Informational Hearing

Senate Subcommittee on Invasive Species

Senator Cathleen Galgiani, Chair

Aquatic Invasive Weeds in the Delta: Impact and Control

Stockton, California

May 9, 2013

SENATOR CATHLEEN GALGIANI: Welcome. Thank you for attending today the Senate Subcommittee on Invasive Species informational hearing, which is entitled *Aquatic Invasive Weeds in the Delta*, and we'll be discussing impact and control.

The Sacramento-San Joaquin Delta is an invaluable natural resource to California, as we all know and appreciate here in the Central Valley, supplying water to our families, farms, harbors, and marinas. However, aquatic invasive plants proliferating in the Delta are threatening businesses and communities by obstructing navigation channels, marinas, and irrigation systems. They also clog pumps and boat propellers and create safety hazards for recreational activities. We most recently saw this over the months of December and January with regard to the water hyacinth. When uncontrolled, these invasive weeds may also damage cherished natural ecosystems and habitats by crowding our native plants and wildlife, some of which are actually protected

under the Endangered Species Act. For all of these reasons, the ability to control invasive weed populations is of great importance to preserve the rich history, culture, and economy of the Delta.

Therefore, today's hearing will investigate invasive weeds that have become or could become significant threats to the Delta. We will receive testimony from state and local government officials, researchers, and local businesses to fully understand the problem at hand and what must be done to mitigate the negative effects of these weeds. I look forward to today's discussion and thank you all for your attendance at this important hearing.

With that, I would like to invite our first panel of witnesses to come forward, and that would include Mr. Anton Favorini-Csorba who is the fiscal and policy analyst from the California Legislative Analyst's Office; secondly, Ms. Sylvia Ortega Hunter, who is the acting director of the California Department of Boating and Waterways; and Councilmember Elbert Holman from the City of Stockton.

While they get settled, I would like anyone who is interested to provide testimony during our hearing and public comment period to please sign in with the sergeants who are here at the back of the room. And thank you and welcome.

MR. ANTON FAVORINI-CSORBA: All right. Thank you very much, Madam Chair. Anton Favorini-Csorba with the Legislative Analyst's Office.

So what we were asked to do by the committee was to kind of set the broader stage for invasive species management in California, not just focused

on aquatic invasive weeds but kind of everybody who's doing something related to it. So what I'm just going to briefly do for you is lay out kind of just a definition that we've been using for invasive species; talk about some of the funding that's involved, who does that; and then, lastly, a couple of important statewide plans that are going on right now that will affect invasive species. So just, you know, I'll probably get yelled at by some of the ecologists in the audience for the definition that we have here because I think there's some debate. But what we're going with is: an invasive species is a plant, animal, insect, other invertebrate, or even a disease that doesn't occur naturally in an area and could cause economic or environmental harm. So it either might inhibit recreation, damage ag, or reduce biodiversity in an area.

The Invasive Species Council of California has put together a list of species with the help of UC Davis. They say that there's about 1,700 invasive species that could threaten California. I'll just point out a couple of them: the Mediterranean fruit fly, glassy-winged sharpshooter, and Asian citrus psyllid. Those are all very important in terms of their effect on agriculture. We'll be talking more about aquatic plants, so I'll skip that. But then invertebrates like the quagga mussel and zebra mussel that get into water delivery systems, that's a serious concern.

So just, overall, how much does the state spend on invasive species management? And so we tried to put together kind of a crosscut budget that totals all this, and it's about $90 million to $100 million a year on kind of directly controlling or managing invasive species. There's more outside of that:

say, some of the actions in the Delta that are going on right now that might be restoring the ecosystem, might have an invasive species component, but the focus isn't directly on that. But so what you see from the chart on page 2 is that about 90 percent of the funding is given to the Department of Food and Agriculture, the California Department of Food and Agriculture, so you get $77 million. A lot of their funding comes from the federal government, and the vast majority of federal funds goes to CDFA.

So just briefly, to talk about some of the other departments, aside from the ones that are here, you know, I think CDFA is in a better position to tell you what they do than I am, same with the Division of Boating and Waterways. So just, you know, talking about some of the others, the State Lands Commission and the Department of Fish and Wildlife, they run a Marine Invasive Species Control Program, and so they regulate ballast water when a ship comes into port; they can be carrying invasive species. That's one of the major ways that aquatic invasive species get here. The Department of Fish and Wildlife also does a number of other activities. You know, of course, they're in charge of enforcing all the laws in the state that relate to fish and wildlife, including, you know, preventing people from importing. They also put together an aquatic invasive species management plan a few years back.

CAL FIRE, largely, it kind of, in the course of its just ongoing duties to manage forest and prevent wildland fires, they do, like, fuel reductions. Some invasive species can cause buildup in plant material that catches on fire and makes fires worse, so they clear that out. And then, lastly, in terms of

activities, there are just a couple of other smaller ones that we came across. The Coastal Conservancy does some core grass eradication in San Francisco and Humboldt Bays, and then there are some departments that do research to support the activities of others.

So as I mentioned before, there's kind of this $90 million number for total expenditures. Over half of that comes from the federal government. The other main sources are the Food and Agriculture Fund, and that's about $20 million was spent, or is being spent, in 2012-13, and that's administered by the Department of Food and Agriculture. They get their revenues from motor vehicle fuel taxes, kind of the portion that is, you know, when farmers buy fuel. Then, you know, industry also contributes some sources to that.

The other big, kind of special fund source is the Harbors and Watercraft Revolving Fund, and that just broadly supports the Division of Boating and Waterways activities, including their invasive species activities. Then they have a couple of revenue sources there: again, motor vehicle fuel taxes from boaters, also boating registration fees. They have a loan program as well. And so what you hear, you know, over the years is, because there are these kind of general-purpose revenues that are going into the programs, sometimes they get used for different purposes. And, you know, the intent is always to not affect programs, but, you know, every so often you may end up doing that. I guess the last fund source that I would point out is related to the Marine Invasive Species Program, and that's just a fee that the State Lands Commission

assesses on ships that come into port. So that's kind of how you get up to that total of about $90 million.

So what I've been talking about thus far are kind of the activities and the agencies that are really, when they take action, their point is to control an invasive species. There are other aspects, other departments that do things. Just in the normal course of their business, they'll end up treating invasive species. So you look at the Department of Water Resources, which manages the State Water Project, so they have to take care of aquatic weeds on the state project and make sure mussels don't get in the system. Caltrans treats invasive weeds. And as I mentioned, CAL FIRE's got the fuel-loading reduction.

So the last thing that I just want to touch on is a couple of major policy initiatives related to invasive species broadly, and it's appropriate that this hearing is in Stockton because a couple of these are large Delta-related programs that could have an effect on Stockton. The Bay Delta Conservation Plan, which, you know, folks may have heard of as the governor's plan for tunnels under the Delta to improve water supply reliability, is one of the statewide plans; and it has three measures in there that would manage invasive species, including continuing of what we already do.

The Delta Plan, which is different—we probably should come up with a better name for that—is a larger plan to address more broadly the problems in the Delta, and so that there are some components there. And then the last two are these kind of statewide plans, that they're actually in the back of the packet that's been handed out, but the statewide plan management, Prevention and

Management Program, and then also kind of an update to the strategic framework put together by the Invasive Species Council of California.

So with that, I'm happy to answer any questions that you have on any of the stuff that I've talked about. Thank you.

SENATOR GALGIANI: Okay. Thank you very much.

Next, we will hear from our acting director of the Department of Boating and Waterways, Ms. Sylvia Ortega Hunter. Thank you very much for being here with us today.

MS. SYLVIA ORTEGA HUNTER: Thank you, Senator. Good afternoon.

I'm currently the Acting Director of the Department of Boating and Waterways. We've become part of the Department of Parks and Recreation, effective July 1st. I want to clarify one point concerning budgeted dollars.

DBW, in the 2012-2013 fiscal year, has spent over $6 million on the program, the control programs. We purchased the herbicides for the 2013 program this year. Our legal integration into state parks is July 1st, and that integration is underway. DBW will be become a division and is designated as the lead agency of the state for cooperating with agencies of the United States and other public agencies in controlling water hyacinth and Egeria densa. And I want to be clear that it is a control program; eradication is not possible.

Also effective July 1, DBW will be the lead agency on spongeplant in the Delta and the tributaries and the Suisun Marsh, and these programs are designed to control the growth and spread of the non-native invasive plants. In order to begin treatment, DBW has to secure a state permit and then two

authorizations at the federal level, which are called biological opinions. Those biological opinions are from the National Marine Fisheries which is part of the Department of Commerce, U.S. Department of Commerce, and then U.S. Fish and Wildlife Service, which is part of the U.S. Department of the Interior.

The federal approvals, as you said, are required by the Endangered Species Act. DBW cannot directly approach either of these federal agencies. We're required to go through a federal nexus, which is the U.S. Department of Agriculture, so all of our work and our initiation of the consultation process—and the consultation process is actually that application process for the federal biological opinions. But in order to initiate that consultation process, we have to go through the U.S. Department of Agriculture, who's doing a great job, and we appreciate their participation.

