The base unit for the system costs $850 or less. The second system is a series of add-ons for a Blackberry SmartPhone, which converts it into a GPS-enabled, barcode-integrated datalogger. The system we tested centers around the BerryVine Survey data collection software for the Blackberry, although a similar system appears to be possible using Blackberry spreadsheet applications, such as eCell and GridMagic. BerryVine Survey lets you create data collection forms on the Blackberry. It can request GPS fixes from a Bluetooth-enabled GPS unit and automatically enter the lat/longs. A barcode reader can also enter values into fields, which simplifies and speeds entries for fields that might otherwise use a pick-list. BerryVine Survey costs $30, a Bluetooth-enabled GPS receiver can be had for $50-100, and Bluetooth-enabled scanners usually cost in the $200-400 range.

Alternate Presentations

LAWS AND REGULATIONS ASSOCIATED WITH AQUATIC HERBICIDE APPLICATIONS, ARE THEY BEING FOLLOWED? Thomas J. McNabb, Clean Lakes, Inc. P. O. Box 3186, Martinez California 94553 925-957-1905 tmcnabb@aquatics.com. The improper use, transport and storage of Aquatic Pesticides could pose a problem in the western States. At least one Water District has lost the use of a specific aquatic herbicide, as well as areas where other herbicide use has been banned due to the miss application and use by applicators. The rules and regulations that govern the transport and storage of aquatic pesticides is often not followed within the industry. Some specific problems will be reviewed, followed by a discussion on what the industry can do to insure those working in it comply to protect the environment and our industry.

ABSTRACTS
Poster Presentation

Notes