

## Minutes of the Pacific Ballast Water Group Meeting

**April 15 and 16, 2002**

Embassy Suites Hotel

Portland, Oregon

***Monday April 15 1:00 p.m.***

*Call to Order:* Randy Fisher PSMFC

Pacific States Marine Fisheries Commission has a vested interest in the health of West Coast watersheds. This is why PSMFC was an original participant in the Pacific Ballast Water Group (PBWG) and is why we proposed to continue the PBWG meetings by providing staff and support to their continued gatherings.

This meeting is designed to serve three main purposes: 1) to identify problems with ballast water, 2) to identify research priorities and available funding, and 3) arrange for continued meetings and collaboration within the Pacific Ballast Water Group. To accomplish these goals we must first understand what is currently being done and why. The speakers for the days of this conference will brief the group on the ballast water laws of the West Coast and provide a basis for the PBWG to establish research needs.

Jordan Vinograd of Portland State University will serve as recording secretary for this meeting.

*Introductions: In Attendance:*

**Scott Smith:** Washington Department of Fish and Wildlife

**Dave Schnidler:** Port of Seattle

**Heidi Goebel:** Polar Tanker, Inc.

**Jon Stewart:** Marine Environmental Partners, Inc.

**Maurya Falkner:** California State Lands Commission

**Karen McDowell:** California Sea Grant Extension Program

**Evan Matthews:** Foss Environmental Services

**Samantha Murray:** Pacific Environmental Advocacy Center

**Jeff Cordell:** University of Washington

**Nancy Sonafrank:** Alaska Department of Environmental Conservation

**Marilyn Harlin:** University of Rhode Island and Ocean Advocates

**John Chapman:** Oregon State University

**Erik Johnson:** Washington Public Ports Association

**Robyn Draheim:** Portland State University

**Lt. Linda Sturgis:** US Coast Guard

**Cate Holdren:** USCG Commercial Fishing Vessel Coordinator

**Nina Bell:** Northwest Environmental Advocates

**Tina Proctor:** US Fish and Wildlife Service

**Anne Birnie:** US Army Corps of Engineers

**Mansour Samadpour:** University of Washington

**Daniel Pippenger:** US Coast Guard

**Brian Mulvey:** National Marine Fisheries Service

**Sharon Perkins:** Pacific States Marine Fisheries Commission

**Paul Manzi:** Alaska Tanker Co.

**Paul Heimowitz:** Oregon State University-  
Sea Grant

**Bradly Chapman:** Chevron

**Jack Wylie:** Oregon Department of  
Environmental Quality

**Jordan Vinograd:** Portland State  
University

**Stephen Phillips:** Pacific States Marine  
Fisheries Commission

**Russ Herwig:** University of Washington

**Lt. Randall Farley:** US Coast Guard

**Jason Daughn:** Office of Senator Ron  
Wyden

**Dorn Carlson:** Office of NOAA, National  
Sea Grant

**Denny Lassuy,** US Fish & Wildlife  
Service

**Erik Kastner,** Columbia River Steamship  
Operators

**Pat Lim:** Department of Fisheries, Vancouver,  
B.C.

**Lt. Gary Koehler:** US Coast Guard

**Harry Hutchins:** Puget Sound Steamship  
Operators Association

**Keith Ward:** US Coast Guard

**John Thornton:** Washington Department of  
Ecology

**Karen Hays:** Alaska Tanker Company

**Paul Fishman:** Fishman Environmental  
Services, Ltd.

**Lt. Brad Crowley:** US Coast Guard

**Kevin Anderson:** Puget Sound Water Quality  
Action Team

**Jim Townley,** Columbia River Steamship  
Operators

**Randy Fisher,** Pacific States Marine Fisheries  
Commission

#### Federal/State/Canada/Industry Program Updates:

*LCDR Keith Ward: U.S. Coast Guard*

I am with the Coast Guard's Pacific Area Command, which covers all of the West Coast of the United States plus Alaska and Hawaii, and we also have offices in Guam, Singapore and Japan. We also work with other Pacific nations on regional issues. I am stationed out of Alameda, California. I have been invited to brief you on the Coast Guard's Ballast Water program.

#### **Regulatory Program**

The mandatory mid-ocean ballast water exchange for ships calling in the Great Lakes remains in place. The Voluntary National Guidelines for the rest of the U.S. continue. This voluntary program consists of voluntary ballast water management (BWM) guidelines, and includes a requirement that all vessels entering U.S. waters from outside the Exclusive Economic Zone file a BWM report. The reports detail what the vessel did on the voyage with their ballast water. There is no requirement to do an open-ocean exchange; that is voluntary.

The Coast Guard provides half a million dollars a year to the Nation Ballast Water Clearinghouse, at the Smithsonian Environmental Research Center (SERC) in Maryland, for them to collect and analyze data on compliance with the voluntary program. In putting together our draft report to Congress this year, we analyzed the voluntary

program's first 12 months of data and found that only 25% of vessels are complying with the reporting requirement. Analysis of subsequent months data shows little change from that rate. This suggests that because this ballast water management program is voluntary, it is not being done. The obvious next step is to develop national regulations making the voluntary ballast water management program mandatory.

### **Ballast Water Treatment Technology Initiatives**

Besides the half a million dollars the Coast Guard provides to the Nation Ballast Water Clearinghouse, the Coast Guard also funds our own Research and Development Center, in Groton, Connecticut, which supports studies being done by the EPA, Industry, the University of Miami and private companies. A number of technologies are being investigated worldwide by government, industry, academic and non-governmental interests. Technologies include filtration, hydrocyclonic separation, and chemical and physical biocides (i.e. ozone, chlorine, ultraviolet radiation, heat treatment, and vacuum). However, none of these have yet been proven to be effective in a shipboard application. The Coast Guard expects to receive a report in the near future evaluating the testing methods and results of two private companies currently engaged in developing ballast water treatment systems. These projects represent a range of scales and stages in the development process, from a small-scale, shipboard installation to dockside tests. A second Coast Guard sponsored project is testing and evaluating two general approaches to ballast water treatment, one using filtration and ultraviolet light and the other using hydrocyclonic separation and ultraviolet light. This research is more basic in nature and is conducted under controlled and similar conditions of flow rate, water quality, and test organisms. The work is being performed at the University of Miami. The project is expected to continue in 2002 with the focus on filtration and ultraviolet light.

There is an issue with the "No Ballast on Board" or NOBOB. This issue involves the problem of ships reporting NOBOB at their original port of call, then taking on ballast in one area of the Great Lakes and moving it to another area of the Great Lakes. This is not acceptable, but no solution has been set as of yet to this serious problem. Vessels which declare "No Ballast on Board" (NOBOB) often contain significant quantities of unpumpable residual water and accumulated sediment that contain nonindigenous organisms. Of particular interest is the effectiveness of operational procedures that could be performed by vessel operators in the near term to reduce the amount of sediments entering U.S. and Great Lakes waters as ballast residuals. The Coast Guard is collaborating with academic and government researchers, and the shipping industry on studies of the distribution of NOBOB vessels, the amount and distribution of water and sediment carried in their ballast tanks, and the composition of the biological communities they carry. IT is anticipated that this work will lay the groundwork for evaluating the effectiveness of operational ballast water management practices aimed at minimizing sediment load and possible ANS movements. This project is being conducted through the NOAA Great Lakes Environmental Research Lab. Preliminary work was performed this past fall and winter. The shipboard fieldwork began last spring at the end of the 2000-2001 Great Lakes Ice Season and continues this year.

A key hurdle to developing accepted ballast water treatment technologies is the absence of a standard by which proposed technologies can be evaluated. The Coast Guard is leading a coordinated effort involving a wide range of stakeholders to develop such a standard, and has set this as a priority for 2002. A notice requesting public comment on four possible approaches to setting standards for ballast water treatment, as well as answers to several specific questions related to setting, implementing, and enforcing such standards was published in the Federal Register on 1 May 2001 and the comment period closed on July 2, 2001. An Advance Notice of Proposed Rulemaking requesting comments for a treatment standard, which incorporates the previous public comments, as well as domestic and international developments over the past 2 years, was published in the Federal Register on 4 March 2002.

The Coast Guard is also in the process of developing a program that it hopes will provide the necessary incentives for ship owners and operators to actively participate in projects testing ballast water treatment technologies. The details have yet to be worked out, but would likely include the advance approval of experimentally installed systems. To prevent misuse of this approval, the program would contain safeguards to insure that the proposed studies have a reasonable chance of being as effective as ballast water exchange and are conducted according to well-established principles of experimental design and analysis. A notice requesting public comment on how such a program might be structured was published in the May 22, 2001 edition of the Federal Register. The comment period closed on July 23, 2001 and the Coast Guard is in the process of formalizing this program through rulemaking.

The Coast Guard has established a formal engineering test program with the U.S. Environmental Protection Agency (EPA) Environmental Technology Verification Program. This alliance is designed to accelerate the development and commercialization of ballast water treatment technologies through third party verification and reporting of performance. Some of the anticipated products of this collaboration are protocols for testing, verifying and reporting on ballast water treatment technologies. The first meeting of the Ballast Water Stakeholder Advisory Group took place in June 2001. This group assists in identifying the direction of the ETV efforts, and serves as conduits between the organizations they represent and the ETV program. Separate technical panels will also be established.

On the international front, the USCG is working with the International Maritime Organization's (IMO) Marine and Environmental Protection Committee (MEPC). The Ballast Water Working Group at MEPC continued its work to develop a ballast water treatment performance standard; however it is recognized that ballast water exchange will be used as a starting point for international ballast water standards. The major obstacle to concluding an international agreement remains the absence of a ballast water treatment standard. Continuing its leadership role in this issue, the U.S. agreed to again coordinate an intersessional correspondence group to continue discussions on developing a ballast water treatment standard. U.S. input to this group is coordinated by the Coast Guard and represents the current state of domestic thinking on environmentally protective ballast

water treatment standard. U.S. views have been generally well received to date and incorporate agency positions of the USCG, NOAA, EPA, DOD, MARAD, DOJ and DOS.

Another big step that has been made since the last PBWG meeting, is that the Industry itself is working with the Coast Guard, states and other groups and funding its own research projects to find suitable treatment methods for ballast water.