The consultation process takes up to two years to finalize these authorizations. DBW has secured the water hyacinth permit and the biological opinions and began treatment on March 18, just for the Water Hyacinth Control Program. The 2013 season goes through November 30th. These authorizations will take us through 2017, so we secured the biological opinions for five years. Annual reporting is required to comply with the authorizations and involve a synopsis of treatment during the treatment season, which includes where treatment occurred, acreage treated, how much herbicide was introduced into the water, a summary of environmental monitoring, and water quality monitoring and results, and any violations of the permits or biological opinions.

Over the past eight years, in both the Water Hyacinth Program and the Egeria Densa Program, there's only been one violation, which concerned water clarity, and it did not affect the protected habitat. DBW plans to initiate the consultation process by early 2016 in order to secure the necessary authorizations before the expiration of the current water hyacinth authorizations that we have.

As we all know, water hyacinth is a floating aquatic plant with shiny leaves and a lavender flower. DBW manages the control program and, as I said, it's not an eradication program. There's no known eradication method in the world for water hyacinth. Water hyacinth first came to the U.S. in 1884 at the Cotton States Exposition in New Orleans. Visitors were given this lovely plant, and the extra plants were dumped into the local waterways.

By 1904, water hyacinth was spotted in a Yolo County slough. It spread gradually for many decades and was reported in the Sacramento-San Joaquin Delta in the late 1940s and early 1950s. By 1981, water hyacinth covered a thousand acres of the Delta in 150 miles of the 700-mile Delta waterways. In 1982, SB 1344 was passed, designating DBW as the lead agency for controlling water hyacinth in the Delta, its tributaries, and the Suisun Marsh. This legislation was introduced by then-Senator Garamendi. Water hyacinth floats and grows in mats, and these mats can double in size every ten days in optimal conditions. It can quickly become a dense floating mat up to six feet thick. DBW has documented mats as wide as 150 yards, so we're taking significant floating mats, and the mats travel with the currents and tidal movement.

When a siting is reported, by the time a crew arrives on site, the mats may or may not be there, so now we're chasing the mats. Other times, the mats get caught on structures and can be treated when the crews arrive. The situation, however, may impair access to boats and reduce water recreation. The upside of that is that the mat's there when we get there.

The approvals I discussed earlier determine whether herbicide usage may affect any of the threatened, endangered, or sensitive species and critical habitat. Effects to human, agricultural areas, or potable water intakes are also considered and protected. The approvals place restrictions on where treatment can occur, when and where the program can start treatment, and requires an extensive water monitoring program. Thorough water quality sampling is conducted at treatment sites throughout the season to ensure herbicide levels stay under the acceptable levels.

DBW conducts surveys to determine where water hyacinth is located and which areas are in most need of treatment. DBW also surveys to determine what crops are in the vicinity of potential treatment sites to ensure herbicides do not drift into adjacent sensitive areas. DBW also reviews weekly fish monitoring data to determine presence of any protected fish species. The fish count is a joint effort by the U.S. Fish and Wildlife Service, Department of Water Resources, and Department of Fish and Wildlife. Before all treatment events, DBW surveys for the presence of the protected giant garter snake and elderberry bushes, which are the habitat for the protected elderberry beetle.

Treatment is limited to days when winds are below ten miles an hour, and treatment cannot be performed in the rain and can only occur when dissolved oxygen levels in the water are within the prescribed limits, so it's a very scientific approach that we take in treatment. Since the beginning of the 2013 season, which was March 18th, we've treated 250 acres, which is dispersed among 43 sites within the Central and South Delta. DBW is treating with glyphosate. It's a slow-acting herbicide. Starting June 15, DBW has the option to use 2,4-D, which is a fast-acting herbicide but much more restricted in use.

To date, we've lost 12 days of treatment to weather and rain and wind conditions, which, as I said, prohibit treatment. The crews work four tens, Monday through Thursday, and we've made that change in staff work hours due to the mobilization, demobilization, and travel that's required to get to these sites. We've seen some results of the herbicide treatment, and we've also observed existing winter die-off. With the coming summer, we'll see exhilarated growth. It's the condition that the plant thrives in. But the 2,4-D treatment will help us with the control and stay ahead of the summer infestation. DBW intends to request an amendment to the water hyacinth authorization to treat spongeplant, which DBW will become the lead agency on beginning July 1st. Currently, if the spongeplant is attached to the water hyacinth, it can be treated.

The Egeria densa is a water-submerged aquatic plant popularly used as an aquarium accessory, and it's that beautiful long green plant we see in the

aquariums. It was introduced into the Sacramento-San Joaquin Delta about 50 years ago. It now infests many thousands of acres in the Sacramento-San Joaquin Delta. The plant can spread very quickly depending on environmental conditions and often by fragmentation. So if the plant is pulled out and fragmentation occurs, those plants will go plant themselves somewhere else and grow.

DBW is the only governmental entity authorized to treat Egeria densa in California with herbicides. In 1996, AB 2193 was passed authorizing DBW to develop a control for this invasive species. That legislation was introduced by then-Assemblymember Rainey. DBW began treatment in 2001, so we have a 12-year program we have underway.

The Water Quality Permit, which is the state permit—you remember the biological opinions are federal, so the permit is the state? The Water Quality Permit is known as NPDES. That permit for Egeria is in hand. The U.S. Fish and Wildlife Service Biological Opinion is also in hand. The consultation process for the—they call it NMFS, N-M-F-S, National Marine Fishery Services—is underway, and we expect the full biological opinion this summer. However, it caused us to lose this first of two growth seasons.

We're currently requesting that NMFS fast track the option for their 2013 biological opinion. This would actually extend the 2012 biological opinion, and then we would continue pursuing the current five-year biological opinion which would then take us to a 2014 to 2018 biological opinion period. That way, we

can treat in June, and we hope that we'll be successful in that request. That's underway at this very moment.

The Egeria treatment sites are determined by site surveys using rakes at low tide, and it's a back-to-back rake, a double rake, that's dropped into the water at the Egeria site and pulled up, and then the scientists can make a determination of the health of that plant and the necessity for treatment. Once a site is determined to be in need, it's prioritized. Herbicide usage is determined, and treatments are usually 12 weeks long and consist of weekly treatments at each site at the prescribed rate of treatment. Tidal influence affects the treatments too. This current dilutes and washes herbicides from the treatment area.

DBW is the only entity in the world treating in tidally influenced water bodies. This is why it is critically important to be completely thorough with the preparation and monitoring of herbicide residue levels at sites and outside of sites to ensure that no herbicide is getting to agriculture or municipal intakes. The method is that herbicide pellets are spread by boat over the site area. The pellets sink to the bottom and slowly release the herbicide into the plant, which the plant absorbs during its active nutrient-intake period. So during those early growth stages is when the plant is consuming the nutrients and takes in that herbicide, and then the plant is affected and controlled.

DBW's website contains current information on Egeria densa and water hyacinth programs. The Spongeplant Program rolls out in July and information will be available by that time. The information also includes a public

information number to report invasive weed sightings. DBW responds to all calls. Public input is an important factor in the success of these controlled programs.

Moving forward, DBW is looking at a variety of treatment methods to expand its control program. Currently, with the staff that we have and the boats that we have, we can only get a maximum of six boats out on the water on a day. We hope in the coming months to have more details of the resources available to expand these important programs. I've also brought two of DBW's scientists with me, Geoff Newman and Angela Llaban, if there's any specific scientific questions that they can address.

SENATOR GALGIANI: Thank you very much.

MS. ORTEGA HUNTER: Thank you, Senator.

SENATOR GALGIANI: You had talked about the process for slow-acting herbicide, and what I was wondering is, I've heard discussion about manual hauling of the water hyacinth out of the water versus herbicides, use of the herbicides. Can you talk a little bit about that, the differences?

MS. ORTEGA HUNTER: Well, that's one area that we're looking into. There are processes where, as I said, that manual rake can be thrown in and pull out the weed. But the more popular thing that I've seen is mechanical removal where equipment actually goes in the water and removes the plant and brings it up, and then it's hauled away. And there's some excellent videos too that I've seen online where that process is underway. We're looking into those options and to see what DBW can do within its current authorizations and

then, beyond that, the administrative process of obtaining the resources to be able to actually acquire those types of options.

SENATOR GALGIANI: Okay. Also, I was wondering, you mentioned earlier the transfer of responsibilities for Department of Boating and Waterways to the Department of Parks and Recreation. Do you see that having any change in how invasive species are controlled?

MS. ORTEGA HUNTER: No. I don't see that having any change. The change in the law that will make DBW a division within the Department of Parks and Recreation just replaces the name "department" to "division." The leadership at state parks is completely behind the existing programs of DBW and intends a seamless transition, and they have proven that already with the smooth integration that's underway and their recognition of the importance of the DBW programs.

SENATOR GALGIANI: Okay. Thank you very much.

I did have one last question for you and that was with regard to the Invasive Species Council. Have you been involved with the council and worked with them? And maybe you can speak a little bit more about how that works.

MS. ORTEGA HUNTER: I have not been. I'm not familiar with that. I apologize. Perhaps…

SENATOR GALGIANI: That's okay.

MS. ORTEGA HUNTER: …our staff is.

SENATOR GALGIANI: I'm not familiar either, so that's why I asked the question. Well, thank you very much for your presentation.

Next, I'd like to call upon Councilmember Elbert Holman. Thank you for joining us.

MR. ELBERT H. HOLMAN: Thank you, Senator, for allowing us to come and give our perspective on this highly important issue. I'll be very brief as we don't, the city of Stockton, doesn't have any involvement in the eradication of water hyacinths or what goes on in the Delta, but we do recognize that it is a very important issue, and we do, being on the water, suffer some of the effects of the water hyacinths invading our area. So I want to give you a perspective on how it can affect a local jurisdiction.

When you think about it, the Department of Boating and Waterways is the agency that has the ability to spray for the water hyacinths, and a lot of their being able to do that, as we understand it, they have to obtain federal permits from various agencies to be able to complete that. Over the last couple of years, the federal agencies have delayed giving them the permission to spray the water hyacinths. And as a result, the water hyacinths, we have this overgrowth of water hyacinths in the Stockton waterways. And most of it gathers here, right at the head of the Stockton channel. And when these delays occur, we're negatively impacted. And we have difficulties with navigation, water quality, fish and wildlife—our marina is affected and water-related businesses in an area that is already having physical issues. We don't need any more negative impacts in that area. But one thing that I am told is that when these paths come and they stop at the head of our channel, they become dumping grounds for garbage and other waste material. They've found

all kinds of things in there when it's been removed, and so that brings another issue, a health issue, to the waterways besides the water hyacinths, so we've had that experience here.

The city of Stockton in the last couple of years has spent $34,000 a year to remove water hyacinths from our areas. And we just had our largest community event that we have all year, which is the Stockton Asparagus Festival, and I was given a number by staff that I was astonished with that told me that we spent about $100,000 to remove the water hyacinths from the head of the channels so that the Asparagus Festival could have their function there.

SENATOR GALGIANI: Wow.

MR. HOLMAN: So that was a real huge impact on us.

In addition to the cost of removing the invasive weed, marinas, boaters, businesses that rely on the waterways have been negatively impacted. And even though it's the Delta, the Delta is one of the largest economic engines in the region; and Stockton, the economy depends on the Delta. And so we need to do whatever we can to keep the water hyacinths from further deteriorating our water quality, filling up our boating slips in the downtown area. Boat-launch ramps are closed. The hyacinths are making it unusable, further reducing potential revenue to Stockton, the quality of life for Stockton residents and neighboring communities, by limiting water access for kayaking, rowing, fishing, boating—all the things that people who live in this area love to do.

Businesses that went—watercraft, the cruise lines that go out and do the cruises in the evening, it hampers them. That's also part of the local economy.

And whatever we can do to get this eradicated and out of the area, we would love to see.

SENATOR GALGIANI: Thank you. Thank you very much.

Well, thank you to the first panel.

And at this point, I would like to go ahead and welcome up our second panel. Joining us under the subject of *Research* will be Dr. Patrick Akers, who's the senior environmental research scientist of the Integrated Pest Control Branch of CDFA; also Dr. Shruti Khanna, postdoctoral researcher from the Center for Spatial Technologies and Remote Sensing from the University of California, Davis; and finally, Scott Ruch, chief scientist with Ruch Logic, LLC.

Thank you very much for joining us this afternoon.

Dr. Akers, if you would like to proceed first.

DR. PATRICK AKERS: Thank you for inviting me here this afternoon. I heard you speaking about how you're interested in the invasive species that threaten California that are already here and that might be here, so I think that's what I'll focus on speaking about today.

What Food and Agriculture's basic philosophy is, it's a pest prevention program, which means that we try to find pest populations when they're small and relatively easy to handle and then respond quickly to them so we can destroy them before they get away and become generally established in California, and we do that for some aquatic weeds as well as—probably most people are more familiar with things like the medfly.

The kinds of aquatic weeds that are already here in California that are under some sort of regulatory official control probably aren't well known to other people, most people, because they really aren't a problem generally because of the suppression that they're under. But there are five major species that are, of aquatic plants, that are here in California already. One's called hydrilla, which is sort of like elodea on steroids. There's one called spongeplant, which right now is, you know, giving water hyacinth a run for its money. There's one called giant salvinia, which is actually a pretty little fern, but it can make thick mats, two or three feet thick, sort of like water hyacinth can. There's another one called alligator weed, and there is one, just that's brand new, that's called annual primrose. All these have active control projects on them to a greater or lesser extent. The most effective and strongest of those responses is to hydrilla because it has, pretty much, some dedicated sources, sources of funds, and that program is actually pretty effective and pretty successful.

In places like Florida, where they haven't—they let hydrilla get away; they now spend anywhere from $10 million to $20 million a year just keeping it kind of suppressed. Here in California, we've had hydrilla actually introduced in California in at least 32 different locations. At this point in time, we have 26 of those, approximately, eradicated; and so we have about six active sites in California and one of the major ones being Clear Lake, which is a 43,000-acre lake, as you know.

Those programs on hydrilla had been very effective so that in all the remaining eradication programs we haven't had any plants for the last six years except for two—one of those is in Clear Lake and one of those is in a small series of canals and ponds about halfway between Grass Valley and Marysville. In general—and we haven't had any new finds in California since about 2005; that's probably due to our good nursery program that keeps undesirable aquatic plans from getting through our nursery system.

So the hydrilla is pretty well on the run in California. The other kinds of—the next plant that's under control in California is one that's called South American spongeplant. We have been responding to it to some extent, where we have the resources. Where we found it, we've suppressed it pretty well. If you get to it when it's brand new, it's pretty easy to eradicate, but it quickly builds up a fairly long-lived seedbank. And if you let it do that, then you can bet on spending at least five years trying to clean up that particular infestation.

We are keeping it under pretty good suppression where we find it, but it has spread to the canals west of Fresno. It's on the western side of the San Joaquin Valley, and it is continuing to spread because it has very, very small seedlings that spread very easily. In fact, it's my opinion that it spreads much more easily than water hyacinth, and it's sort of a water hyacinth "want-to-be" if you know anything about spongeplant. So that one is slowly getting away from us, but we are still responding to it.

The next plant that's under control in California is called alligator weed. If you know water primrose, it's one of the ones that grows out across the water

in the Delta that fouls a lot of boats when they try to get close to shore. Alligator weed is the water primrose on steroids. It's very difficult to kill them. In fact, it's been in California in two main locations since about the middle of the 1960s. There were very active eradication projects on it and then there have been some pretty decent follow-up projects on it, efforts on it, but even after 50 years of trying, we haven't been able to eradicate those two populations.

On the other hand, it hasn't spread much from those. It's only known from those two locations in California. So our ability to keep it from spreading inside California is, again, probably due to keeping it out of the aquatic trade, out of the nursery trade, and that's due to our nursery programs.

I mentioned giant salvinia, that's a water fern. That popped up in about—it got popular in the aquarium trade and the water-garden trade back in the late 1990s; and so all of a sudden, it popped up in about 40, 45 nurseries about that time here in California and then it got out in about four locations in California.

In Texas, this weed has covered entire reservoirs, and it caused major problems for them. It's also a problem in Louisiana and Florida. But where it got out of the nurseries here in California were small, and we were able to eradicate all of them within the borders of California. There is one location along the Colorado River where it continues to exist. It hasn't done well there, for one reason or another, and it hasn't spread from that location, but it does exist along the Colorado River down around Imperial County.

And the last one popped up in Butte County, north of Sutter Buttes, a couple of years ago, in 2011. It's called annual water primrose. It's different from most of the water primroses because it's an annual. Most of the primroses, water primroses, are perennials. And it's actually native to the Eastern United States, but it's also weedy in the Eastern United States. In its native range, it's a weed. So if it gets somewhere where it doesn't have its natural enemies, it's very likely to be highly problematic, and it can be a serious problem in the rice and other aquatic areas.

Fortunately, the Butte County agricultural commissioners worked closely with the growers and the irrigation companies up there, and they have a very vigorous response on it, and it seems as though they might be able to get ahead of it. It creates thousands of very small floating seeds, so it's very difficult to contain, but they are hopeful that they can get ahead of it.

So in addition to those plants that are already within California, there are three or four I'd like to mention that could be especially threatening if they got here in California. One's called the *Lagarosiphon major*. It's sort of like hydrilla. It's caused major problems down in New Zealand. In some lakes, it's created so much—it's a submerged, underwater plant just like hydrilla—in some locations there, it's created so much biomass they harvest something like 200 tons of wet material per acre. So that's an awful lot of material you have to deal with. It's not yet in the United States, and again, the pest exclusion system seemed to be working pretty well at keeping it out of the United States.

But if it were to appear, it would be a serious problem for… should be a reason for serious concern.

Another underwater weed sort of like hydrilla is called *Hygrophila polysperma* or sometimes called swamp weed. It looks a lot like alligator weed except that it occurs almost entirely underwater rather than floating across the water. The reason why this one's scary is it's in some locations in Florida already and in a couple of locations in South Central Texas. And in some of those locations in Florida, it's actually outcompeting hydrilla. So hydrilla would probably completely bury all the *Egeria densa* that we had here in California, it if were to get into someplace like the Delta and make the *Egeria densa* look like it wasn't so much of a problem. The hygrophila might do the same thing for the hydrilla, so that's scary. On the other hand, it doesn't seem to be spreading very easily out of Texas and Florida. It seems like it might have some temperature restrictions that might slow it down from moving north, but it's not something that I would like to bet our environmental health on.

The other issue about hygrophila that makes it such a concern is it's very difficult to kill. They're almost—there are no known effective herbicides against it. And the one good biological control that we have for hydrilla which is this triploid sterile grass carp apparently almost refuses to touch and eat this hygrophila. They like to eat almost anything.