*Question from John Chapman: “Is this an issue with undeveloped countries as well as developed countries?”*

*Reply from Keith Ward:*

No, not so much because it is primarily the developed countries that do the majority of the shipping. It is basically those countries that are active members of the IMO. But, ballast water issues in general are being addressed all over the world. Introduction of invasive species have occurred all over the world from Russia to China. The IMO’s “GloBallast” Program is designed to help member states be prepared to implement international Ballast Water Management provisions when they enter into force. The program is funding Port Baseline Surveys in areas all over the world including China, India, Brazil, Ukraine, South Africa and Iran. So that’s a good point in that it will be important to help smaller nations with ballast water issues in the future.

*Question form Jim Townley: Why is the CG showing such low reporting compliance?*

*Reply form Keith Ward:*

Well, it depends on a couple of factors like if the flagship countries are stressing the importance of compliance with the voluntary exchange requirements. But, really the bottom line is that it is not mandatory, therefore, they aren’t going to do it.

*Question from Jim Townley: The local level, grass-roots efforts seem to be much more effective than on the national level.*

*Reply form Keith Ward:*

The Bottom up approach on this issue does seem to be more effective because at the local level you are better able to get the information to the agents and follow up on the repots in a real time manner. We are not able to do this yet on a national level.

*Question from Jim Townley: So is it safe to say that the Coast Guard is supporting a mandatory exchange program on the national level?*

*Reply from Keith Ward:*

Yes. Ultimately it is our goal to have every vessel doing a mandatory exchange or have an on-board treatment system.

*Question from Paul Heimowitz: Have you heard anything about the EPA’s proposal to work with the Coast Guard on this?*

*Reply from Keith Ward:*

Well, it was my understanding that the EPA was asked to treat ballast water as a regulated point source pollutant, but in the end we decided to hold off on that. The EPA's existing Environmental Technology Verification (ETV) program is working with the Coast Guard and taking a lead in developing standards, evaluating ways to certify treatment methods, and testing the limits of existing technology.

*Question from Paul Heimowitz: What is the Environmental Technology Program about?*

*Reply from Dave Schneider:*

It is a group investigation designed to look at differences in domestic and foreign industries in regards to setting standards for technologies and such.

*Comment from Bradly Chapman:*

The reason the industry is having a hard time complying basically comes down to an issue of cost. It's not mandatory now, and it's costly to do an exchange, so why would we do it?

*Reply by Keith Ward:*

Yes, exactly. The Coast Guard has been criticized for its method of cost estimation. Basically, the cost of doing an exchange was estimated by the Coast Guard based upon a 3<sup>rd</sup> Assistant Engineer's pay. But in all actuality it is probably more like a Master's overtime pay. Time is money and this is not a mandatory exchange.

*Question from Evan Matthews: Are exemptions covered in that report the Coast Guard made to Congress?*

*Reply by Keith Ward:*

I am not sure.

*Comment by Jim Townley:*

I think another reason it is hard to comply with the request to exchange is that there are so many variables with fax numbers, forms, etc. I give the Coast Guard kudos for what they have been able to do.

*Reply from Keith Ward:*

That 25% compliance figure is a nationwide figure. It will most likely look better on a local level here. I think all in all the U.S. industry here is trying to comply or at least to come up with alternatives. It is also important to remember that the Coast Guard would be able to make things happen, to increase compliance very quickly if it were made mandatory. Look at how quickly we were able to implement the changes in the Advanced Notice of Arrival Forms after September 11<sup>th</sup>. It took us just a few weeks to implement and enforce that program.

NEW SPEAKER:

*Scott Smith: Washington Department of Fish and Wildlife*

I would like to start by extending my gratitude to Randy and Stephen from PSMFC for this opportunity and their continued support. Thank you.

Washington Ballast Water Management Program:

I would like to start by pointing out why it is we're all working so hard to manage ballast water. It is the threat of invasive species that motivates our work. A good example is the Atlantic Comb Jellies that have done mass destruction in the Black and Caspian Seas after their introduction there.

In Washington we require mandatory reporting of all ships coming into Washington waters. We also have a mandatory exchange for all vessels. They must do an exchange outside of 50 nautical miles from the shore. And, as of July 2004 all vessels must either exchange or treat their ballast.

I would like to take some time to define some basic terms that I will be using in this presentation. According to Washington law, *treated* water means that it is very low to no risk and all invasives have been removed from the water. An *exchange* means low risk water. *Unexchanged ballast* is what we consider high risk water.

Washington will accept either the US Coast Guard Form for ballast reporting or the IMO form. To collect these forms we work with the Columbia River Merchant's Exchange out of Portland and the Puget Sound Marine Exchange.

Now let me briefly summarize the success of our program. When our law first went into effect we show about 50% compliance. This is because we did not require a report from those vessels that were not planning on discharging in Washington waters. This made it very hard to know if a vessel was not planning on discharging or simply failing to fill out a report. So on September 20, 2001, we implemented a new rule making it mandatory for the vessels to notify the ME via letter or report if they are not planning on discharging. This allows us to better monitor and enforce our ballast water law and as you can see (refers to chart) our compliance had gone up considerably since this new rule went into place (about 95% compliance). We have the ability to fine a vessel up to \$500 for failure to comply with our law.

*Shows map of tanks discharged in Washington.*

This map shows that about 30% of the ballast discharged in the Columbia River was unexchanged water. For January through March 31 of 2002, the volume of water discharged in Puget Sound was 127,000 MT; the volume on the coast was 74,435 MT; and the volume on the Columbia River was 12,045 MT. In all of the cases the majority of the vessels had come from California as their previous port of call.

In Washington, we are very interested in implementing an alternative ballast water treatment on our vessels. As I said before, we have a set mandate for all vessels to be doing an open-ocean exchange or using treatment by July of 2004. To do this we feel

that it is imperative to have a set standard. Therefore the standard that we set is 95% kill or removal of all zooplankton, and 99% kill or removal of all phytoplankton and bacteria. This is what we have established as an interim approval process for ballast water treatment methods, until a better standard is set.

SB6538 is our amended ballast water management law. It was in this amendment that we decided to move our treatment mandate date back to 2004. It was previously set for this year, but the treatment technologies were not ready for that to be a reasonable expectation. This law also established a ballast water work group. The Washington Department of Fish and Wildlife is to update the Ballast Water Work Group on Oregon task force efforts as well as find funding for ballast water research.

As far as our conclusions for the state of Washington go, we are hoping to improve funding and research so that we can reach our goal for mandatory treatment by the year 2004.

On a national level, it is fairly obvious that the National efforts need our support. It will be important to consider ballast water management in the reauthorization of NISA. Hopefully this NISA reauthorization will also make funding available for such research projects.

On a regional level, WA believes that for ballast water research to receive funding the restrictions on NOAA funding need to be lifted so as to allow all states to be considered for funding. Federal funding should also be provided for on-board treatment technologies to be developed. We believe that research teams for treatment technology research should be composed of Vessel Operators, Technicians, Research Coordinators, and Regulatory Personnel. The development and funding of pilot projects also need to be established on a regional level. I think we all would agree that in order for any of this to be done we need to establish effective standards and research priorities.

*Question from Randy Fisher: Can't the EPA just establish standards now?*

*Reply from Scott Smith:*

I don't know if they will agree with our rule. It's good that ours is a rule and not a law though. Rules are easier to change than laws and maybe we can change the rules to make them in line with Coast Guard standards.

*Question from Jim Townley: Why do you show such low compliance on that one graph and high on the others? (Refers Scott back to a chart)*

*Reply from Scott Smith:*

This was low because we were only looking at high-risk vessels that were outside regional waters. These vessels were not really reporting at first because they were not discharging, but once we changed our law our compliance went way up.

*Comment from Jim Townley: I would really like to thank Scott and WDFW for working with the Port and the Industry on this issue.*

*Question from Evan Matthews: Are you working on any technical demonstrations on vessels?*

*Reply from Scott Smith:*

Yes, we are working with Allegra Cangelosi to combine efforts with the East Coast and their technological studies.

*Question from John Chapman: What did you use as a basis for your treatment standards?*

*Reply from Scott Smith:*

Well, we consulted with some microbiologists and we were really just using it as a standard to start from, but we didn't say that it had to be as good as an exchange or anything like that.

*Question from Group: Do you think that the 2004 date for mandatory treatment is realistic?*

*Reply from Scott Smith:*

They will not HAVE to do treatment, but they will have to do exchange if the treatment is not an option for the vessels.

*Question for USCG from Randy Fisher: Is Coastal exchange dangerous?*

*Reply from Keith Ward:*

It depends on the type of vessel and the conditions of the sea.

*Comment from Karen McDowell:*

The safety is about the same no matter where you do it at sea, it's the biohazards that become a safety issue when you get closer to the coast.

NEW SPEAKER:

*Jack Wylie: Oregon Department of Environmental Quality*

*"Oregon Ballast Water Program: A Program With No Resources"*

Oregon's Ballast Water Law was established by Senate Bill 895, sponsored by the Port of Portland, the Maritime Industry, Merchant's Exchange, and the Columbia River Steamship Operators. This bill was passed into law on January 1, 2002.

The law prohibits the discharge of ballast water in Oregon waters except under certain conditions. The conditions for acceptable discharge are: if a vessel undergoes a complete open-ocean exchange (either 100% ER exchange or a 300% FT exchange); if a coastal vessels did an exchange below 40 N or above 50 N latitude; or if the exchange was not

feasible due to the safety of the conditions. The law also states that all vessels must submit a ballast water report 24 hours prior to entering port in Oregon. Like Washington, the law established a ballast water task force.

The reports must be submitted 24 hours prior to entry of an Oregon port. Oregon accepts the IMO or CG standard forms for ballast water reporting. These forms are sent from the agent or the vessel to the Merchant's Exchange in Portland. Then, Jordan Vinograd at Portland State University goes and picks up the reports, compiles the data and informs the ME and DEQ of any problematic reporting.

So far, we have noticed certain problems with the law. The most evident problem is that if we have a problem with compliance we have no resources or capacity for enforcement. Therefore this is a law without any bite so to speak. Coastal exchange is of particular concern and the compatibility with or neighbor-states is of concern on this issue as well. The joint jurisdiction of the Columbia River is of particular concern in that there is a lot of interstate traffic between Washington and Oregon. In this traffic ballast water reports often get submitted to only one state and not both. We are trying to work with Scott Smith and Peter Butterfield of WDFW to share data. Lastly, vessels with many W. Coast ports of call are of concern because they are dealing with many different laws right now, which makes monitoring, and compliance very difficult from both ends.

*Question from Erik Johnson: How does Oregon mesh with Coast Guard standards?*

*Reply from Jack Wylie:*

All vessels must file an ANA (Advanced Notice of Arrival) and a ballast water report. They submit these forms to the ME and then it is left up the appropriate authorities to gather and evaluate that information. Ideally the feds and the locality work together to get this accomplished.

*Comment from Jim Townley: I would like to extend a sincere thanks to Jack Wylie too for Oregon's efforts in working with the Ports and the Industry. They have shown very good compliance so far for not having any resources.*

*Reply from Jack Wylie:*

I would like to point out that although Oregon has no resources, the law does stress the desire for a national law to take over this ballast water management eventually. I think that is what the lawmakers had in mind when they created this unfunded mandate.

NEW SPEAKER

*Maurya Falkner: California State Lands Commission*

*"California Ballast Water Management and Control Program"*

The California Ballast Water Law was signed in on October of 1999. It was reauthorized in January of 2000. It sunsets in January of 2004. In Legislature it is referred to as AB 703.

The Law emphasizes ballast water reporting by making it a mandatory statewide, multi-agent program. Research and development are strongly emphasized as well.

Our Law is based loosely on the Federal Program only anywhere it said “voluntary” we changed it to “mandatory.” A \$400 fee is collected per vessel voyage. This makes our law different from that of Oregon and Washington because it is a funded mandate. We use this fee for baseline research (bio-surveys) and alternative treatment technology research. We also have the ability to force compliance because if a vessel does not comply we send them a letter telling them about all of the civil penalties they are breaking by not complying with this law.

Basically there are four agencies involved with our law: the Board of Equalization, who does the fee collection; the California Department of Fish and Game, who is involved with the bio-surveys; the State Water Resource Control Board; and the State Lands Commission. All of these agencies are required to submit a report at the end of this year.

The Board of Equalization is responsible for collecting the fees and determining the funds status. By the end of July of this year we will be reducing our vessel fee to \$200 per vessel voyage because of the high rate of compliance that we have had for the last year.

The Ballast Water Technical Advisory Committee meets quarterly to discuss any issues that have come up and to make sure that we are all on the same page. This group is comprised of representatives from the industry, agents, and ships.

*Question from Randy Fisher: Where did the law originate? Why?*

*Reply from Maurya Falkner:*

Originally we were going to require an NPDES permit for every vessel that came into California. We decided that that was not really reasonable, stepped back and decided we should use the Coast Guard’s law as a basis and form a new law for California regarding ballast water management. The fee-based system would only pass if the money would be going towards research, so that is why we made all of the Committees.

*Question from Randy Fisher: Is the bio-survey a one-time deal?*

*Reply from Maurya Falkner:*

Yes, but we have recommended that it be continued for the new bill. We think that it should be done either biannually or every three years.

The survey involves sampling organisms from primary and secondary sites. The report of their findings is due to come out in December.

The State Water Resource Control Board is responsible for doing a literature review on the research that is out there or being done currently. Then we have done some

technology demonstration projects. Again, a report to the legislature will be out in December.

The California State Lands Commission gets the job of setting the fee, gathering and entering the data from all of the reports that we receive, and doing vessel inspections. The inspections involve boarding 25% of all vessels. As we have progressed in the program we have begun doing more targeted inspections. That is, re-boarding those vessels that have compliance problems in the past to see if they have fixed the problems. We also do research and education and outreach. We have a report due to the legislature due in January.

Annually we get about 7,000 vessels in California. The reports may be submitted via fax, e-mail, etc.

*Shows summary of stats: Slide with years, compliance, and ports*

*Shows table: Showing vessel type, report, and compliance*

In general, our compliance has increased over the years.

*Question from Keith Ward: Are you familiar with the ballast water plan done by John?*

*Reply from Maurya Falkner:*

Yes, I worked on it with him. The California State Lands Commission has been working very closely with the Coast Guard. We try to help each other out.

*Question form Randy Fisher: Does a vessel get fined every time it enters a new port in California?*

*Reply from Maurya Falkner:*

No, just the first port of call in California. If it leaves the state and returns, then it gets fined again. We use information from the Merchant's Exchange and the agents to make sure a vessel is not charged a fee twice.

*Question from Randy Fisher: Do you charge cruise ships?*

*Reply from Maurya Falkner:*

Yes, every time they re-enter the state.

*Question from Jim Townley: Can you send more vessels up to Oregon? (HAHA) You show 10% compliance on your table. Is that still true today?*

*Reply form Maurya Falkner:*

No. That figure was for when the law was first implemented in 1999. Now we have 95% compliance.

*Question from Bradly Chapman: The Washington information is for all vessels whether they were in ballast or not, right?*

*Reply form Scott Smith:*

Yes, that's correct.

*Maurya Falkner:*

We encourage vessels that come into port on a regular basis to send information on every port in their last voyage. We call these vessels "frequent flyer vessels" and this helps us track ballast.

Most of our vessels are container vessels.

*Shows summary of statistics: Vessel Origin (Not Ballast Water origin necessarily)*

This table shows that most of our vessels are coming from Asia, the West Coast of the United States, and Mexico.

*Question from Randy Fisher: What about fishing boats? Do you get reports form them?*

*Reply form Maurya Falkner:*

No, we don't deal with them.

*Shows Summary of Statistics: Discharge Volumes*

*Question from Pat Lim: Do you deal with vessels from Canada or Mexico differently than you deal with vessels form Oregon or Washington?*

*Reply form Maurya Falkner:*

Yes, they are required to do an open-ocean exchange. About 25-30% of the vessels from Canada and Mexico are not complying with this regulation. These are mostly cruise ships. In a few cases we have given the vessels an alternative exchange zone option. The biggest violators are from Mexico. Our inspectors board these vessels regularly to verify exchange.

*Question from Randy Fisher: How many vessels are polled?*

*Reply from Maurya Falkner:*

About 2000 vessels are inspected. About 25%.

*Question from Randy Fisher: Are the exchanges broken down by port?*

*Reply from Maurya Falkner:*

Not with me, We look at the last port of call information. As I said, most of the vessels coming into California are coming from Mexico or Asia.

*Shows Map of the world with 200 nautical mile buffer zone. The areas where exchanges are being done are shown in black dots.*

California State Lands Commission has a Marine Facilities Division. This group does the field inspection program. We have officers in Hercules and Long Beach. We have a total of 15 officers and inspectors.

We also do Vessel Compliance Monitoring, which we coordinate with the USCG. As I said before, we try to board at least 25% of the vessels that come into port. We check the paper work and logs, interview the crew, sample the ballast water tanks for salinity, and work on outreach and education with the crew and port officials. When a vessel is in violation either because the salinity is found to be too low or other violations, we do write up the vessels. The inspectors spend time with the crew and try to teach them about the desirable management practices.

We are also involved with quite a bit of research. Much of our research is on alternative treatment systems including shipside filtration, thermal, UV Light, chemical biocides, shoreside and antifouling techniques. We have partnerships with the USCG for an advanced approval process and with SERC for efficacy studies. The characteristics of ballast water arriving in San Francisco is being studied by San Francisco State University. Of course this group is a key component for opening up the process of monitoring coastal vessel traffic. We have a partnership with CSLD to organize and share data. We also work with SERC and USCG for outreach and education projects.

Again, we are looking to our future program with high hopes for the reauthorization of the California Program in 2003. For this reauthorization we have a list of preliminary research recommendations which includes: reports for all vessels, setting standards, developing standards, research indicators, continued research on treatment technologies, continued periodic biomonitoring, continued field inspection program and continued fee based program. We have more specific ideas for the development of standards based on risk assessment, designing a basis for these standards, and no standard set in law so as to allow for progress. One of the main problems with this issue is that there are too many variables in the vessels themselves. The IMO has helped in that they want new builds to have to make the vessel ready to implement an on-board treatment system eventually. This makes it necessary for the provisions for treatment to be left open.

*Question from John Chapman: What is the Sea/Lands Commission looking for in their program?*

*Reply from Maurya Falkner:*

They are at the terminals looking for the transport of oil etc.

*Question from John Chapman: What do they have in CA that we don't have in Oregon? Why don't we have a fee?*

*Reply from Jim Townley:*

They have volume, money, and business. In the long run we get a lot out of being able to do business with California. If we put up a fee, no one would come to Oregon.

*Question from Jim Townley: If the West Coast has such good compliance how does the CG study show only 25%?*

*Reply from Maurya Falkner:*

Well, they have a delay in SERC's reporting and they have no follow up or local interaction with the vessels. Also the length of the studies are very different.

NEW SPEAKER

*Pat Lim: Department of Fisheries, Vancouver, BC*

Well, B.C has no fees, no laws, or anything like the United States in regard to ballast water. However, it is my understanding that it was the Port of Vancouver that originated the ballast water-monitoring program. It was first called the Harbor Master Standing Order. We have over 90% compliance with this port-based program.

Vancouver ports get more than 3000 vessels a year without counting cruise ships.

On a national level, Canada has Ballast Guidelines through Transport Canada and Fisheries and Oceans. These guidelines were set in September of 2000 and we based on the program implemented by the Port of Vancouver. Basically they are based on the IMO regulations. We hope to have the ballast water become more legally enforceable. But, right now, they are just guidelines- not law. Basically the Guidelines require that the vessels submit a ballast water plan, or exchange at a depth of 2000m or in the exchange zones outside the EEZ. It will be difficult to create a uniform law in Canada because we have three different oceans to monitor, providing three different sets of problems. We accept any sequential exchange method, including ER or FT, and of course we accept a retention option. We have no BW reception facilities yet. Alternatives are accepted as well if they are shown to be as effective at open-ocean exchange. There are several studies I have found in recent publications that give several reasons that exchange is not a good method of BW management though.

Within the Pacific Region of Canada we have a group of four organizations or groups working on ballast water related issues: the West Coast Ballast Working Group, the Fisheries and Oceans, Scientists (working on technologies and exchange), Funding Group (looking for funding). It is very difficult to find funding for ballast water related studies in Canada right now because the hot topics are aquaculture and biodiversity and hull-fouling studies.