Another plant that's in the United States already in, like, Vermont is called water chestnut. It's not the water chestnut that we get out of the cans for our Chinese meals. Its scientific name is *Trapa natans*. It can create very

large, heavy masses. It's a floating plant, sort of like water hyacinth, but the really unpleasant thing about this plant is that it makes very large floating seeds that are spiny. So these floating seeds get blown into the shallow areas or they sink where your swimming areas are and then these spines have a little hinge on them so that when you step on them the spine goes into your skin and then breaks off. So you end up with a spine, is all in your feet, and that makes it a plant that I certainly would like to keep out of California. Again, it does not seem to move very rapidly out of the Northeast. But if it were to appear here in California, I'd consider it a reason for serious concern.

Then there's one other that seems to be coming at us. It's called flowering rush. It's moving down the river systems across the Northern Tier states. It just started moving out of Idaho into the Snake River and is now moving down into the Columbia River. So it seems to take these very long leaps and then once it gets into a watershed it just keeps coming. It's another one of these plants that there is no known control for it, no herbicide that seems to work. It's not really a rush, but it looks very much like one, and it causes the same kind of crowded conditions. But it moves into niches that don't already have vegetation in them, and it can block those areas from being used by wildlife. So it's another plant that could be of concern. So I think I'll stop there.

Are there any questions?

SENATOR GALGIANI: Thank you very much.

Perhaps you can tell us just for a moment how climate change has affected the presence of invasive weeds and what significant changes in lifespan we are seeing, if there are any that you're noticing at this point.

DR. AKERS: Not for aquatic weeds yet, that I know of. We haven't noticed any range extensions or changes here in California that I'm aware of. So far, most of these plants have fairly wide temperature tolerances and fairly wide environmental tolerances, so they seem to move around many areas pretty easily, especially things like hydrilla.

SENATOR GALGIANI: Okay. You spoke of some of these invasive species that are in Florida and Texas and so forth already. I wondered if you could speak for a moment about out-of-state research programs and whether we in California are collaborating with them or whether we're able to, and if not, what might be standing in the way of that happening.

DR. AKERS: I'm not aware of any significant collaborations between us and other research programs.

SENATOR GALGIANI: And it could be a funding issue?

DR. AKERS: Yes, and, you know, we're focused on controlling, and we do consult with experts outside of California when we have a new issue come up and consult with them on potential control techniques and their biologies.

SENATOR GALGIANI: And then finally, are there any options on the horizon other than using pesticides to control some of these weeds?

DR. AKERS: No. [Laughter] So you can use—there's a variety of other possible control options, but they all have pluses and minuses. For instance,

the mechanical harvesting will kill a lot of small fish. Herbicides do definitely have some negatives, but they also have some uses. Many of these weeds would be much better if we could just get to them very early and hit them hard, when they're here early, and quickly and keep them from ever getting a foothold.

SENATOR GALGIANI: Okay. Well, thank you very much. I really appreciate your time.

Next, we have Shruti Khanna who's the postdoctoral researcher from the Center for Spatial Technologies and Remote Sensing from UC Davis.

DR. SHRUTI KHANNA: Thank you.

SENATOR GALGIANI: Thank you.

DR. KHANNA: So I'm going to kind of describe a little bit of what our lab has done in the Delta with invasive species. We worked mainly on two, on mapping two, invasive species in the Delta. One is water hyacinth and the other one is *Egeria densa*, and this was a pilot project funded by CDBW in 2003 to check if remote sensing could be helpful in mapping these species.

For those of you who don't know what remote sensing is, it's basically getting information about an area without touching it, so "remotely." And in that sense, a digital camera is probably the very basic remote sensor. What we do instead—and you can see it in one of the figures on the handout—is that, while a digital, distal? camera is looking at three bands (green, red, and blue), what an advanced remote sensor can do is basically look at hundreds of bands

and especially in regions that our naked eye cannot see at all, so not in the visible region but in other regions of the spectrum.

So getting a continuous signature like that allows us to map these species even when they occur with similar-looking species. So that is the reason that we have been able to use this kind of data to map, like water hyacinth, and even differentiated from other floating species such as the native pennywort or the invasive water primrose. So once the pilot study was kind of proved to be promising, the hyperspectral data, which is the kind of data which has these continuous hundreds of bands, was acquired using CDBW funding from 2004 to 2008 in June of every year, and this data, the sensor is located on a plane, and the plane kind of flies over the region, and you get data which was 3-by-3 meter pixels, so quite spatial resolution was quite good. And we used the data to classify the species, especially submerged species, for 80 percent of all submerged species biomass in the Delta is *Egeria densa*. So you can kind of look upon it as an *Egeria densa* distribution and, of course, water hyacinth. So using these maps, we try to find out basically three things.

One was, of course, where it is located, the distribution, and how much of it there is. In terms of acreage, we are not looking at how much it is under the water but in terms of how much of the area is covered. Also, we did look at, as part of our research, the management of both of these species and was it effective; and if not, then what other factors helped in making it more or less effective.

So for water hyacinth, what we found out was that in 2004 when we started the project it was about 720 acres in the entire Delta. (One advantage of remote sensing is that it is giving you complete cover. It is not like you're going out there and sampling this data. You have information on each and every small, little area in the Delta. So when I say that the cover in the Delta was 720 acres, then that is giving you not an estimate but basically how much of it is out there.) And by 2008, it had come down to 250 acres.

For *Egeria densa,* in 2004 it was about 4,000 acres, rose up to about 6,000 acres in 2006, but reduced to about 2,300 acres in 2008. And the reasons that we looked at were, first of all, for water hyacinth; it is really susceptible to frost. And in 2007, 2007 winter, so I'm talking 2007 December, 2008, or rather—wait a second—I think it might be 2006-2007 season; I'm not sure. But there were three consecutive weeks of frost and that brought down the distribution a lot. We also compared treated and non-treated areas of water hyacinth to see if controlling water hyacinth had any impact on how much of it there was the following year.

What we found was, whereas, if you compared it to at the end of the spring season—so you are looking at sometime in October/November—then you see that it does bring down the cover of water hyacinth, the control does. But by next year that advantage is lost. So there is basically no difference in the amount of cover in treated sites versus non-treated sites. So what this showed was, yeah, there is an immediate impact. You can kind of keep the channels clear and keep fighting against, you know, letting the cover increase.

But overall, the following year there is really no difference, in that it wasn't even as though the areas that weren't treated had more water hyacinth the following year, there was absolutely no difference compared to areas that were not treated. So that's what we found for water hyacinth.

For *Egeria*, what we found was that the significant difference came in the last year. So in 2008, the cover really went down, but until 2007 the cover was quite high. And one of the researchers in my lab, the study that she did kind of showed that they changed their strategy of management in 2007, where they went aggressively for Franks Tract which kind of was acting as a nursery of this species throughout the Delta, and we feel that that is what caused the decrease in *Egeria densa* specifically.

So the point that I want to make is that outside factors sometimes can have a bigger impact on the species covered than any amount of control. For example, for water hyacinth, what frost did was something that control couldn't do. So we feel that this kind of a monitoring program—because this program, this data set, was collected for five consecutive years and it is actually today the biggest hyperspectral data set existing in the world—so if this kind of a monitoring program can be continued, then it would really be helpful in seeing how the climate plays into how the species performs. And that kind of research is sometimes critical to making management more effective because if you knew that such a natural factor can have a huge impact on the species cover you can adjust your management strategy to take advantage of it.

Other than that, both of these, *Egeria densa* and water hyacinth, are also a kind of ecosystem engineers where they modify the environment to make it more conducive to their growth. So, for example, water hyacinth really reduces the amount of oxygen in the water column underneath it and also shades out any submerged species that might grow there, so it is outcompeting what was there before it. *Egeria densa* over the last 40 years that it has been in the Delta has been consistently, by spreading, reducing the turbidity of the Delta. The Delta waters used to be a lot more turbid, and this is research by another researcher in my lab who has shown that *Egeria densa* had a significant role to play in reducing the turbidity of the Delta, which is not only harmful to the species that are adapted to the more turbid water of the Delta, but it is also further making it easier for *Egeria densa* to spread. So they are positive feedbacks on their own establishment.

Further, the last point that I want to make is that we know that there is a plan for the tunnels in the Delta and this is—historically, the Delta used to be more saline than it is now. So it is expected that by making these tunnels we will kind of restore the Delta to what it was originally like, more brackish instead of freshwater. Both of these species are freshwater species. They don't do that well in brackish water. So if that plan went ahead and if the salinity in the Delta increased, it would control in a natural way the spread of these species.

SENATOR GALGIANI: You're saying that if that plan went forward there would be greater salinity?

DR. KHANNA: Yes. Because originally, historically, the Delta used to be more saline than it is today. Because we want to water our fields with that water, we keep it fresher. And there would be, rather—I won't even call that it will be more saline, but there will be seasonality in the salinity. So, you know, normally what you will have is during high flows the water would be more fresh, during the rainy season. Then during the low-water season, it will become more saline. But that higher salinity anytime during the year will control the species. One of the major reasons that they have been able to invade the Delta so well is because it is so fresh all throughout the year.

SENATOR GALGIANI: Okay. Thank you very much.

Next, we have Scott Ruch, who is chief scientist of Ruch Logic, LLC. Thank you for joining us this afternoon.