In any case, we hope to have a draft plan by fall of this year (2002). The prevention and management of BW will be of interest in this plan. Most of the focus will be on the Pacific Coast and individual species invasions. This is the specific interest of the Western Regional Panel. Our goals for that are to participate in more forums like this one.

The big problems that we are facing right now are: cost, lack of primary researchers, shift of focus away from BW research, lack of participation from all coastal ports (Prince Rupert doesn't want to participate), lack of coordination and good compliance (makes people think there is no problem).

*Question from Scott Smith: Is the Department of Fisheries encouraging the development of aquaculture in Canada?*

*Reply from Pat Lim:*

Not really, but there are lots of farms being established now.

*Question from Bradley Chapman: What is being done with hull fouling and biodiversity studies?*

*Reply from Pat Lim:*

There are lots of surveys being done on ANS that can be identified in Canada.

*Question from Jordan Vinograd: Who monitors your program?*

*Reply from Pat Lim:*

Mike Foreman, and the Coast Guard right now. There is no compilation of the data as of yet. And really no monitoring. There is a study being done in Vancouver where lots of vessels are being boarded to check for organisms, but that is with the voluntary compliance of the vessel owners and operators.

NEW SPEAKER

*Jim, Townley, Columbia River Steamship Operators*

The industry is also concerned about the environment. We, like you, are not sure how to solve this problem, but we have been working on it since 1997. We would like to have a national law. The PBWG is important in reaching this goal. We will do anything in our power to accelerate the progress. We have learned from the Imo and USCG that it is very beneficial to get programs involved to coordinate the activity of the states. This will not only help with the ballast water program but use the resources we have most efficiently. We all have to work together. We need the help of the Ports, the ship Operators, the academics, government etc. to get this done.

The progress was slowed in 1999 because California was developing their law. So we decided to wait and see what California ended up doing and base our programs for the Columbia River on theirs. Then Washington started their program and now Oregon. Now that we have the final piece, the next step is unification and getting national regulations.

The opportunity is here in this room. We need to leverage our advantage here of having all of the resources of all of the different organizations working together here on the West

Coast. Even though our focus has been on the National issues right now, we all know that the environmental issues are still extremely important.

The problems we face are the scarce resources in regards to funding. CRSO are looking for ways to fund some projects that will make a unified West Coast Ballast Water Plan a reality. We really want to get this to the federal level. The components or steps in this process are Reporting, Research, Testing and Treatment. Right now we are in the Research phase of this process.

*Question from Randy Fisher: What do you think about the California program?*

*Reply from Jim Townley:*

I think I need to learn more about it. Maybe Oregon can learn from them about ways to get funding.

*Question from Paul Heimowitz: What about the dredging of the Columbia? Will that take money from ballast water research?*

*Reply from Jim Townley:*

The State is expecting to get money but not from the industry. They are spending a lot of money to monitor this program.

*RANDY FISHER:*

Well, let's adjourn for today and tomorrow we will hear about some of the research that is going on in the Pacific Coast.

Pacific Ballast Water Group Meeting  
**April 16, 2002 8:00 a.m.**

*Call to Order:* Randy Fisher PSMFC

Good Morning!

Yesterday I heard a lot about what is going on right now from the standpoint of each of the West Coast states, Canada, the USCG and the industry. I took notes on the suggestions and problems that I heard from each of these groups as to what should be done about this ballast water issue. I wanted to run these points by you all and see if you have anything to add or change.

1. Reporting should be made mandatory but should reflect the current state reporting system. It should keep the Coast Guard involved. It should also list any exemptions necessary for each state.
2. Oregon, Washington, *Alaska, Mexico* and Canada have no money for reporting systems.
3. Coast shipping is of great concern.
4. Concerns over standards reflecting a numerical invasive removal requirement are an issue.
5. There is no agreement between the states and BC on who gets checked (i.e.: in regards to boat size, tanks, etc.)
6. There needs to be better coordination between Oregon and Washington in regards to the Columbia River traffic.
7. Shoreside treatment is not really a practical option.
8. There needs to be an agreement on appropriate indicator species.
9. There needs to be an agreement on treatment technologies and development.

*Question from Evan Matthews: Are there still uniform laws in regard to oil spills?*

*Reply from Bradly Chapman:*

Yes, but it's not the same kind of problem as is the case with ballast water.

*Comment from Jim Townley:*

I think that the mandatory requirement is very important. It would not be too hard to implement this with other laws in place for national standards.

*Question from Maurya Falkner: How do local people monitor this though? We don't want a 24 hour advanced ballast water report. We get too many amended forms. The timing on the forms is important. SERC talked about a generalized ballast water section on the ANA. Then the vessel could submit a real ballast water form once they are in port.*

*Comment from Scott Smith:*

We discussed that too and it seemed that the Alaska tankers really liked that idea.

*Comment from Pat Lim:*  
We do that in B.C.

*Comment from Maurya Falkner:*  
On point two you should add Mexico and Alaska.

*Randy adds Alaska and Mexico to point two.*

*Comment from Randy Fisher:*  
Well we want you to keep these points in mind when we discuss the research options today.

*Suggestion from John Chapman:*  
What if we did electronic reporting?

*Reply from Maurya Falkner:*  
We are trying to do that now in California. Most people are very supportive of the idea.

*Question from Mark Sytsma: Do most vessels have the capacity to do electronic reporting?*

*Reply from Keith Ward:*  
Yes, absolutely.

NEW SPEAKER:

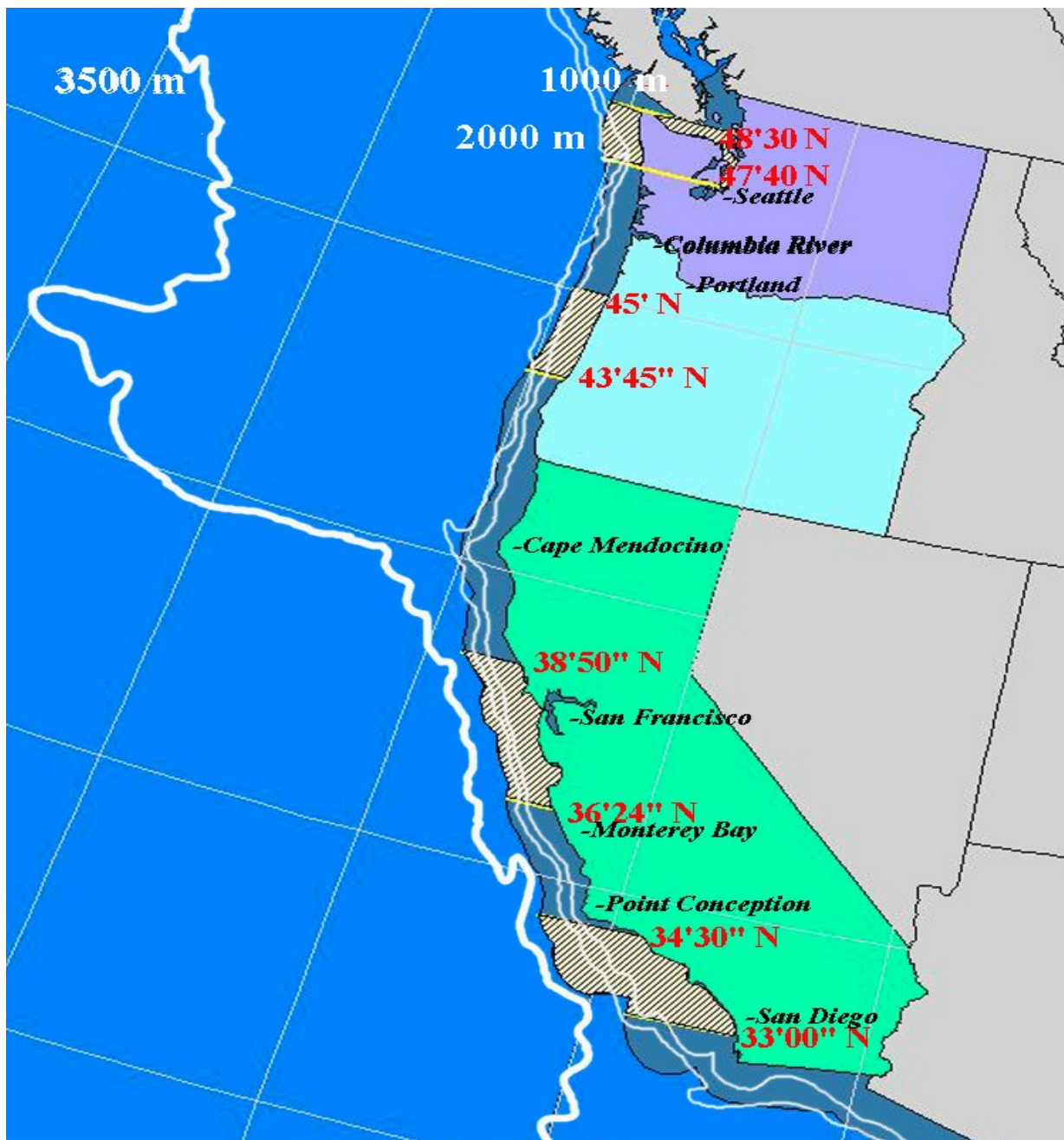
*Mark Sytsma, Portland State University Center for Lakes and Reservoirs  
Near-shore Physical Oceanography of the West Coast of North America: Implications  
for Ballast Water Exchange in the Management of Invasive Species*

This is basically a summary of a workshop that I recently attended with Stephen Phillips, Jordan Vinograd, Karen McDowell and three oceanographers to talk about ballast water management as it relates to physical oceanography. Specifically we were interested as it related to the problem of coastal shipping.

At this meeting everyone agreed that the best option for ballast water management available for coastal vessels is exchange right now. We all agreed that a universal coastal management plan is necessary to simplify the state-to-state management that is now in effect. So we decided that certain areas of the West Coastline are not suitable for ballast exchange (Exclusion Zones) due to: current flows (i.e.: direction, force, etc. that will encourage inoculation of the coast), or coastal environments that are especially sensitive to ANS invasions (i.e.: Wilderness sanctuaries, estuaries, wetlands, etc.).