MR. SCOTT A. RUCH: Good afternoon. I am Scott Ruch, Chief Scientist of Ruch Logic, a Berkeley-based scientific consulting firm.

Thank you for the opportunity to take part in this important hearing today. It's a pleasure to be in a room where so many folks are concerned about aquatic invasive weed issues in the Delta.

Over the past decade, I've logged more than 6,000 boat engine hours, mapping more than 150,000 repetitive project-site acres of submerged aquatic vegetation in the Sacramento-San Joaquin Delta and technical support of the Department of Boating and Waterways *Egeria densa* control program. During this decade, I've also traveled more than 30,000 water miles throughout the Delta observing change in both submerged and water-surface vegetation,

including emergent and free-floating communities in the diverse Delta habitats. In addition to the Delta, other Northern California waters I've mapped include 42,000-acre Clear Lake in support of *Hydrilla verticillata* eradication management planning and Emerald Bay at Lake Tahoe in support of Eurasian watermilfoil management. I've worked in seven different states, from Florida to Washington, mapping shallow-water aquatic ecosystems, specifically focused on invasive submerged aquatic vegetation issues.

My vacation time away from the California Delta has been spent exploring other multiple complex delta systems on five different continents, including Vietnam's muddy Mekong and Red River deltas and the Netherland's meticulously engineered Dutch Delta. This decade of professional scientific observational experience, both here in our backyard California Delta and deltas of the world, has made me fully appreciate the myriad of challenges of not only maintaining the ecology and viability of important life-giving delta water resources but, most especially, zeroing in on the roles of invasive water weeds, whether helpful or detrimental, in managing these complex estuarine systems.

Now that my experience is established, I wish to address the core of why we are all gathered here today: the current impact and control of aquatic invasive species in the Delta. Measuring *Egeria densa* control program efficacy is my bailiwick. Measuring the effectiveness of *Egeria* management is hypercritical to continuously refine the methodology of treatments as well as to determine and measure the progress of this program in both year-to-year management efforts as well as overall long-term programmatic operations.

Utilizing differential quantitative mapping technologies such as hydroacoustics in combination with traditional botanical sampling is how I go about measuring effectiveness in *Egeria* control. For those of you not familiar with hydroacoustic mapping technology, a good general rule analogy is carrying out similar work to that of a radiologist, mapping internal human problems such as the location of a cancer in the human body and measuring the effectiveness of treatments to control the intensity and spread. Like the focus and care taken to treat human cancer, the *Egeria densa* control program uses an adaptive management approach to vigilantly assess the *Egeria* infestation before taking any chemical actions.

The *Egeria densa* control program operates within the adapted management framework of the current Delta science plan through a planning, doing, evaluating, and responding cycle. The data I provide first precisely defines the problem by inventorying the infestation, including ancillary plants present and tide elevation that the problem exists. Once goals and objectives for managing the quantified infestation are laid out, necessary data for conducting the treatments include understanding water volume of regional waters; water flows, including velocity and direction; sediment type and hardness; and agricultural crops contiguous to treatment areas.

This helps limit the critical unknowns by providing: 1) necessary data for informed management planning; 2) necessary data to focus efforts maximizing efficiency and success; and 3) objectively quantifying short- and long-term infestation change and developing the success thresholds, essentially providing

performance metric data that helps refine methodology of managing submerged vegetation issues in the Delta. Each winter, previous year's results are evaluated and responded to by adapting and prioritizing upcoming year's treatments to Delta regions based on a triage scale of managing the most impacted navigational acreages of the roughly 7,000 acres of *Egeria* in the Delta.

There are many complex factors in the Delta that influence treatment efficacy. Number one are the weather and the season—and during drought conditions, like we're currently experiencing, it's very favorable to *Egeria* propagation; in the late '80s and early '90s, a four- to five-year period of drought in California really was beneficial to *Egeria*—as well as temperature and light intensity. Secondly: water quality, including salinity levels, sedimentation, as well as turbidity. Third: water quantity, the volume of water flows, the volume of tidal periods. Fourth: existing other aquatic conditions, the presence of algae, secondary species, surface species. Fifth: the treatments themselves, the chemical types and the formulation, the applications, the start dates, and the contiguous irrigated agriculture. And sixth: grow back, what are the number of years that sites can be left unchecked before they become troublesome again?

Well, in its first decade, the *Egeria densa* control program lived under an umbrella mission statement of balancing the need to control *Egeria* with the need to minimize environmental impacts to Delta waterways. And between 2001 and 2006, baby steps, testing herbicides in small pilot-scale test sites

and opening lanes for bare-minimum navigation, took place. And during this time, the controlled sites showed increases in *Egeria densa* during the same timeframes that treatment sites showed decreases. And we've witnessed multiple-year control in Fourteen Mile Slough. Well, based on what we learned in those first five years, in 2007 there was a programmatic shift to a regional nursery-controlled approach. And based on the fact that roughly 50 percent of Delta *Egeria* was located in 3,200-acre Franks Tract, the heart of the Delta and the "Grand Central Station" of migratory vessel traffic fragmenting *Egeria,* Franks Tract was focused on, and it was a success. Now, absent a decade-old stands of *Egeria*, it's now a seasonal tract. So rather than managing an existing infestation, it's more about managing growth of new seasonal infestations each summer.

Well, with what was learned in 2007 and 2008, in 2009, this regional nursery approach was shifted to the northeast Delta, and especially White and Disappointment sloughs. However, the level of control achieved in Franks Tract was not possible due to contiguous irrigated agriculture intakes and small, high flow-through sites. In 2010 through 2012, Franks Tract seasonal infestations were focused on. In 2011, there was an intense six-month treatment in Discovery Bay. And in 2012, late, late middle-summer start dates severely hindered the program.

So through all the scientific analysis, I've learned: Number one, water depth and tidal current dictates colonization. Water temperature is the most important indicator in *Egeria* presence in the upper water column. Number

two, spring and early summer Delta-wide water quality and algal blooms are as serious as *Egeria densa*. Third, each Delta treatment site has its own unique behavior, and most sites have multiple personalities. There's no blanket approaches for managing all the Delta sites. Fourth, the complex Delta requires fast-reacting management to clear or maintain lanes by Memorial Day weekend navigation. In my opinion, this is only achieved by matching permitting, politics, and legislation with a scientific reality that April 1st is a critical permit for systemic herbicide application on *Egeria*. Fifth, we need to apply knowledge of prevalent scouring current patterns to help naturally manage, and a good example of this is Franks Tract. Sixth, when control is achieved, it turns into a balancing act in the well-nutrient-fed submerged Delta—managing *Egeria densa* versus native pond weeds, versus other potential exotic invasive submerged vegetation fighting for initial secondary succession space, creating their own unique dose of navigational hazards. We're learning this lesson also in Franks Tract, and this lesson screams the need to develop an integrated aquatic vegetation management plan specifically tailored to the Sacramento-San Joaquin Delta complex, heavily human-engineered ecosystem. And lastly, number seven, due to this balancing-act phenomenon, it's vitally important to understand that this is complicated, long-term management with multiple species management and monitoring moving forward, not simply targeting two or three dominant exotics.

Reality is that once an exotic invasive species is controlled in the Delta other vegetation, exotic or native, considered invasive or not, aggressively

competes to occupy the space the dominant exotic invasive once ruled. So there are 11 submerged species currently existing in the Delta vying for the same water column space while these seven are vying for water surface space. So in addition to the example I gave in Franks Tract regarding *Egeria* management and native pond weed succession causing navigation issues, another example of this phenomenon is the water surface, including emergent and free-floating vegetation cycle of exotic invasive water hyacinth to native water pennywort. In years of great water hyacinth control, water pennywort, considered a native to the Delta, moved in and now noxiously occupies many of the former water hyacinth trouble spots. In some cases, both species now persist, but the Department of Boating and Waterways is only legislated to treating exotic invasive water hyacinth and just recently exotic invasive South American spongeplant, not native water pennywort.

So submerged species are also impacted by water surface plants. Extended shading created by hyacinth or pennywort disabled submerged growth below, proving no matter submerged or surface, aquatic vegetative life in the well-nutrient-fed Delta will persevere in an ongoing opportunistic cycle. The main premise of these control programs is to clear lanes for navigation. It does not matter to the boaters or water users whether the vegetation is scientifically considered exotic or native. It still potentially creates noxious conditions, disabling the vital cultural, recreational natural resources and agricultural values in the Delta as well as ecological degradation and imbalance, underscoring the importance of multiple species management

capabilities moving forward, all outlined in an adaptive, integrated Delta aquatic vegetation management plan.

Well, thanks for the opportunity to share my decade's worth of observational, scientific, and Delta experience, and I'm happy to answer any questions regarding this experience or other Delta aquatic weed phenomena.

SENATOR GALGIANI: Thank you very much.

I wanted to clarify something. You said there were 11 submerged species in the Delta…

MR. RUCH: Correct.

SENATOR GALGIANI: …and another additional seven that are vying for surface space?

MR. RUCH: Well, the four main free floating are emergent species and three of the submerged species I count, vying for water surface space.

SENATOR GALGIANI: Okay. But, yet, DWR is only authorized to treat water hyacinth and *Egeria densa*?

MR. RUCH: And now South American spongeplant as well.

SENATOR GALGIANI: Okay. But specifically, you said not the pennywort?

MR. RUCH: Correct.

SENATOR GALGIANI: Okay. And none of these others?

MR. RUCH: Right.

SENATOR GALGIANI: So out of 18, they're authorized to treat three; is that correct?

MR. RUCH: And that authorization is for the three most dominant, that if left unchecked will take control of the Delta. But I guess my point is that you've got to pay attention to the whole family.

SENATOR GALGIANI: Yes. No, your point's well taken.

I'm aware that Assemblymember Joan Buchannan has legislation to give the Department of Boating and Waterways greater authority to manage invasive species and try to eradicate them, control them, actually. So are you familiar with the legislation, whether it would then address this specific issue where we only have three that are being treated because of the authorization limits?

MR. RUCH: I'm not intimate with it.

SENATOR GALGIANI: Okay.

MR. RUCH: I'm just familiar with the *Egeria*, the hyacinth, and now recently the spongeplant.

SENATOR GALGIANI: Okay.

MR. RUCH: But I know it has been talked about, at least within Boating and Waterways and at different meetings, for a number of years about the issue of multiple species management moving forward.

SENATOR GALGIANI: Okay. Thank you.

This is directed to anyone who wants to answer it. But do you have the opportunity to form partnerships with industry resources to further research efforts in all of these areas?

DR. AKERS: Yes. We often work with industry to develop one kind of control method or another on an as-needed basis but not—we don't have any kind of institution set up where it just happens all the time.

SENATOR GALGIANI: But you have the flexibility…

DR. AKERS: Yes.

SENATOR GALGIANI: …to be able to do that anyway? Okay.

DR. AKERS: Or with UC or with Scott, yes.

SENATOR GALGIANI: Okay. Very good.

Well, thank you very much for your time and your presentations, and we'll go ahead and call up the third panel now. It will be the discussion of impacts.

Our first panelist, Andrew Rehberg, Harbor Master for RiverPoint Landing Marina-Resort; also Rick Hatton, who is the president of Aquatic Harvesting, Inc.; and Jeff Wingfield, Director of Environmental, Government and Public Affairs Division from the Port of Stockton.

Thank you, gentlemen. Thank you.

Mr. Rehberg, would you like to begin?

MR. ANDREW REHBERG: Yes. Good afternoon. Thank you for inviting us out here today for your meeting. My name is Andrew Rehberg. I am the harbor master for RiverPoint Landing Marina-Resort here in Stockton out at Buckley Cove which is at the west end of March Lane.

In the last two years of managing RiverPoint Landing, along with my 27 years of boating in the Delta, we've increasingly fought with the ever-growing

Egeria densa and the overbearing flow of the hyacinth within the primary boating channels. The hyacinth in the last two years has been extremely prominent within our marina and the local boating areas. One scenario is August through October 2012 they completely choked off the last third of our marina, the public launch ramp, the entire back half of Buckley Cove, and Ladd's Marina, which is just to the east of us, this harbor, and made it virtually impossible for any of our boating customers or the general public to use their boats for cruising, fishing, water skiing, or any of their other outdoor watersports activities. This problem also happened in 2011 for roughly the same time period, which is about half of our prime boating season out in this area.

Revenue loss from these three months is a huge portion of our boating season and because our small marina can't afford to sustain these potential revenue losses from the lack of slip rentals, fuel sales, and other services that we attempt to provide. But the more serious threat is the significant numbers in Delta boaters who will eventually or simply lose interest in their chosen recreation and move on to other pursuits. These negative economic impacts could be huge in the Delta counties if these weed problems are not effectively addressed and abated.

In the past years, there has been no recording, to our knowledge, to the public about the spraying program nor has the seasonal plan ever been laid out. Consequently, no status or progress updates or notices of where the applicators are currently working have been available to marine businesses for

recreational boaters. We also haven't seen an evaluation of prior budget allocations and the measurement of success. There doesn't appear to be a direct connection between the money spent by DBW on their spraying applications and a success in controlling the water hyacinth problem. On top of that, we see the *Egeria densa* being a much larger issue; but unfortunately, it's hidden beneath the water where a lot of times we can't see it.

However, we believe that reorganization of DBW and the new acting director, that there may be a stronger effort in this regard and that already more timely information has been disseminated to the public through their website and by email. However, please note that the last communication from DBW about their spray program was dated on March 15, 2013. We feel that the website that they run should be able to provide not only the marine operators but the general public with up-to-date, real-time status about where they've sprayed or where they're planning on spraying next. Monthly or frequent updates should be available and would be extremely helpful to everyone, especially those of us who are on the frontline being bombarded by questions from boaters who can't get their vessels out. Communications from users, I think, would be a great opportunity for DBW to get live information in areas, identifying specific infestations, having a hotline number of somebody that we can easily talk to and give direct information to.

I'll keep this simple and quick, so I just want to say thank you for appreciating, having us come out, and we appreciate your legislature's efforts

to make the spray program more transparent and better designed to control these invasive weed species.

SENATOR GALGIANI: Thank you very much. You mentioned a need for better communication. We spoke a little bit earlier about the Invasive Species Council. Are you involved with that or does anyone from the Delta have a representative to that council?

MR. REHBERG: I put my name on the contact list to still be contacted, and this is probably my first step as far as myself being involved in the, basically, the council.

SENATOR GALGIANI: Excellent. Good. That's very good. Thank you, thank you.

Next, Mr. Rick Hatton, President of Aquatic Harvesting, Inc.

MR. RICK HATTON: Good afternoon. Thank you. I appreciate this opportunity to share my observations.

I had 28 years working in Silicon Valley starting companies. And now I found that it's much more enjoyable to be out there working on the water. So for the last five years, that's what I've been doing, removing aquatic weeds, primarily from the Delta. We go down into Arizona, do a lot of work in Lake Havasu, and travel up to Washington. I can tell you stories of beautiful scenery on lakes, even harvesting in the snow.

There are two effective methods for removing these weeds. A third one possible that I heard and was quite intrigued earlier when the lady was speaking about increasing the salinity—I like that. But the two that I'm most

familiar with are chemical and mechanical, and both of them are effective when done properly and both can be disaster when they're not.

The chemical, if it's applied at the proper dosage and the proper application methods, it's great. When it's not, it's a waste of money. We can talk about 2011—and I'll get more into that in a moment—Discovery Bay. They wasted a couple of a million dollars because the dosage was too low, and I get my information directly from the people that are operating those boats. But when it is applied at the proper dosage, it is very effective; however, it is slow.

Mechanical, it can be very effective instantly, but it's a disaster if you've got a poor operator that's cutting his weeds, doing a sloppy job, and allowing the trimmings to float away. I have seen folks that have harvested, and they'll have, you know, 500 cubic feet of cut weeds, and they go and they deposit it on the rocks, just waiting for the next high tide. I would almost, almost be in favor of having our community of harvesters in some way… you've got to make sure that these operators aren't doing that kind of stuff. I don't think we need to go as far as permitting all of our cutting. But just like you need a drivers' license, you've got to know; you can't go dumping your weeds. And working closely with the Sheriff's Department that park their boats in Andrews Marina, I can call them, and they'll run out and put a stop to that at any time.

Anyways, let me talk more about the actual mechanical harvesting. If you want to really get a good view of it, go to my website, aquaticharvesting.com. There's some videos on there. The first one will show you. It's a pontoon boat, barge about the size of a Cadillac. In the front of it is

a big cutterhead, eight feet wide and six feet tall. The sides and the bottom have, like, hedge trimmers. These are the same parts you see on a combine cutting a hayfield. We buy the parts from John Deere. We drop this thing into the water, and we move forward. Everything in its path is cut. It comes out of the water onto a conveyor belt. There are some clippings that will miss the blades because the blade cuts this way, and the end of the branch, let's say, goes floating away. It's important that that operator spend a few hours cleaning up the mess when they're all done.

I was cutting out at Tinsley Island last night, St. Francis Yacht Club, number two in the United States. It took three hours at the end of the day to run around and pick up all those clippings. If your operator is sloppy, they're all going to resprout someplace else.

Let me bring up as a cost savings, there are some marinas out there who say, "Let's not hire these guys anymore; let's just do it ourselves." They literally get hedge trimmers, tie them onto a little barge, drive around the marina, and cut and let them float away. Perry's Boat Harbor is forced to do this. Their harbor master, Joe, does not like doing it, but his owner has said, "We've got to cut costs; do it anyways."

If the marina owners recognize—and there's only a few of them, and I know almost all of them—but there's only a few of them that do this—but if they recognize the damage that they're doing just by saving a couple of bucks, and how much are they? You know, for me to do, like, Andrews Marina, how much does it cost me? It's the equivalent of two slips out of his entire marina.

If he dedicates two slips, that pays my bill for an entire year. Some of the other marinas who cater to smaller boats, it may take up to four slips, but it's not that much.

I want to talk about the two plants. I agree with the previous speakers. It comes down to the three: the hyacinth, the *Egeria densa*, and the sponge. I haven't seen any sponge yet. I know it's coming. I'm aware of it, and if I see it, you know, I'll ring the bell.