In this meeting we generated a map of the suggested Exclusion Zones for ballast water exchange:

*Shows Map:*



From this workshop we also generated a list of research recommendations, which includes drifter studies, dye studies of ballast water dilution in ambient waters, and seasonal fluctuation in currents studies.

Jordan Vinograd is writing up a report from this meeting.

NEW SPEAKER:

*Karen McDowell, California Sea Grant*

As Mark mentioned I was also present at this meeting. We hope to have a follow up workshop this summer or fall. I would like to get biological oceanographers involved. It would be great to have all of the various stakeholders present to come up with a comprehensive plan for the West Coast coastal shipping ballast water management. The reauthorization of NISA will be influential in this process as well.

*Question from Maurya Falkner: Do you have any information on Mexican currents?*

*Reply from Karen McDowell:*

No.

*Comment from Maurya Falkner:*

I think it would be important to note that in the exclusion zones there can be no take-up or release of ballast in those zones.

*Reply form Mark Sytsma:*

Yes, the discharge is something we are worried about too.

*Comment form Karen McDowell:*

Right now, our report addresses seasonal changes in currents but the biological standpoint may compliment this physical standpoint as well.

*Comment from Marilyn Harlin*

From a biologist's standpoint it is alarming to think that the vessels may take on ballast in the exclusion zones too. They shouldn't take on or release ballast in those areas.

*Comment from Karen McDowell:*

I think it will be important to also study the ballast water residuals. They haven't been studied at all on the West Coast.

*Question from Dorn Carlson: Do your findings jive with the Beeton report?*

*Reply form Karen McDowell:*

The Beeton report focused on identifying alternate exchange zones for open ocean exchange. Once it was determined that there wasn't going to be any good alternate exchange zones, they didn't go into much more detail. The new report was focused on coastal ballast exchange. It has updated information on coastal currents from Barbara

Hickey based on her 1998 paper, along with up to date information from other researchers. It will also have much more detail on coastal processes and seasonal changes.

*Question from Paul Heimowitz: What if we had special lanes for special kinds of vessels?*

*Reply from Karen McDowell:*

Those kinds of issues will be addressed in the meeting this summer.

*Question from Randy Fisher: Isn't the important ballast water research on biology? Shouldn't the biological research be done before the oceanography studies?*

*Reply from Karen McDowell:*

The biological research won't be done in time for the summer workshop.

*Reply from Mark Sytsma:*

A lot of the current research is already done. The biology is questionable.

*Comment from John Chapman:*

The green crab will make it on its own because they have such a long larval life history. That's something that doing an exchange won't effect.

*Comment from Mark Sytsma:*

You're right. As far as research goes, this will be really for the purpose of risk assessment. We are just trying to reduce the risk, but we are certainly not expecting to eliminate it.

*Comment from Karen McDowell:*

Eventually everything will go everywhere. It is basically up to the stakeholders to determine what level of risk they are willing to accept. Does the benefit of coastal ballast water exchange (reduction of risk of introduction) outweigh the costs ships conducting the exchange and the potential cost of requiring ships to travel further offshore to conduct the exchange.

NEW SPEAKER:

*Dorn Carlson, NOAA, National Sea Grant*

Congress gives NOAA money for ballast water research. This year we met to discuss ballast water research and all of the federal funders attend. We tried to get a clear understanding of where there are gaps in research. It seems that most of the gaps are occurring with ballast water technology research. Some treatment technologies are not yet at the point where they can be tested on vessels. We are missing the chemical data and the data to understand the possible effects of this technology on the vessels themselves.

I am here to announce that I will be posting a formal request for research proposals within the next few weeks. NOAA wants to facilitate the collaboration with investigators and funders. The US Fish and Wildlife Service as well as the Maritime Administration (part of the U.S. Department of Transportation) also are offering support in this effort. The Maritime Administration has fleets on stand-by at all times. They want to do something with these vessels.

The one “catch” in this NOAA funding is that most of the money is targeted for the East Coast and Great Lakes regions. 10% or so can go to anywhere in the United States. I want to encourage the West Coast people to try for the funding. We have no limitations if the proposal is not region specific. We will accept collaborations with researchers on the West Coast and lab work as well. The Maritime Organization wants the researchers to know that the vessels are available for boat-based testing as well. We have almost two million dollars total available for the research. Fish and Wildlife has offered a quarter of a million dollars too.

Please watch our website for the formal notice and rules:

[www.nsgo.seagrant.org/research/nonindigenous.html](http://www.nsgo.seagrant.org/research/nonindigenous.html)

I can also put links on my web page as well.

I will try to send an e-mail out to everyone that is on my list as well.

The research restrictions should not be discouraging. Maybe if we get a lot of good proposals from the West Coast it will help Congress see the need to remove the restrictions. It is also important to recognize that any research, whether it be done on the East or West Coast, it will help us all in the overall goal of fighting invasive species. Ballast water is a huge ANS priority. We will also be having a hull-fouling workshop in July.

*Question from John Thornton: When is that workshop?*

*Reply from Dorn Carlson:*

I'm not sure about the exact date.

*Question from Paul Heimowitz: Is there a list of the distribution of the vessels available from the Maritime Organization?*

*Reply from Dorn Carlson:*

I think the Maritime Organization has vessels just about anywhere.

*Question from Denny Lassuy: Can someone use some of the FWS money for vessels on the West Coast and then the NOAA money for non-West Coast lab work?*

*Reply from Dorn Carlson:*

I don't think we have done it like that before, but you should try. Why not?

*Question from Mark Sytsma: Who will contract the money? What if we are a non-Sea Grant University?*

*Reply from Dorn Carlson:*

You don't have to be a Sea Grant University to receive the money. It's not a Sea Grant program, so why not try for it?

*Question from John Thornton: When is the San Diego Conference?*

*Reply from Dorn Carlson:*

I don't know off the top of my head, but you can find out on [www.marine2002.org](http://www.marine2002.org)

BREAK

NEW SPEAKER:

*Russ Herwig, University of Washington*

*“ETV: Environmental Technology Verification”*

This program is primarily involved with design and protocol for environmental technology. I want to start by stressing that this is a verification program, not a certification program. We study environmental performance characteristics based on fairness, objectivity and technology soundness.

We first defined the basic treatment technology as those technologies that are prefabricated or commercial ready treatment systems that are capable of doing a satisfactory kill or removal of all organisms in ballast water. The bio-performance of the technology is considered as well. This includes evaluating the power/space requirements, temperature/energy efficacy, operation and maintenance issues.

In protocol development experts and consultants were brought in to develop a final draft protocol. We have quite a ways to go before this is released.

*Shows flow chart for the treatment testing process.*

This testing process would be applicable to several different technologies.

The purpose and the scope of the protocol are for land-based systems only so far. The approach to developing the testing protocol was to provide sufficient challenge in generating the conditions to test the treatment technology with. In other words, we wanted to test the worst-case scenario. We looked at all available records on ways to verify the performance of the technology based on water quality and reports of the environment in a ballast tank. In our study we consider verification the efficacy on a basis of removal, killing, or otherwise inactivating all bacteria, protists, micro algae and zooplankton. Viruses were not considered in this study.

The first challenge lies in determining standards for water quality. The type of system was classified according to three conditions: 1) Type (based on increasing turbidity), 2) Fresh water (< 1 PSU), and 3) Marine (~ 33 PSU). Increased particulates and organic matter are associated with the latter two conditions.

The second challenge lies in the biological conditions. We test the systems with indigenous organisms and then “spike” the water with a surrogate organism. The proposed surrogate organisms include: bacteria (gram positive), zooplankton and protists (resting stage cyst form, dinoflagellates). However, the difficulty lies in culturing these organisms.

*Question from Mansour Samadpour: Are you using the spores?*

*Reply from Russ Herwig:*

Yes, but it is very difficult to pick out the perfect surrogate. We don't know enough about their biology. Bacterial spores are the most resistant so they would be the best surrogate to use.

*Question from Mansour Samadpour: Why don't you use the bacteria that the Public Health Department uses for their water quality tests?*

*Reply from Russ Herwig:*

They are not spore forming.

*Question from Mansour Samadpour: But, you have to meet their standards anyway don't you?*

*Reply from Russ Herwig:*

I agree but there are not enough environmental indicators for dangerous ANS to only use this one, especially when it is not spore forming.

The test approach in regards to duration and reliability of the technology included a run for 150% of the recommended duration. We want to do three tests: a treatment on uptake, on discharge and while in the tank. Any testing facility that we decide to use will have to facilitate all three-treatment options.

*Shows flow chart of the uptake treatment testing.*

First we treat the uptake, inject the organisms, pump up to 300 tons/hour and hold the water in the tank for five days in 300 MT tanks. Then we sample the discharge to evaluate the efficacy of the uptake treatment.

*Question from Evan Matthews: How accurate are these tests if they are only pumping such a small amount of water relative to what the average vessel can pump?*

*Reply from Russ Herwig:*

That is hard to evaluate in these land-based studies.

*Shows flow chart for tank treatment testing.*

The problem with this treatment system is the viability of the organisms, the resolution of the technology, and the enrichment approach. For the latter we incubate the water for 7-14 days and give the treatment media a plus or minus score for each organism. We propose the use of a dinoflagellate species as our indicator species. We have done tests to compare the sensitivity of this organisms with others use as an indicator species. We are now working on the development and selection of a rapid viability assessment for this species.

Here is an outline of our anticipated goal dates:

April of 2002 = Draft protocol completed

July 2002 = Final Draft complete

Nov. 2002 = Final Protocol Complete

March 2003 = Begin Testing

We do request any feedback you all might have on suitability, standards, and other comments to be submitted to [www.epa.gov/etv](http://www.epa.gov/etv) or [www.nsf.org/etv](http://www.nsf.org/etv)

Ray Frederick and myself are willing to take any comments as well. My e-mail address is: [herwig@uwashington.edu](mailto:herwig@uwashington.edu)

*Question from Scott Smith: Do you have a facility yet for your testing next year?*

*Reply from Russ Herwig:*

No, not yet. To be honest, I doubt that the testing will be ready by that anticipated date.