Hyacinth, it was in control up until a couple of years ago. Now I'm going to share with you—and I've been asked to share this—what my personal opinion is of what caused this huge spike in hyacinth. In 2011, there was an effort to focus on Discovery Bay. There were two public meetings. I went to both of them and voiced an opposition because of the amount of money that was going to be spent on Discovery Bay. Four to $6 million on one community went to—you know, Boats and Waterway devoted, dedicated all of their efforts into Discovery Bay. Okay. At those two meetings, I said, "Wow, that's a lot of money. I'll do it for $200,000." No, no, no, no, no. So the money was spent. And while they were so dedicated—here's a key point—while they were very dedicated on Discovery Bay, the rest of the Delta was neglected. And while it was neglected, the hyacinth just exploded. Now we've got this huge volume of hyacinths floating around. Oh, no. What are we going to do? We'll catch it next year. Next year? Oh, geez, we forgot to get the permits, and they were late again, okay?

It was just a big mess. Now I've got to come back to say that the people on those crews, Department of Boats and Waterways, I know most of them. I like them; I respect them; and I believe it's likewise. They were so discouraged; they were distraught; they were complaining to me. They were saying, "This isn't going to work. We've got to change it." And they were pretty much told to be quiet.

Now we come around to—there is a change, and I really need to emphasize this, it's changed again, for the better. Since Sylvia's been on Boats and Waterways, the crew has sent me text messages—and this is a quote I can show you on my cellphone—"It's fun to come to work again." They are dedicated; they're happy; their frustrations are dissolving; and they're attacking this. The permits now are coming in, not only on time but early. We've got a five-year permit now. Hee-haw. Let's go get those weeds. They put their careers into this. They're excited again. And I believe that given this current momentum that within three years they'll be under control again. So all the right steps, the culture, the permits, the right chemicals—we're back to using 2,4-D which is, you know, a pretty toxic chemical. For a while there, they had to use something less toxic, and you could just see it very slowly withering. Well, now it's dead quickly.

You can tell I love this topic. I get passionate about it, and I enjoy working with other people in this industry that, you know, we share the same goals. And I would encourage, this is one thing that we talked about at the meeting with Congressman McNerney is, hey, let's see it together. Let's have a

gathering, not necessarily a committee but a gathering, where we get together and say, "What are you seeing? What's working with you? Oh, hey, did you know about this?" Just something informal to trade notes. And so after that meeting, we always swap business cards, and already we're yacking it up on the phone about, you know, what we're seeing on the Delta.

The next will be, outside of hyacinth, let's talk about the *Egeria densa*. Okay. Now, my focus is primarily in the marinas. I also work, we know, with a lot of lakes and the Colorado River and stuff like that, but around here in the Delta, it's the marinas. And a marina owner would say, you know, you can put, like, let's see, last year, King Island Marina. I was asked, "Hey, don't go in and harvest King Island this year because we're going to do the chems." You can go talk to Rich Williams, their harbor master, who does that one tower in the Stockton Marina. He didn't like it. It was too slow.

So you've got these plants that are very slowly dying. No, he doesn't want a very slowly dying—he wants it gone, right? Because even a slowly dying plant is going to clog the intakes of the boats and hang along the propellers. If we went in there and harvested it, it's gone; but by two or three days, the marina's whistle clean. He can make his money. So, you know, both of them are good, but in the actual places where they park the boats, I think a quicker fix would be better.

And some of the places we'll go to—like I did it upon last week, up in the Sonoma area—we'll go in there, and we'll harvest, and we'll take the plants out. And then you can come back afterwards and now dose it with chemicals. Well,

why would you do both? Well, if you just put the chems in a captive area, like a lake, pond or maybe even some of these marinas, dose them up with the chemicals, what happens? Plants finally die, they go down to the bottom, they decompose. While they're decomposing, the dissolved oxygen, which the fish need, you know, it starts to reduce; and you get fished killed. So I kind of giggled when somebody said earlier about, " Oh, those mechanical harvesters, they kill the fish." Well, like, so do your chemicals. The difference is, when I pull up a whole bunch of plants, I see a bunch of sparkly fish jumpin', I can reverse my belts and let them out. We do kill some fish, but it's so minor. And, you know, the big fish, no, we always, you know, we can pick 'em up and toss them out. When you pick up a fish and toss it out, you know, we're too busy to be doing this all day. So it doesn't happen that often. I may pull in a couple of fish, you know, a big fish in an hour. They're all released. The little tiny babies, I'll make a decision while I'm doing it: Is it worth it or not? How many are in there? It's a big Delta. And if I pull up one tree of weeds with, you know, 20 fish in it the size of one inch, it's, you know, what does my conscience tell me at that moment? I talked about that.

Okay. A couple of, this last page, I wanted to cover some things. Stockton, the guy came up to me afterwards and whispered in my ear. I say, "No, you've really got some bad information on that one." Asparagus Festival, I was the person who did that. It wasn't a hundred grand. I'm sending him the invoice. It's going to be $6,000—and I was there for four days—a huge difference. The hundred grand, what that number comes from, is the city of

Stockton said, “We don’t want this to happen next year, so let’s budget a hundred grand.” And that’s the estimate. The engineer from MUD sent out a RFP that says “we expect this to cost about $100,000”, and that’s for somebody to come out, a private contractor, once a week for an entire year. And when they get there, if there’s a couple weeds, take them out. If the whole area is covered in hyacinth, you’ve got to take them out. So you could be there for one hour; you could be there for one week. But for the entire year, that’s where that hundred grand number comes from.

I was also asked to talk about what was it at the end of, you know, where the water comes into the city. And there’s this large area that, literally, before we cleaned it for the Asparagus Festival: toxic waste, dead dogs, dead birds, gobs of large carp. You’ll find that area floating with hypodermic needles, condoms, paint cans, lots of paint cans. It’s just, people just throw their garbage in there. We’d go through there and remove it with a harvester; you know, we’re pulling out garbage and plants. You know, within two days, it was gone. So I want to come back to: when you’re doing harvesting, it’s instant results, okay?

Before I go on, I want to go back. I know I’m kind of jumping, scatterbrain. What I had said about the lakes, doing both mechanical harvesting and chemicals, I wanted to take the plants out so we remove that biomass so I don’t harm the dissolved oxygen. Now we can come back in with chemicals to make sure that everything in that lake is dead, so the two of them together work very, very nicely.

You had asked the question—two more things—effects of climate change. Yeah.

SENATOR GALGIANI: Yes.

MR. HATTON: Yeah. I see it because we used to have our cutters designed only to go down six feet because that's where the plants were growing. Now the plants are growing down eight feet, ten feet. Why? Some people say it's the clarity of the water, maybe the intensity of the light. I don't know. These other guys are much smarter than me, and they may be able to come up with a real answer, but we are seeing the effects. It is happening. I've got lots of customers across the Western United States who are saying, "I never had plants before. What's going on?" Maybe the birds are taking the seeds. I don't know. But there's a lot more growth that wasn't there, you know, a decade or so. Napa, they've got all these irrigation ponds. They didn't have any plants in them, but all of a sudden, boop, they're filling up. The phones are ringing.

Another thing on climate change would be the snowfall. The effects in the Delta are heavily dependent on that snowfall. If there's little snowfall, they hold back the reservoirs. If there's a lot, they release it. Last year, it was cold, lots of snow. They released it. That caused the temperature in the Delta to drop, and my season was really hurt. There was no—the work didn't start until somewhere in May, June because the water was so cold from the release of the water in the reservoirs. This year, thank God, we're in a drought, and we're busy again. [Laughter]

One last thing, I'd like someone else to comment on it. I've only heard rumors about this. But for Franks Tract, we've heard that called a couple of times, and we did go out there and kill a bunch of plants, but I've also heard the fishermen say the fishing is nothing like it used to be. Maybe it's because there's no plants to hide in, but I don't know. Maybe there's more to that.

I do get nervous with chemicals. They are effective. But just like we see all these commercials all the time on TV, if you were using this drug ten years ago, call us. Are the chemicals that we're using now on our water, are they safe? Everybody says it is, but I still get nervous about it. So I would like to encourage—still we need to use the herbicides but consider moving more into the mechanical as an alternative to it, working together in conjunction. Not only are we cheaper but faster and a nice alternative.

Again, thanks for allowing me to share my observations in the Delta. It's a place that I enjoy working, and I hope to work closely with the people that you're bringing together for many years.

SENATOR GALGIANI: Thank you very much. Clearly, you enjoy it. I appreciate your being here. [Laughter] Thank you.

Next, Jeff Wingfield, who is Director of Environmental, Government and Public Affairs Division from the Port of Stockton. Thank you for joining us.

MR. JEFF WINGFIELD: Thank you very much for the offer to be here, Senator.

I'd just like to start off with a little bit of background. I'm sure a lot of you know, but the Port is a major job generator and economic engine for the

Stockton area. We're the fourth or fifth busiest port in California, depending on the year; and we are the third largest, land-wise, in California; and we're the second largest inland port on the West Coast, just behind Portland. We import and export approximately 3 million metric tons of cargo every year, and we import 90 percent of the fertilizer that's used in the Central Valley.

I share the gentleman from RiverPoint's frustration when dealing with the water hyacinth. You know, we're bringing in vessels, 200 vessels per year, and we recently were restricted to daytime traffic. We could no longer navigate at night. That's a tremendous impact to our business. What was happening was false radar reflections. You know, they would hit the hyacinth on the water. The pilots couldn't tell whether they were on land or in water. They couldn't see the banks so they, and rightly so, they restricted navigation to the daytime. That happened for about three to four months and that restriction was just lifted in March.