*Question from Mansour Samadpour: How do you plan on certifying the treatments? What will be your basis for determining that the water is clean?*

*Reply from Russ Herwig:*

It is not a certification; it is a verification process. We will determine the standards based on the worst-case scenario with data to back this standard up. This is still in pre-draft stages.

*Question from Group: How have other ETV sites been started?*

*Reply from Russ Herwig:*

I'm not sure. I think vendors pay fees to be able to run the tests on the vessels.

NEW PRESENTATION:

*Russ Herwig, University of Washington*

*"Marrowstone Island"*

The Western Fisheries Research Center has developed its Research Station at the abandoned Coast Guard station on Marrowstone Island. They were given \$500,000 last year and anticipate the same amount this year for ballast water research. The future of this funding is questionable, but we do know that we have the money for one more year.

We have been collaborating with Northeast Midwest Institute through Allegra C.

We have been working on a bench-scale evaluation of UV irradiation as a treatment process.

Our research partners include: Allegra C., Jim Winton, Russ Herwig, Jeff Cordell, Dave Wright, Chip Latchley and Ivon Knight.

Our past research has been done on fish disease work, and near-oceanic conditions.

In our recent experiments we have been using UV light on bacteria, phytoplankton, and zooplankton. We are concerned with regrowth after exposure. The dose response curves determine the dosage and duration.

We had an algal bloom last year, so that slowed our work, or at least altered it quite a bit. Jeff Cordell is the one who really has done all the work on the zooplankton identification.

A tool we have been using is a “Collimator.” We are able to give the water a known intensity of UV treatment with small volumes in a no flow situation. We are also able to vary the exposure times and measure dose responses.

Another tool we use is a capillary flow reactor. This tool is designed for bacteria and viruses. We believe it may be applicable to plankton as well though. This tool is useful because we are able to handle larger sample volumes.

A summary of our results is as follows. Zooplankton are not as sensitive as others. There is a notable reduction in viable bacteria in both techniques. In zooplankton the UV exposure seemed to induce spawning, which is obviously counter-productive.

We did several UV microbiology experiments with the ambient seawater off the Marrowstone Island. In general the number of viable organisms go down as exposure times increase. However, There is often a rapid regrowth 48 hours after exposure.

*Question from Mar Sytsma: Did you retest the organisms with a second exposure after the initial exposure?*

*Reply from Russ Herwig:*  
No.

*Question from Monsour Samadpour: Why don't you look at the technologies used for drinking water cleaning?*

*Reply from Russ Herwig:*

These doses of light are less than have been used to clean water on cruise ships. It is not the same problem.

*Question from group: So you are only able to damage the organisms, not kill them?*

*Reply from Russ Herwig:*

That's correct. We really want to run more tests at a much higher dose and exposure. Right now the organisms are able to self-repair any damage inflicted by the UV exposure.

*Tisbe* is one tough copepod. We think that this species would be a good bio indicator for the success of the technologies because it is able to withstand such high dosages as 200 mwsec. In fact, it seems to increase its fecundity. This is the exposure that we are able to do in the Collimator. The exposure must get very high to kill them. Our control is no light exposure.

So our proposed activities for 2002 are to increase the light intensity on these experiments. We also want to do some experiments with filters so that only the eggs of these organisms can get through. Possibly we could take advantage of automated identification systems and do some shipboard testing as well.

*Question from Group: Where and how will you do the onboard testing?*

*Reply from Russ Herwig:*

I'm not sure; right now we are talking with Maurya from California to see how they have done it.

*Question from Group: Will there be a viable ETV station on Marrowstone Island?*

*Reply from Russ Herwig:*

I don't know.

*Comment from Scott Smith:*

We have been given 1.2 million dollars to that. We might possibly do this on a more global scale as well.

NEW PRESENTATION:

*Russ Herwig, University of Washington*

*"School of Aquatic Fisheries Sciences: Ozone and UV Exchange"*

We, at the University of Washington have a Ballast Water Research Team. We were able in the last year to do some experiments on board a vessel named the *Tonsina*. These experiments involved using ozone in the tanks of the vessel to see if we can remove, kill or inactivate the number of viable organisms in the ballast water. We also have been

involved in the UV experiments. We have done some sampling of the vessels entering Puget Sound as well.

The University of Washington Ballast Water Research team consists of: Jake Perrins, Jason Taft, Olga Kolata, and Benjamin Paulson.

The Ozone treatment experiments on the *Tonsina* were done in May 2001, September of 2001, and one more is to be done in November of this year.

The *Tonsina* is a real commercial vessel, so we really work on her schedule. We hope to continue this work after this year in collaboration with California and their research projects. Bill Cooper is the PI for this ozone project.

The *Tonsina* is owned and operated by the Alaskan Tanker Company, LLC. She is a double hull tanker and is 869 feet long. British Petroleum installed the tubing and plumbing on the vessel in order for the ozone to be pumped into the tanks. Basically we were involved with onboard sampling of the tanks after various exposures to the ozone.

Our biological procedures were as follows. The ozone treatment was generated onboard the vessel. The control tank was not exposed to any ozone. We sampled at different depths while the tanks were being ozonated and before. No sediment was collected in our sampling. We also ran a zooplankton net through the tank and Jeff Cordell was responsible for identification of the zooplankton while onboard the vessel. Greg Ruiz was interested in the phytoplankton sampling. We also ran caged animal assays. We put caged animals into the tanks and exposed them for 10 hours in the ozonated tanks after they were acclimated to Puget Sound water of course. Then we remove the organisms to see what has survived the 10 hours of exposure.

The results of the microbiology section are as follows. Ozone works really well, especially at the top of the tank. The bottom of the tank did not get quite as much ozone exposure due to inadequate distribution of the ozone in the water in the tank. No microorganisms were viable after exposure, even after a month at 10 C. Most of the zooplankton were killed.

Of the caged animals that were tested, all of the crabs were still alive. All amphipods were very alive. The Mysids were killed at the top of the tank, but not at the bottom. I think the crabs will die after time. I doubt they would be able to produce viable offspring.

*Question from the Group: How much ozone was used?*

*Reply from Russ Herwig:*

I don't know off the top of my head, but I can find out for you.

*Question from Monsour Samadpour: Have you tested the toxicity in the surrounding waters after the ozonated water has been deballasted?*

*Reply from Russ Herwig:*  
No, not yet.

*Question from the Group: Was there much corrosion in the tanks?*

*Reply from Russ Herwig:*  
No, not from ozone anyway. Ozone has such a short half-life that I suspect that it will have very little impact.

*Question from the Group: Have there been any concerns with the impacts on health and safety?*

*Reply from Russ Herwig:*  
Yes. I am sure it was there in the air. I could smell it.

We are continuing these studies for the next two years so we hope to ask more questions like these.

As I mentioned, we have been doing sampling on the vessels in the Puget Sound for the last year as well. The Sound gets about 3,500 ships/year. The main types of vessels we see are tankers and bulk carriers. Bulk carriers carry a lot of seawater in their ballast tanks. We are using salinity as our means of monitoring right now to see if the vessels have done an exchange or not. In the water samples we collect we run basic water quality tests on them: fecal coliform, total number of bacteria, and microorganisms should be sampled for in the future. Some crews let us test their vessel's ballast, but it is on a purely voluntary basis. Some of the grain terminals' allow us to sample there too. These container vessels have much less ballast though. We have been able to sample only 6 vessels.

*Shows schematic of ballast water tanks.*

As you can see, vessels have "ribs" in their ballast tanks. This makes sampling very tricky because there are lots of places for sediment to get stuck. Another problem is that identification of these microorganisms is extremely tedious and difficult. In the larval stages of the organism's life it is often impossible to do without some kind of genetic analysis.

One vessel of particular interest to us was a bulk container vessel that we were able to sample. Its last port of call was in Japan and they say they underwent an exchange. The method used was ER. We sampled its cargo hold water and did three net tows.

We found some surprising results. One was an Asian coastal copepod that was found in very high numbers in our samples. This implies that the vessel either did not do an exchange or the exchange method does not work very well.

The challenges that we face in this study include: getting on the vessels, determining a treatment technology that is effective for the volumes of water that we are dealing with, mixing of a chemical (ozone) within the tanks, targeting all of the organisms, and development of risk analysis measures.

BREAK

NEW SPEAKER:

*Robyn Draheim, Portland State University  
"Lower Columbia River ANS Survey"*

The Lower Columbia River is currently the focus of an effort to characterize the Aquatic Nonindigenous Species present in the system to determine the invasion history, rates of invasion, and invasion vectors.

This baseline biological invasion survey was developed by researchers at Portland State University, Oregon State University, and the University of Washington. We began work on it in October of 2001.

The objectives are to characterize the lower Columbia River which will provide a baseline for: calculating the rates of invasion in the river, evaluating the efficacy of the ballast water regulations and contributing new information to ongoing regional ANS studies. We hope that this study will facilitate comparisons with work done on Prince William Sounds, Puget Sound, Washington Coastal Estuaries, Coos Bay, and San Francisco Bay as far as establishing distribution patterns, etc.

*Shows map of study area.*

As you can see this is fairly extensive study area. It includes 146 river miles (from mouth to Bonneville Dam). This includes all of the river that is affected by tidal influences.

The project components are a literature review (2001-2002), taxonomic field survey (2002-2003) and a final report in 2003.

The first stage of the project, the literature review is nearing completion and awaits Review by the Technical Advisory Committee. This committee consists of local, regional and national experts on biological invasions of aquatic systems, taxonomy, and regional resource management. The survey design, progress and results of this research are being produced in consultation with the Technical Advisory Committee. This week we will begin sampling at the locations chosen for the 2002 survey.

The goals of the literature review were the following: to compile a preliminary list of nonnative species, to identify taxonomic gaps in previous studies, to identify poorly studied habitats, to identify potential ANS "hot spots," and to identify areas for long-term sampling. I have also used the literature review to begin compiling information on each

of the ANS species reported in the LCR, date of introduction, vector, distribution and impacts if known.

The three major studies that have been done in this region include: the Columbia River Estuary Data Development Project, Bi-State Water Quality Program, and the Environmental Monitoring and Assessment Program-West Coast Pilot. From these studies we have been able to compile a preliminary list of aquatic nonindigenous species and cryptogenic species we believe have been introduced into the Lower Columbia River. This has also been helpful in compiling a preliminary inventory of those species that are native to the LCR, with additional information from the site-specific studies of areas, especially embayments in the estuaries.