And what happens when these vessels, if they're restricted to daytime traffic is, if they cannot get and be berthed at our docks before sunset, they have to anchor downstream and wait until the next morning to transit up, sometimes to a 12-hour delay. Those delays roughly cost the end users about $2,000 per hour. So if you look at, you know, roughly, if we're stuck for three or four months and we have 200 calls per year, that equals, you know, could be as much as 50 vessels that are impacted per year. So our very worst case, we're talking $1.2 million in potential impacts to our tenants, our customers, and eventually the end users. I'd just like to say dredging or clearing out this

hyacinth is just like dredging or any other channel maintenance. If there are delays, companies will choose not to locate here or to ship through another port. They already have an eight-hour transit from the Golden Gate to Stockton, so any further delay is unacceptable. If the hyacinth remains an issue, it has the potential to cripple our business. And we definitely want those jobs and cargo to stay in Stockton.

Thank you.

SENATOR GALGIANI: Thank you very much.

Maybe you can speak to us about some of the most recent problems in recent years where it's affected you specifically and maybe some of the steps that you had to take or rely on the state to take.

MR. WINGFIELD: We began contacting the Department of Boating and Waterways last season because we saw just a huge impact. One of our slips was completely filled in with hyacinth. It doesn't—where it really affects our ships is through the intakes, and it clogs up those intakes. So we called, we tried to help out. We also started looking at mechanical ways we can mechanically remove it ourselves, but the problem is, it's just, it's overwhelming. I mean, it's so, so far down. And then you see, even when the ship channel's cleared out, a lot of times, you know, folks upstream in some of these sloughs, they'll drag material. They'll drag some of the mats and push it into the main channel just to kind of get rid of it, and then we're dealing with additional. So we've stayed close with Department of Boating and Waterways.

We've called them, offered to assist any way we could, with obtaining their permits, and we will continue to do that.

SENATOR GALGIANI: Okay. Thank you very much.

In your view, are there more steps that we should be taking at the state level? I mean, we know that now we have the permits for the next five years and that's a very positive step. And we've had changes at Boating and Waterways. And certainly, our new director is doing a wonderful job, and you mentioned that earlier, and so thank you to you. But are there other significant things that we should be looking at doing, in your view?

MR. WINGFIELD: Well, I would second the appreciation to the new director. She's been able to get things moving that—and I work with NMFS and Fish and Wildlife Service on a lot of projects, dredging; and I understand it is difficult a lot of times to get the permits.

I would say, you know, it's great that we have a five-year permit. I would say start working on the next five years because they get busy, you know, with the sequester, with other things. If there are impacts they're having now, they don't have the staff there. I would just continue to work on it, just reengage them almost immediately to start getting their application in for the next one.

SENATOR GALGIANI: Okay.

MR. WINGFIELD: And if there's anything that—you know, reach out to others too in the community if they need help, and I would just say communicate with us.

SENATOR GALGIANI: Thank you. And I think I'll be anxious to look at Assemblymember Joan Buchanan's legislation dealing with giving greater ability to Department of Boating and Waterways with dealing with new invasive species earlier rather than later, and perhaps that will make some significant progress for all of us. In fact, Susanna Schlendorf, I believe, is here from Assemblymember Buchanan's office.

Would you like to take a moment to speak about the bill?

MS. SUSANNA SCHLENDORF: I would be happy to.

SENATOR GALGIANI: Thank you so much.

MS. SCHLENDORF: Do I need a microphone or can you…

SENATOR GALGIANI: We have a microphone over here, if you'd like to…

UNIDENTIFIED SPEAKER: The podium is working.

MS. SCHLENDORF: The podium's working? Okay.

UNIDENTIFIED SPEAKER: Just watch the wires.

MS. SCHLENDORF: Thank you, Senator Galgiani…

SENATOR GALGIANI: Thank you.

MS. SCHLENDORF: …for the opportunity to talk about AB 763, which is the bill that would mean that no longer would each weed have to be put into statute. It creates a process by which when a weed that is identified as a really "bad player," as someone discussed here, certainly are. Fish and Wildlife will set up a risk assessment process. They do this informally now, but this creates a process by which once a weed is identified a risk assessment is done,

bringing together any of the stakeholders, anyone who, or any organization or agency is appropriate to participate. Depending on what it is and where it is, they determine that, yes, it needs to be dealt with, and this is a process that is comparable to what Food and Agriculture uses currently, the terrestrial weeds. And at that point, subject to the permitting process and available resources, a weed could be treated without having to wait several years to go through the legislative process.

But last year, Assemblymember Buchanan had the bill on spongeplant, which back on January 1st we were able to, well, begin the process of the permitting process on that this year. But when we did that bill, what everybody said is, "You mean every time there's a weed you have to have a bill?" So she committed this year to carrying this bill that would mean that we would no longer have to have that process.

SENATOR GALGIANI: Very good.

MS. SCHLENDORF: Thank you very much.

SENATOR GALGIANI: It's great to know. We talked earlier about the fact that there are 11 submerged species in the Delta and another seven that are vying for surface space. But the fact is that the Department of Boating and Waterways only has the authority to control three of the 18 at this point in time.

MS. SCHLENDORF: We would echo what others have said, that working with Sylvia and her Boating and Waterway staff has been a pleasure.

SENATOR GALGIANI: Thank you. Thank you very much.

Well, this concludes our third panel, and I thank you very, very much. We will go ahead and open it up for public comment if we have anyone in the audience that would like to step to the podium and ask a question or make comments.

I'd like to take a moment first to thank legislative staff members who have joined us also today. With us, Tony Wong from Assemblymember Susan Eggman's office, and Gary Prost from Congressmember McNerney's office, and Susanna Schlendorf, who just spoke to us from Assemblymember Buchanan's office, and Ray Sotero from Senator Lieu's office. And then we have my staff and our Senate Agriculture Committee staff, who worked very hard and did a very good job putting the hearing together today—thank you very much. And then we have the Senate sergeants who are present also with us. So thank you to all of you.

Richard Slezak, would you go ahead.

MR. RICHARD SLEZAK: May I add my thanks to those fine public servants just mentioned?

The fellow with the Cadillac harvester, I hope you get lots of work. I hope you can harvest the whole Delta. I grew up down in Oxnard, so I'm familiar with the harvesters to harvest seaweed, a wonderful, edible plant. I recommend it to everybody the next time you're down there and you see someone at the beach and pick it up and eat it. I've been doing so since I was five years old. And I'm just pitching in for the mechanical in preference to the

chemical. But, you know, used sparingly, the chemicals can work, and please continue funding it.

SENATOR GALGIANI: Thank you.

MR. SLEZAK: And hopefully there is a way that the plant life—we can get some money back to reduce the necessity for state revenues being applied.

SENATOR GALGIANI: Thank you.

Richard, I know who you are, but can you please state your name for the record?

MR. SLEZAK: Richard Slezak, long-time member of the Democratic Central Committee and concerned citizen.

SENATOR GALGIANI: Thank you. Thank you very much.

MR. SLEZAK: That's how lazy I came.

SENATOR GALGIANI: Do we have anyone else who would like to make a comment? Please.

MR. RANDY WELCH: My name is Randy Welch. I'm with the Stockton Yacht Club, one of the work captains out there. And also, my family's lived on or near the Delta since 1935, so we've seen a lot of things over the years.

I just wanted to underscore the concern that everybody's had toward controlling the invasive species out there because of the fact that we've seen out on the Delta—we see more disabled boats on a regular basis because of the various type of species that are out there. Even our boat, a little larger—I think you've seen—is 84,000 pounds. But with the *Egeria*, when I drop an anchor in certain areas between McDonald and Mallard Island, the anchor won't stop in

heavy wind. We go right into the levee side. It can be very, very dangerous for the boats because they can't latch onto the bottom and anchor safely out there. Also, when we do anchor, sometimes the anchor is so filled and clogged with plant life the wenches and two or three people it takes to physically pull the anchor back up onto the boat, which can be dangerous for the people that are working with the machinery and just the physical nature of that.

Also, in the '80s—I was once a water skier, you can't tell now—but the California Delta was noted in *WaterSki Magazine* as the second best place, only behind Cypress Gardens, to water ski. And that area is something that we ought to be proud of and treasure and protect. Most of the areas that we utilized in the '70s and '80s and early '90s are not navigable by water ski at this point in time because of the underwater plants that are there, and so forth, so that's taken away from it.

There's another place called Five Fingers which was worldwide known to boaters and yachtsmen around the world as a destination to go to, and I would see boats from New Zealand, from Alaska, from the Caribbean that would use it as an anchorage. At this point in time, you cannot get into that little boat anymore because of the underwater and above-the-water vegetation that's in there. So it's very important work that everybody's talking about doing, and it's very important that we keep—we just recently retired and moved back to Stockton to take advantage of the waterways, so it's something that we're very excited about helping to keep intact and go forward.

I want to thank you all, and I appreciate the hard work, and hopefully we can get enough money for all those 18 types of plants. Certainly, we have funding for three, but it sounds like we would need to make everybody understand that there is more than just the three out there, that there's additional funding that would potentially be needed to be able to make sure that those don't get out of control also.

SENATOR GALGIANI: Thank you very much.

MR. WELCH: Thank you very much.

SENATOR GALGIANI: Thank you.

Do we have anyone else who would like to make a comment?

Seeing none, that concludes our hearing for today. Thank you to everyone for participating, particularly our panelists who prepared presentations in advance, and thank you for taking the time out of your busy days.

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