*Shows a summary of the ANS in the Lower Columbia River.*

Cryptogenic species are defined as those species that there is not enough information on to determine if they are native or not. Both invasive plant populations that are listed as cryptogenic may be the result of nonnative cultivars/genotypes but there is simply not enough information to determine that. The polychaetes are probably misidentified because the taxonomy of worms is extremely difficult to decipher.

*Shows examples of the ANS in the LCR and cryptogenic species of the LCR.*

The taxonomic field surveys are to begin this summer and continue next summer as well. We will be building on the literature review. We will attempt to characterize the poorly studied taxa and habitats, establish long-term sampling stations, and utilize 2002 results to develop the 2003 survey.

Marine, estuarine and freshwater invertebrates and aquatic macrophytes will be extensively sampled at all sites. We will utilize experienced ecologists to survey the major habitats and communities and catalog each species collected.

In addition we will focus our sampling efforts on a taxa-specific field collections at appropriate locations. The objective of this strategy is to utilize the taxonomic experts to sample and analyze key taxonomic groups that are difficult to identify, resulting in their being under-studied on the Lower Columbia River. These efforts will focus on such poorly studied taxa as: oligochaetes, polychaetes, epibenthic meiofauna, small crustaceans, gastropods, and freshwater bivalves.

We are working with the Smithsonian Research Institute on the design of the fouling plate surveys.

If possible, reexamination of archived collections of ANS and cryptogenic species not found in the recent surveys will allow us to determine if collections contain mis-identified species or introduced species that failed to become established.

The three main areas for the field surveys are: the Columbia River Estuary, Willamette River Confluence, and the Longview/Kelso area.

*Shows examples of photos from each area.*

The final report will be presented in fall of 2003. This report will include a final list of the nonnative species, relate the history of invasions on the Lower Columbia River, estimate invasion rates, describe pathways of invasion and for each ANS we hope to characterize a timeframe, source, vector, distribution and impacts of their invasion.

The project is funded by the US Coast Guard and the US Fish & Wildlife Service.

NEW SPEAKER:

*Mark Sytsma, Portland State University*

*Columbia River Aquatic Nuisance Species Initiative (CRANSI)*

CRANSI was instrumental in getting the funding for Robyn's project and for getting \$500,000 appropriated for ballast water research on the Columbia, which is anticipated to begin this summer. We are also collaborating with SERC on this, as Robyn mentioned.

Right now we are really in the preliminary scope of the work on this ballast water research project. We will be verifying exchange using a multivariate approach. Right now we are in the process of developing the protocols for doing the ballast water sampling. The primary goal is to develop a discriminate function for differentiating between coastal and mid-ocean exchanges. We are collaborating with developers of this instrumentation.

The scope of the work would involve testing for organisms in the ballast tanks. The proposed elements for a verification of exchange include: literature review, culturing of test organisms, and then developing means for exterminating organisms in ballast water. The four main vectors for ANS in vessels are: coastal trade ballast tanks, hull fouling, barge traffic and transoceanic vessel ballast water.

The Coast Guard has given us funding for the next two years.

*Question from Scott Smith: What is the process that will be used for doing this evaluation?*

*Reply from Mark Sytsma:*

The Coast Guard has very clear parameters for what they want to be done in this research. We must also do what CRANSI has proposed as well though.

*Question from Scott Smith: What is the status of the SERC report?*

*Reply from Mark Sytsma:*

I have a copy of it if you need one.

Basically we have to define what has been done and what needs to be done. After that we have very detailed protocol to meet Coast Guard's requirements.

NEW SPEAKER:

*Maurya Falkner, California State Land Commission  
"Overview of the West Coast Demonstration Projects"*

We were given \$150,000 from the Department of Fish and Wildlife. The Port of Oakland matched that amount. The money was designated to be used to evaluate ballast water treatment systems. However, this is not enough money for anyone to do this kind of boat-based evaluation. So we formed a partnership with Matson Navigation, Polar Tanker Vessels, and Princess Cruise Lines to make this happen. We got together and talked about the requirements for such research to be done.

From this meeting we were able to pick two vessels to perform these studies on. One of the vessels is a container vessel called the Sea Princess. We put an Optimar System on board. This system has a filter system, cyclonic separator and a UV exposure (130mw/s<sup>2</sup>) given in two doses per tank.

The goals of this project were to determine the feasibility of getting a treatment system out there, to figure out the energy/space restraints and to assess the operational restraints. We were to report these findings to the funders addressing the restraint issues.

We have a contract with the Sea Princess. She is a vessel with 11 ballast tanks holding up to 2,300 m<sup>3</sup> of ballast. She has two tanks to pump this ballast. This is obviously a comparatively small vessel. The treatment system is only a one-pump system.

The water comes in through the pump where it enters a "sludge port" and the cyclonic separator, then to the UV exposure, through pipes and back to the tanks. The solids that are separated get discharged in the source water. This discharge valve is closed when the ship is underway and when the ballast is discharged. The system was evaluated in October by the California Research Team.

The results of the research are as follows. The researchers rode the vessel from LA to Mexico and back, working 20-hour days, doing many measurements every hour. They tested for chlorophyll A, HPLC, P Modular Fluorescence, carbon, Nitrogen, ETS, Phytoplankton and Zooplankton. Because the Sea Princess never goes to mid-ocean an open-ocean exchange was not possible. The control was no treatment. Unfortunately they found no difference between the treated and un-treated ballast.

There were many problems with this system. One was that there was some kind of black oily substance found in all of the pipes. The piping for the gray water was not separated from the black water tanks in this vessel until recently. This may have been a problem. There was a leak in the UV chamber so when we opened it up it had completely filled

with rust and corrosion. We want to do a fair evaluation, so we feel that we must try to fix these problems before submitting a report on the efficacy of the treatment system.

The second vessel we used is a container vessel called the *Pheifer*. The final installation was just completed, but we have postponed its first trial to double check for any problems like the ones we encountered on the *Sea Princess*. This vessel is much larger than the *Sea Princess* as well. We want to run the system as much as possible as well. Initially we had some problems with a “hummer effect” which caused vibrations, which broke the tubes. So they will fix that and start again. The first evaluation is set for May 3<sup>rd</sup> of 2002. We will have two control tanks, two treatment tanks and two exchanged tanks.

Issues we have with this research are the accuracy of the logbooks, electrical problems, and a lack of an automated system. We need an automated system to record the time, date, and GPS location for every time the treatment systems is activated or deactivated.

*Question from Mark Sytsma: Does the treatment process slow the vessel down?*

*Reply from Maurya Falkner:*

We will try to figure this out once a working system is in place. We really want to automate the system eventually. We are not quite to that point yet. Every the system is turned on alarms go off, so this is problematic when the system has to be turned on at night on a cruise ship or something like that. We also want an auto-shut-off option as well.

*Question from Group: I notice that this is a Norwegian system on a US vessel. Does this cause any compatibility problems?*

*Reply from Maurya Falkner:*

No. The system is built here in the US. The CG doesn't care as long as it is ABS certified.

BREAK FOR LUNCH

*Randy Fisher, PSMFC*

Welcome back. Now comes the hard part. We need to define our research priorities as a group. PSMFC has decided to host this PBWG meeting in part because we have money to invest in research. We want to make sure that our money will go to a good cause, and worthwhile efforts in ballast water research.

Is investment in a place like Marrowstone what we need? Is it worthwhile to invest our efforts on that type of facility?

*Maurya Falkner:*

Yes, it is important to invest in that kind of facility to get the background we need to improve the technology. It is important to fill the gaps in our knowledge. There are not a

lot of people out there testing technology. But, I think the research needs to be done on a vessel, not in a land-based facility like Marrowstone.

*Jim Townley:*

Why concentrate all of the research in one place? Why do we need to do it all on the West Coast? Is the biology more prevalent out here?

*Maurya Falkner:*

I think there is a lot more to this problem than the biology involved. It would be nice to have large scale testing, but it is important that the tests be done under “real” conditions on a vessel, not in a lab.

*Jon Stewart, Marine Environmental Partners*

From the standpoint of the vendors we need to know what standards we are trying to meet. We need ETV programs too.

*Dorn Carlson:*

There are a few facilities on the East Coast. Maybe they could help fill gaps in research after lab analysis of the technologies is complete.

*Scott Smith:*

Do you know if the ETV’s meet the needs for facilities that the USCG requests?

*Dorn Carlson:*

No, it is still a need.

*Scott Smith:*

It seems that all of the facilities now are all different in what capacities they have.

*Mansour Samadpour:*

With the filter industry, I know that they put out bids to see who can treat the water. If the companies put things together like that for an on-site testing facility we won’t need land-based facilities.

*Jon Stewart:*

Only entrepreneurial companies are willing to do that kind of thing. No one in the industry can do scientific testing on a vessel out of our own pockets. We will do it when the technology is available, and we will help along the way, but I don’t think we will do it all ourselves.

*Russ Herwig:*

I went to a meeting recently with various vendors and the overwhelming consensus was that there are no standards set for them to strive for. Once the standards are set, then we can strive for improving technologies. I believe we need a facility that can culture the surrogate species to run tests on. If it all could be in one location that would certainly speed up the process.

*Dave Schneider:*

We need to make sure that the product will have a market. Whatever you make has to be working and has to be shown that it will bring in money. Once we get past that hurdle then the shipping operators will invest in it.

*Bradly Chapman:*

The industry wants studies to back up the technology before we will invest in anything.

*Evan Matthews:*

We need to test the testing procedures as far as monitoring and maintaining these technologies. That way we can make sure that the technology is meeting standards.

*Randy Fisher:*

Ok, well it sounds like we should go through the points I brought up at the beginning of the day again. Only now, lets address the problems with these issues.

1. Reporting should be made mandatory but should reflect the current state reporting system. It should keep the Coast Guard involved. It should also list any exemptions necessary for each state.
2. Oregon, Washington, *Alaska, Mexico* and Canada have no money for reporting systems.
3. Coast shipping is of great concern.
4. Concerns over standards reflecting a numerical invasive removal requirement are an issue.
5. There is no agreement between the states and BC on who gets checked (i.e.: in regards to boat size, tanks, etc.)
6. There needs to be better coordination between Oregon and Washington in regards to the Columbia River traffic.
7. Shore side treatment is not really a practical option.
8. There needs to be an agreement on appropriate indicator species.
9. There needs to be an agreement on treatment technologies and development

*Scott Smith: In regards to Point 3,*

We don't have unified coastal management because CRSO and Alaska Ports lobbied against our proposed program. So for this to happen we need to cooperate.

*Maurya Falkner:*

California does agree with the coastal issues and does want to help.

*John Chapman:*

Maybe they didn't know the issues well and that's why they lobbied against it.

*Cate Holdren:*

The Coast Guard is the leading agency, so I think the bottom line is that we want them to take the leadership role.

*Scott Smith:*

Well the Coast Guard only wants mandatory reporting for everyone outside of the EEZ.

*Maurya Falkner:*

It should be all vessels have to report, not just those outside of the EEZ.

*Keith Ward:*

Can I report back to the USCG that the PBWG wants all vessels to have mandatory reporting?

*Group:*

Yes.

*Karen McDowell:*

We need to really focus on research priorities, not mandatory reporting.

*Randy Fisher:*

Yes, we will get to that.

*Scott Smith: In regards to Point 4,*

Randy, tell DC that we need money for this research. We have proposed the Harbor Maintenance Tax fund for money. We can help with more money if that gets passed.

*John Chapman:*

Why don't Oregon and Washington charge a fee like they do in California?

*Jim Townley:*

We pay 118 different fees already. We add any more and we will lose our market share. We can't do that. We need to encourage more ships to come here.

*Dave Schneider:*

We look 80 miles north in Washington and we have to deal with a major competitive port in another country. We can't charge more fees for the same reason.

*Jim Townley:*

Due to international globalization of trade we can't charge a fee. We won't get anything more from doing that because they won't come to the Columbia River when they can go somewhere else and get more out of their stop there.

*Scott Smith:*

How you feel about the Harbor Maintenance Tax? It basically just means better use of the taxes we have.

*Jim Townley:*

We would get a lot out of it, while Puget Sound wouldn't. They haven't agreed, but we can certainly discuss it more.

*John Chapman:*

Why is Southern California doing so well?

*Jim Townley:*

Volume.

*Randy Fisher:*

Basically they were going to either have to do an NPDES permit for every vessel or a fee. They chose the fee for obvious reasons.

*Mark Sytsma:*

Money is the bottom line. The CG does a lot of work but they have no money in their budget for research and development. If we do that part it will benefit us all.

*Randy Fisher:*

There is some money out there, so my question to you all is what needs to be done? Is there duplication in research going on?

*Mark Sytsma:*

There is no duplication going on.

The USCG should not ask us to do stuff that has already been done. But we have to remember that this work is still preliminary. We need to figure out the best way to go about the research.

*Paul Heimowitz:*

There are lots of questions here. But the problem is national in scope. If we can get special projects going that's great for the West Coast.

*Dave Schneider:*

If this is a national problem, I agree our goal is to move towards technology. That is what we need to focus on. I think it sounds like our next step in doing that is to set a standard. I think it's great that guys like Evan Matthews from Foss is here. They obviously want to be a part of making this decision. I think we need to stop focusing on the efficacy of exchange if we are moving towards technology. The scientists need to evaluate the technologies, not determine which ones are good. All we need to worry about is what the water looks like that is coming out of that boat.

*Jon Stewart:*

We do need standards. Right now we can look at a lot of different reports and get a lot of different values for standards and costs. We need a cost benefit analysis for research in order for capital expenditure to follow suit.

*Scott Smith:*

It is easy to set a standard, but it is hard to decide how to measure it. We need structure. I believe that means that we need a facility with a land based system to set that standard. I hope we can make that facility, maybe from Marrowstone.

*Jeff Cordell:*

In regards to the exchange issue, I don't think it can still be thought of as a long-term technique for management that is economic and scientifically viable.

*Dave Schneider:*

I don't think that will get us where we need to be. We want to set standards for treatment. Maybe exchange could work for some part.

*Jeff Cordell:*

The research on this is very disjunct. It is very frustrating. There will always be exchange experiments. But exchange will never work for micros. Can't we just stop with exchange stuff all together?

*Evan Matthews:*

Can we have a mobile source like the IMO suggested in their draft legislation?

*Randy Fisher:*

Maybe California can answer that.

*Maurya Falkner:*

I don't think technology is really being stalled by a lack of standards first of all. And in response to Evan's question, I don't think a mobile source can be done yet. The UV systems cost way too much. I think we will have to deal with the fact that exchange linked to a treatment system is most likely the solution. As long as we're stuck with exchange as the standard, we have to deal with it.

*Karen McDowell:*

There are no standardized testing protocols for evaluating treatment technologies, which makes it difficult to evaluate and compare various technologies. The money should go to standardizing testing protocols and creating treatment standards.

*Maurya Falkner:*

NOAA workshops show the data, but it is impossible to compare because it is shown in all different ways, using all different kinds of protocols.

*John Chapman:*

There are two standards for risk assessment right now: kill everything or slow the invasion. There are no good measures of rates of invasions. How do we know if the work we have done is helping at all anyway?

*Stephen Phillips:*

All NOAA has to give for West Coast ballast water research is up to \$250,000. We want to know what is the most important research question (s) to get answered so we can put our money towards that.

*Maurya Falkner:*

It's hard to get stuff done regardless of how much money you have.

*John Chapman:*

Well, what is it that we really care about?

*Randy Fisher:*

Well what are the potential costs of ANS if we do nothing?

*Russ Herwig:*

At Dorn's meeting a guy from Michigan said that the cost of zebra mussel invasions in the Great Lakes is in the billions now.

*Refer to table one in the handout:*

*Group:*

To understand the cost of any new standard we must first know what is included in the cost. It should be easy to evaluate a template for cost.

*Maurya Falkner:*

The cost evaluation has been done, but it might not be a fair metric once you consider the different types of vessels.

*Randy Fisher: I*

Ok, well in trying to generate a research proposal, what should it look like?

*Scott Smith:*

I'm not sure what is holding up the standards now, but we need to be working towards technology. I think we should focus our resources towards verification and certification of treatment technology. That seems to be the best way to get the most bang for our buck.

*Maurya Falkner:*

I think the studies should be just that, studies, not focused on certification. Vessels that we use are approved just for use in studies of this kind, nothing else. I am not comfortable with the level of testing being done but I don't have any suggestions to improve that. It seems that the standards should be based on an indicator species. Maybe concentrate our research questions on this.

*Scott Smith:*

Maybe a vessel could be approved for studies for a certain amount of time.

*Maurya Falkner:*

Not certification though.

*Scott Smith:*

But, a program could build from the initial studies to include certification.

*Mark Sytsma:*

We need to understand the difference between descriptive science and research. This is all descriptive science. Descriptive science helps direct research, but research itself should be answering a question like, “Which organisms are the most resistant?” or “What technology is most effective in killing these organisms?”

*Maurya Falkner:*

Applied research is important, yes, but we also need to set priorities.

*Mark Sytsma:*

Both applied research and descriptive science can go on simultaneously. We need to recognize that we will be living with exchange for a long time.

*Dorn Carlson:*

It helps me to listen and not inject my opinions. A standard is needed so we know what will stop or prevent invasion. It is time to work on alternative technologies, but it is also going to take time. A standard that will work right now is not reasonable. We also need a coastal standard. We don't want to find ourselves in a situation where the vessels won't be able to meet the standard that we set.

*Karen McDowell:*

Should the West Coast have national standards research priorities or should we only focus on our regional ones (priorities)?

*Paul Heimowitz:*

If there are no West Coast specific priorities, then what is the point in doing this? Let's focus on the regional aspects.

*Robyn Draheim:*

I suggest that we set up a person, maybe a graduate student, to set up a database with all of the West Coast's collective data for at least the last year. Then we could have one unified place for all of the researchers to go look for information that could be very useful in establishing regional standards.

*Karen McDowell:*

Should the West Coast have national standards or only focus on our regional ones?

*Dorn Carlson:*

It is important to see the National priorities too. That way if everyone submits the same ideas as national priorities the issues could get attention. Maybe it would free up more money.

*Evan Matthews:*

There is a huge lack of funding for the West Coast. If all of our lobbyists are aligned in their issues, it could help a lot.

*Jon Stewart:*

Are there stats about what money is being spent on what and where?

*Randy Fisher:*

Maybe we could compile that. Let's have another meeting. We will work on West Coast priorities for research and circulate that.

*Dave Schneider:*

We need to agree on treatment standards not technology.

*Jim Townley:*

A major sales point could be to make sure that we all are capable of getting such good compliance on the West Coast. Also, I think we need to have goals set to have things done by next fall's meeting. Let's decide what our targets are. Maybe we should set up subcommittees before fall and get some things accomplished.

*Paul Heimowitz:*

We should have a list of regional and national priorities for research. Let's list what has been done, what needs to be done and fill in that part of the picture. We should have an inventory type list. This will help our argument for the West Coast to get money.

*Evan Matthews:*

Let's consolidate our information. Coordination and info sharing seem to be two things lacking from this group.

*Paul Heimowitz:*

We did this before with work groups and assignments, but unless we have a staff, it's not going to happen. We need some momentum.

*Randy Fisher:*

Stephen, Paul, Mark and I will meet to discuss how we will make it all happen.

*Cate Holdren:*

I think there has been a reluctance to go into partnerships with vendors. To make a difference we need to make sure that our applied research means something in the big picture. Maybe we should have model ships with these treatment technologies on board more often. We need to coordinate the work so that the group knows what is happening. Let's circulate the ideas. The we should have a meeting after the oceanographers' meeting this summer.

*Scott Smith:*

We should get all of the researchers together.

*Jon Stewart:*

I am concerned with redundancy in research. It seems to have a very fractured structure. I agree with the idea of a regional data collection. It might help unification of the West Coast and research.

*Jim Townley:*

I think it can certainly be done on a regional level.

*Dorn Carlson:*

As Paul said, even if the research that is funded is not out here, we all benefit. Keep this in mind.

*Randy Fisher:*

Ok, that's all we have time for. We will send out a list of the research priorities that we have heard. Thank you all for coming.

CLOSING